PROJECT MANUAL

STAGG HS
AG MECHANICS SHOP RENOVATION

1621 Brookside Road
Stockton CA 95207

Stockton Unified School District

1944 El Pinal Drive
Stockton, CA 95204

DSA Application No.

02-122192

06/06/24

Community Architecture, Inc.

3701 Business Drive, Suite 200
Sacramento, CA 95820
Phone: (916) 365-9655

Project No.: 2023-014.00

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122192 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 06/27/2024

SECTION 00 01 10
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INTRODUCTORY INFORMATION

STOCKTON UNIFIED SCHOOL DISTRICT
REQUEST FOR QUALIFICATIONS AND PROPOSALS
LEASE-LEASEBACK CONSTRUCTION SERVICES
Stagg High School Agriculture Mechanics Shop Renovation Project
RFQ/P # 24.043

Stockton Unified School District ("District") is seeking proposals from qualified persons, firms, partnerships, corporations, associations, or professional organizations to provide constructability review, value engineering, master scheduling, cost estimating, budgeting, and construction services for the development and construction for the **Stagg High School Agriculture Mechanics Shop Renovation Project** ("Project"), in accordance with the lease-leaseback structure set forth in Education Code section 17406 et seq.

The Request for Qualifications and Proposals ("RFQ/P"), which includes instructions for its completion, is enclosed for your consideration. Respondents to this RFQ/P shall submit a completed Statement of Qualifications ("SOQ") along with the Proposal (collectively "RFQ/P Packet"). Respondents must mail or deliver five (5) bound copies, one (1) unbound copy, and one (1) electronic copy on CD or DVD or USB flashdrive of the RFQ/P Packet conforming to the requirements of this RFQ/P to:

STOCKTON UNIFIED SCHOOL DISTRICT
ATTN: Tony Lopez
2141 Robindale Ave.
Stockton, CA 95205
RE: RFQ/P # 24.043

ALL RESPONSES ARE DUE BY 3:00 P.M. On Friday, August 16, 2024. Oral, telegraphic, facsimile, telephone or email RFQ/P Packets will not be accepted. RFQ/P Packets received after this date and time will not be accepted and returned unopened.

A mandatory information meeting will be conducted on **Friday, July 26, 2024**, at **10:00 A.M.** The meeting will be held at **1621 Brookside Road, Stockton, Ca. 95207.**

Questions regarding this RFQ/P may be directed to **Tony Lopez/ tonylopez@stocktonusd.net** , and must be submitted in writing on or by **2:00 P.M. on Friday, August 2, 2024**.

This Project is subject to labor compliance monitoring and enforcement of compliance with prevailing wage requirements by the Department of Industrial Relations pursuant to Labor Code section 1771.4. Contractors of all tiers must be currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. All Respondents must be prequalified by the District in accordance with Public Contract Code section 20111.6. First tier electrical, mechanical and plumbing subcontractors are required by Public Contract Code section 20111.6 and must be prequalified prior to the time subcontractor bids are submitted. To comply with the skilled and trained workforce requirement pursuant to Public Contract Code section 2600, all contractors must agree to be bound by the District's Project Labor Agreement. The agreement can be found here: https://www.stocktonusd.net/cms/lib/CA01902791/Centricity/Domain/148/SUSD%20PLA%20Feb%2011%202020.pdf

If the District issues addenda to this RFQ/P, Contractors are solely responsible for and must acknowledge receipt of addenda in the Contractor's SOQ. Failure to acknowledge and respond to any addenda issued by the District may, in the District's sole discretion, render the Respondent's SOQ to be deemed nonresponsive and may be rejected.

RFQ/P SCHEDULE SUMMARY

DATE	ACTION ITEM
July 12, 2024	**Release and advertisement of RFQ/P # 24.043.**
July 26, 2024 at 10:00 A.M.	**Mandatory Site Walk/Informational Meeting.**
August 2, 2024 at 3:00 P.M.	**Last day to receive written questions from Respondents.**
August 9, 2024	**Last day for District to issue addenda to answer questions/clarifications.**
August 16, 2024 at 2:00 P.M.	**Deadline for submissions in response to RFQ/P #24.043.**
Week of August 19, 2024	**Release of shortlist qualified Respondents and interview notifications.**
Week of August 26, 2024	**Interviews of qualified Respondents.**
September 10, 2024	**Board Award of L/LB Contract**
September 11, 2024	**Notice of award to selected Contractor.**
September 17, 2024	**Notice to Proceed with Pre-Construction Services.**
October 9, 2024	**GMP Due.**
October 22, 2024	**Board Acceptance of GMP.**
October 23, 2024	**Notice to Proceed with Construction**

The District reserves the right to change the dates on the schedule without prior notice.

*** Friday, July 26, 2024 – Mandatory Site Walk – 10:00 A.M.***

Stagg High School, 1621 Brookside Road, Stockton, Ca. 95207

STOCKTON UNIFIED SCHOOL DISTRICT
REQUEST FOR QUALIFICATIONS AND PROPOSALS
LEASE-LEASEBACK CONSTRUCTION SERVICES

I. INTRODUCTION

Stockton Unified School District ("District") is a California public school district.

This Request for Qualifications and Proposals ("RFQ/P") defines the services sought from Respondents and generally outlines the Project requirements. Respondents to this RFQ/P shall submit a completed Statement of Qualifications ("SOQ") along with the Proposal (collectively "RFQ/P Packet").

I. PROJECT DESCRIPTON AND SCOPE OF SERVICES

A. General

The purpose of this RFQ/P is to select a qualified person, firm, partnership, corporation, association, or professional organization to provide constructability review, value engineering, master scheduling, cost estimating, budgeting, and construction services for the development and construction for the **Stagg High School Agriculture Mechanics Shop Renovation Project** ("Project"), in accordance with the lease-leaseback structure set forth in Education Code section 17406, et seq. Selected developer shall have experience with the construction of public-school facilities and complying with the requirements of the Office of Public School Construction ("OPSC"), the Division of the State Architect ("DSA"), and Title 24 of the California Code of Regulations.

To submit a proposal, Respondents must be properly licensed by the California Contractors State License Board and registered with the Department of Industrial Relations ("DIR") as required by law. Only Respondents who have been prequalified by the District in accordance with Public Contract Code section 20111.6 are eligible to respond to this RFQ/P.

The selected developer will be required to comply with the prevailing wage requirements, the skilled and trained workforce requirements, and the District's bonding and insurance requirements. The selected developer and its subcontractors must agree to be bound by the District's Project Labor Agreement. The selected developer shall be required to work cooperatively with District staff, the Governing Board, all other technical consultants, the architect, the project inspector, and any program and/or construction manager, if any, retained by the District for the Project, citizens' oversight committee, other District committees, and the community at large to deliver a timely and professional completion of the Project.

The Project is further defined in the attached **APPENDIX A**, along with the District's construction budget and schedule for the Project. Respondents' Proposal shall include Respondent's proposed fees and costs to perform the Project if the Respondent is awarded the contract.

The District intends to select one Respondent that best meet the District's needs to perform the Project. The criteria on which the District makes its determination will be based on the District's adopted best value methodology and criteria provided in this RFQ/P.

B. Scope of Work

Although the final scope of work will be negotiated in the executed Agreement (defined below at subparagraph F), the selected developer shall be responsible for performing the following scope of work, at a minimum:

Preconstruction Services:

1. Review design and support documentation for content, constructability, completeness, scheduling, clarity, consistency, and coordination.

2. Undertake value-engineering analysis and prepare reports with recommendations to District and Architect of Record to maintain established program budget and specifications.

3. Provide detailed cost estimates.

4. Expedite design reviews, including modifications, if any, based on value analysis.

5. Provide a proposed Guaranteed Maximum Price ("GMP") for the construction of the project with identified subcontractor bids and self-performed work.

Construction Services:

1. Construction of the Project.

2. Coordination of record drawings and specifications.

3. Compilation of operations and maintenance manuals, warranties/guarantees, and certificates.

4. Obtaining occupancy permits and coordinating testing, documentation, and governmental inspections and approvals.

5. Preparation of accounting and closeout reports and occupancy plan reports.

6. Other responsibilities as necessary for the completion of the program.

C. Lease-Leaseback Structure

The Project will be funded from various sources, and any agreement reached will conform to the statutory framework for the lease-leaseback delivery method pursuant to Education Code section 17406, et seq. Financing for a portion of the construction of the Project will be included in the Agreement attached to this RFQ/P as **APPENDIX B**. During construction, the District shall pay tenant improvement payments. Once the Project is complete, the developer shall lease the completed facilities back to the District for a pre-determined monthly lease payment amount. However, the District intends that the lease will include an early termination payment option for the District.

D. District Project Management Description

District's Governing Board will be responsible for making final decisions, but the Superintendent will be responsible for day-to-day decisions and may designate a project manager who will be the primary point of contact between the selected developer and the District.

E. Prequalification of Designated Subcontractors

If used, contractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses (collectively, "MEP subcontractors") shall be prequalified by the District to perform construction work as a first-tier subcontractor on the Project pursuant to Public Contract Code section 20111.6.

F. Registration of Respondent and All Tiers of Subcontractors

The selected developer(s) shall not allow any employee or subcontractor to commence work on any contract or any subcontract until the proof of registration with the Department of Industrial Relations required of the developer or subcontractor has been provided to and accepted by the District.

G. Form of Agreement

Selected developer must be able to execute the District's standard form of Site Lease and Facilities Lease ("Agreement") is attached to this RFQ/P as **APPENDIX B**. After the plans and specifications have been approved by DSA, the Facilities Lease will be amended to include the agreed upon Guaranteed Maximum Price.

H. Indemnity

Respondents to this RFQ/P must acknowledge that they have reviewed the District's indemnity provision set forth in the Facilities Lease (**APPENDIX B**) and must agree to the indemnity provision and confirm in writing that, if given the opportunity to contract with the District, the Respondent has no substantive objections to the use of the District's standard indemnity provision.

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I. Insurance

The District requires at least the following insurance coverage from the selected developer:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	Developer: $1,000,000 per occurrence; $2,000,000 annual aggregate Subcontractors (over 10%): $500,000 per occurrence; $1,000,000 annual aggregate
Excess Liability		Developer: $1,000,000 per occurrence; $1,000,000 annual aggregate Subcontractors (over 10%): $500,000 per occurrence; $500,000 annual aggregate
Automobile Liability – Any Auto	Combined Single Limit	$250,000 (limits may be met with Excess Liability Policy required herein)
Workers' Compensation		Statutory limits pursuant to State law
Employer's Liability		$200,000
Builder's Risk		Replacement Cost
Pollution Liability		$250,000 per occurrence; $250,000 annual aggregate

The limits of insurance for those subcontractors whose scope of work does not exceed One million dollars ($1,000,000) shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations	$1,000,000 per occurrence; $1,000,000 annual aggregate
Excess Liability		$1,000,000 per occurrence; $5,0000,000 annual aggregate
Automobile Liability - Any Auto	Combined Single Limit	$500,000
Workers Compensation		Statutory limits pursuant to State law
Employers' Liability		$250,000

Selected developer shall provide to the District certificate(s) of insurance and endorsements satisfactory to the District. Insurance policy(ies) shall not be amended or modified and

coverage amounts shall not be reduced without thirty (30) days' written notice to District prior to modification and/or cancellation. For Commercial General Liability and Automobile Liability, District shall be named as an additional insured on all policies. Selected developer's policy(ies) shall be primary; any insurance carried by the District shall only be secondary and supplemental. Selected developer shall not allow any employee or subcontractor to commence work on any contract or any subcontract until the proof of insurance required of the developer or subcontractor has been provided to and accepted by the District.

J. Designation of Certain Products as the Only Acceptable Materials, Products, or Things for the Project- (NOT USED).

II. FULL OPPORTUNITY

The District hereby affirmatively ensures that all Respondents, including without limitation Disadvantaged Business Enterprises ("DBE"), Small Local Business Enterprise ("SLBE"), Small Emerging Local Business Enterprise ("SELBE") and Disabled Veterans Business Enterprise ("DVBE") firms, shall be afforded full opportunity to submit qualifications in response to this RFQ/P and will not be discriminated against on the basis of race, color, national origin, ancestry, disability, gender, transgender status, political affiliation, or religion in any consideration leading to the award of contract.

III. LIMITATIONS

This RFQ/P is neither a formal request for bids, nor an offer by the District to contract with any party responding to this RFQ/P.The District reserves the right to add additional prequalified Respondents for consideration after distribution of this RFQ/P if it is found to be in the best interest of the District. All decisions concerning selection of the developer will be made in the best interests of the District. The awarding of the contract pursuant to this RFQ/P, if at all, is at the sole discretion of the District.

The District makes no representation that participation in the RFQ/P process will lead to an award of contract or any consideration whatsoever. The District shall in no event be responsible for the cost of preparing any RFQ/P Packet in response to this RFQ/P.

RFQ/P Packets and any other supporting materials submitted to the District in response to this RFQ/P will not be returned and will become the property of the District unless portions of the materials are designated as proprietary at the time of submittal, and are specifically requested to be returned. Vague designations and/or blanket statements regarding entire pages or documents are insufficient and will not bind the District to protect the designated matter from disclosure. Pursuant to *Michaelis, Montanari, & Johnson v. Superior Court* (2006) 38 Cal.4th 1065, RFQ/P Packets shall be held confidential by the District and shall not be subject to disclosure under the California Public Records Act until after either: (1) the District and the successful Respondent have completed negotiations and entered into an Agreement, or (2) the District has rejected all Proposals. Furthermore, the District will have no liability to the Respondent or other party as a result of any public disclosure of any RFQ/P Packet.

IV. RESTRICTIONS ON LOBBYING AND CONTACTS

From the period beginning on the date of the issuance of this RFQ/P and ending on the date of the award of the contract, no person, or entity submitting in response to this RFQ/P, nor any officer, employee, representative, agent, or consultant representing such a person or entity shall contact through any means or engage in any discussion regarding this RFQ/P, the evaluation or selection process/or the award of the contract with any member of the District,

Governing Board, selection members, or any member of the Citizens' Oversight Committee. Any such contact shall be grounds for the disqualification of the Respondent submitting a RFQ/P Packet.

V. MANDATORY INFORMATIONAL MEETING AND SITE WALK

Respondents must attend the mandatory informational meeting and site walk, to be conducted on **Friday, July 26, 2024, at 10:00 A.M.** The meeting will be held at, **1621 Brookside Road, Stockton, Ca. 95207 (Stagg High School).** At this mandatory meeting, District representatives will distribute information and materials to further describe the Project, the scope of work, and walk the proposed Project site. Respondents shall consider and address the materials and information distributed at the meeting in their RFQ/P Packets. Respondents that fail to attend the mandatory informational meeting, in its entirety, shall be ineligible for responding to this RFQ/P.

VI. SUBMITTAL FORMAT

A. Format

Material must be in 8½ x 11-inch format with font no less than 11-point font size. The RFQ/P Packets shall include divider tabs labeled with boldface headers below (e.g., the first tab would be entitled "Executive Summary," the second tab would be entitled "Table of Contents," etc.) Five (5) bound copies, one (1) unbound copy, and one (1) electronic copy of the RFQ/P Packet shall be submitted. Each submittal shall not contain more than thirty (30) single-sided pages, and excluding front and back covers, tabs, certificates of insurance, detailed schedule charts. Any double-sided page is counted as two single-sided pages. Submittals containing more than the authorized number of pages will not be considered.

The unbound copy, marked "Copy for Reproduction," shall be formatted as follows:

- No divider sheets or tab
- Text printed on one side only (i.e., no back-to-back pages)
- Pages with proprietary information removed
- A cover sheet listing the firm's name, the total number of pages, and identification of those pages that were removed due to proprietary information

B. General Overview

Each RFQ/P Packet shall include a description of the type, technical experience, backgrounds, qualifications and expertise of the Respondent. The description shall show that the firm possesses the demonstrated skills and professional experience to perform the general functions of the Project and fulfill the goals and vision of the District as its developer for the Project. Submittals shall describe in detail the Respondent's methods and plan for carrying out the Project. Included in this information must be a description of construction scheduling, staging, and logistics based on timelines and information provided by the District in this RFQ/P and the mandatory informational meeting. Describe the Respondent's approach to the Project, including any creative methodology and/or technology that the Respondent uses or unique resources that the Respondent can offer to the District and Project.

C. Contents

Respondents shall comply with the following requirements for its RFQ/P Packet:

1. TAB 1 – Executive Summary (max. 1 page)

This should be an overview of the entire RFQ/P Packet with a description of the general approach and/or methodology the Respondent will use to meet the goals and fulfill the general functions as set forth in this RFQ/P.

2. TAB 2 – Table of Contents

This should be a complete and clear listing of the headings and pages to allow easy reference to key information.

3. TAB 3 – Cover Letter Identifying Respondent (max. 1 page)

This should be a letter of introduction signed by an authorized officer of the Respondent. If the Respondent is a joint venture, duplicate the signature block and have a principal or officer sign on behalf of each party to the joint venture. The letter shall also include:

a. Respondent's name.

b. Address, include any branch office address and point of contact.

c. Telephone number.

d. Facsimile number.

e. E-Mail address.

f. Identify team.

g. Clearly identify the individual(s) who are authorized to speak for the Respondent during the evaluation process.

h. And, the following statement:

"[RESPONDENT'S NAME] received a copy of the District's Site Lease and Facilities Lease ("Agreement") attached as Appendix B to the RFQ/P. [RESPONDENT'S NAME] has reviewed the indemnity provisions and insurance requirements contained in the Agreement. If given the opportunity to contract with the District, [RESPONDENT'S NAME] has no objections to the use of the Agreement."

Or

i. Respondent shall certify that no official or employee of the District, nor any business entity in which an official of the District has an interest, has been employed or retained to solicit or assist in the procuring of the resulting contract(s), nor that any such

person will be employed in the performance of any/all contract(s) without immediate divulgence of this fact to the District.

4. TAB 4 - Respondent Information

a. A brief history of the Respondent. Please include any former names of the Respondent and the number of years the Respondent has participated in construction as a general contractor under each name. List any reasons for change or name or corporate structure.

b. Organizational chart for Respondent. This shall include the names of all key personnel, joint venture partners, and sub-consultants with their titles and specific task assignments for the Project. Resumes of personnel to be involved with the Project should be included, including their school construction experience. The District's evaluation will consider the entire team. Therefore, no changes in the Respondent's composition will be allowed without prior written approval by the District.

Identify up to three (3) persons who will be primarily responsible for working with the District and their respective roles and responsibilities, including Superintendent and Foreman. If Respondent is selected for an interview, the identified individuals must attend the interview and any required in-person presentations.

c. Description of Respondent's technical competence, including a description of in-house resources (e.g., computer capabilities, software applications, modeling programs, etc.), and Respondent's ability to draw upon multi-disciplinary staff to address the services required under the RFQ/P.

d. Provide the volume of construction in dollars for each of the past three (3) years.

e. Provide a statement regarding the Respondent's availability and resources.

f. Provide a statement on financial resources, bonding capacity and insurance coverage.

g. Provide a claims statement *for all resolved or ongoing claims*: Submit a statement indicating any and all suits or claims in which the Respondent or its personnel instigated a claim and/or litigation regarding construction projects within the past five (5) years, and indicating any and all claims in which claims and/or litigation have been pursued against the Respondent or its personnel. For each listed claim and/or litigation: state the issues in the claim and/or litigation, the status of the claim/litigation, the names of the parties involved, and the outcome, if any.

Respondent's claims statement **must** include resolved *and* ongoing claims. Respondent's claims statement **must** include claims history for Respondent *and* its personnel, as well as Associated Firms.

"Associated Firms" are businesses, corporations, companies, partnerships, or other entities associated with Respondent and/or its personnel (e.g., firm name changes, association as prior owner, general partner, limited partner, or other officer).

h. Contractor license number and whether license has been revoked or suspended in the last five (5) years. Respondent must hold a General Building Contractor License (B License), which is current, valid and in good standing with the Contractor's State License Board. Provide the following for each license:

i. Exact name of license holder on file.

ii. License Classification.

iii. License Number.

iv. Date Issued.

v. Expiration Date.

vi. Whether license has been suspended or revoked in the past five (5) years. If so, explain.

i. Provide signatory status.

j. Location of nearest local office and main office, if different.

k. Certificate(s) of Insurance identifying the firm's current insurance coverages.

l. Provide Non-Collusion Declaration. (**APPENDIX C-1**.)

m. Provide Iran Contracting Act Certification. (**APPENDIX C-2**.)

5. TAB 5 – Methods and Strategic Plan

Detailed description of Respondent's methods and plan for carrying out the Project, including:

a. The technical and managerial approach to the Respondent's partnership with the District. Take into account the District's goals for the Project and the general functions required. Respondent may identify additional necessary tasks and discuss these in its proposed method to accomplish the work.

b. How Respondent plans to incorporate skilled and trained workforce into the Project.

c. How Respondent plans to incorporate local subcontracting teams into the Project.

d. How Respondent plans to incorporate construction means and methods into the Project.

e. Proposed cost for completing preconstruction services for the Project for which the Proposal is being submitted.

f. Detailed discussion of costs related to fees, general conditions, insurance, supervision, and management of the construction portion of the scope of work.

Emphasis will be given to the methods and strategic plan as they relate to preconstruction services and how the preconstruction services will transition into the construction services.

6. TAB 6 – Prior Relevant Experience

Description of the Respondent's experience with respect to the areas of public schools or similar construction over the past five (5) years. Specifically, please provide a list of completed or ongoing projects the Respondent has been involved with for the past five (5) years where the total project contracts exceeded **two-million dollars ($2,000,000)** per project. Within that list:

a. Identify the method (e.g., lease-leaseback, bid-build, etc.) by which each project was constructed. For lease-leaseback projects, include the total cost of each project and a breakdown of the total cost by preconstruction services and construction services.

b. Include a discussion of Respondent's experience with working with the DSA on public school projects.

c. Identify and include discussion of Respondent's experience with projects performed in an occupied building and/or immediately adjacent to an occupied building and/or campus.

d. Identify whether the project is completed or ongoing.

e. Identify if any of the projects had phased completion.

For the projects listed, above, be sure to also include the following information:

a. Project's name and description;

b. Firm's role;

c. Award and completion dates;

d. Project's initial contract price and final contract price;

e. Amount of fees received;

f. Staffing, including Respondent's team members, subcontractors and consultants;

g. Relationship with owner/client;

h. References: Provide a contact name, telephone number and email address for the owners and indicate which key personnel of Respondent worked on each project; and

i. Discussion of claims, demands, and/or litigation arising from the project and involving the Respondent, and resolution of the same.

j. Include examples of other similar project assignments on the part of the Respondent.

7. TAB 7 – Contracting History

If any of the following have occurred, please describe in detail the circumstances of each occurrence:

a. Failure to enter into a contract or professional services agreement once selected.

b. Withdrawal of a proposal or bid as a result of an error.

c. Termination or failure to complete a contract.

d. Debarment by any municipal, county, state, federal, or local agency.

e. Involvement in litigation, arbitration, or mediation, whether concluded or ongoing.

f. Conviction of the Respondent or its principals for violating any state or federal antitrust laws by bid or proposal rigging, collusion, or restrictive competition between bidders or proposers, or conviction of any other federal or state law related to bidding or performance of services.

g. Knowing concealment of any deficiency in the performance of a prior contract.

h. Falsification of information or submission of deceptive or fraudulent statement in connection with a contract.

i. Willful disregard for applicable rules, laws, or regulations.

j. Failure to disclose information regarding any of the above may be deemed to indicate an unsatisfactory record of performance. Information regarding any of the above may be considered in determining the suitability of Respondent to perform the needed

services. Accordingly, Respondent may describe mitigating factors as part of description of any of the above.

8. TAB 8 – Pricing and Contingency

The pricing will be evaluated based on the: (1) preconstruction services cost or method of calculation; (2) Respondent's fee, which includes profit and overhead; (3) general conditions cost; (4) bonds and insurance percentage; (5) construction contingency to be applied to errors and omissions; and (6) allowances, if any.

After the Agreement is awarded and DSA approves the plans and specifications, the selected developer will be required to provide a Guaranteed Maximum Price ("GMP") for the Project. As part of the District review of the GMP, the District will expect to have access to all subcontractor bids, contingency breakdown and tracking documents, general conditions breakdown and tracking documents, and Respondent's fees. The GMP shall include all of Respondent's cost for labor, materials, equipment, overhead and profit, general conditions, contractor contingency, and allowances, if any, but shall specifically exclude the amount of the District contingency. In the event the selected developer realizes a savings on any aspect of the Project, such savings shall be added to the District contingency and expended consistent with the District contingency. In addition, any portion of the contractor contingency and/or allowance remaining after completion of the Project shall be added to the District contingency. The Facilities Lease will be amended to include the agreed upon GMP, if the District proceeds with the construction phase of the Project.

9. TAB 9 – Insurance

Each Respondent must demonstrate that it can maintain adequate insurance as required herein. Therefore, each RFQ/P Packet must include a letter from the Respondent's insurance company indicating its ability to provide insurance coverage on behalf of Respondent in accordance with the insurance requirements in **APPENDIX B**.

10. TAB 10 – Assurances

The Respondent must acknowledge each of the following items and confirm that it will be willing and able to perform these items:

Preconstruction Services: Respondent shall provide services that relate to the organization and development of the Project prior to the start of construction including the following:

- **Site Evaluation:** Consult with District staff in relation to the existing site. Selected developer should make site visits, as needed to review the current site conditions. During this evaluation, selected developer may make recommendations relating to soils investigations and utility locations and capacities, in order to minimize unforeseen conditions.

- **Plan Review:** Provide plan review and constructability services. Refer to the Facilities Lease for the required scope. Place an emphasis on ensuring that the Project can be completed within the established schedule and within the available budget. During the review, selected developer shall review the documents for clarity, consistency, constructability and coordination. The results of the review shall be provided in writing and as notations on the documents to the District and Bond Management team. The selected developer

shall also make recommendations to the District and Bond Management team with respect to constructability, construction cost, sequence of construction, and construction duration.

- **Pre-construction Meetings:** Attend meetings at the Project site with the architect of record and the Bond Management team every two (2) weeks, until the Notice to Proceed with Construction is issued on or about (ENTER HERE) (meeting duration is approximately 2 hours).

- **Value Engineering:** Provide a detailed analysis of all major Project systems with an emphasis on possible value engineering possibilities.

- **Detailed Construction Critical Path Schedule:** Produce detailed construction critical path schedules to be incorporated into the Project documents including identification of the Project critical path and agency approvals.

- **Preliminary and Detailed Estimates:** Provide preliminary construction estimates using like-kind construction costs. Upon receipt of the Project plans and specifications, provide detailed construction estimates showing the values of all major components of the Project.

- **Construction Planning:** Plan the phases and staging of construction, staging areas, temporary fencing, office trailer placement, access, etc. as required.

- **Other services:** Any other services that are reasonable and necessary to control the budget and schedule.

Construction Services:

- **Project Accounting and Management Systems:** In coordination with District staff, develop the Project accounting and budget management systems. A process of up-to-date costs management will be necessary. During construction, monthly reporting will be required.

- **General Conditions:** List what is included in the Respondent's general conditions (including full-time and part-time personnel) and a monthly value of the general conditions. Indicate what would be included as a cost of work versus a line item in the general conditions. See **APPENDIX C-3** for an example.

- **Management of Project:** Administer and coordinate on a daily basis the work of all trade contractors the successful Respondent hires to work on the Project. Enforce strict performance, scheduling, and notice requirements. Document the progress and costs of the Project. Report proactively on potential schedule impacts. Recommend potential solutions to schedule problems.

- **Trade Contractors:** Pursuant to Public Contract Code section 20111.6, each prospective MEP Contractor holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses shall be prequalified by the District to perform construction work as a first-tier subcontractor on the Project.

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VII. SELECTION CRITERIA

A. Best Value Evaluation

The RFQ/P Packets will be evaluated based on the District's adopted criteria and rating system to determine the qualified Respondent(s) providing the best value to the District for all candidates that meet the pass / fail criteria listed below (i.e., receive a PASS).

CRITERIA ITEM	DESCRIPTION	MAXIMUM POINTS
Conflict of Interest	Is there a conflict of interest?	PASS / FAIL
Safety	Safety record	PASS / FAIL
Form of Agreement	Proposed changes to District Form of Agreement	PASS / FAIL
Technical Expertise	Relevant experience with like-Projects, prior lease-leaseback experience, value-engineering experience, constructability experience, references	26 points
Interview (If used, score; if not used, all respondents receive 0 points.)	Proposed team attendance, performance, approach to work	22 points
Price Points	Fees, general conditions, contingency, interest proposed on lease payments	22 points
Staffing	Management and Staffing Approach, including skilled and trained workforce	16 points
Schedule/Liquidated Damages	History of meeting Project Schedule and Delivery Date	7 points
Claims/Litigation	Acceptable history of claims and litigation	7 points
		TOTAL: MAXIMUM 100 POINTS

Based on these criteria, District staff assign points to each proposer and then calculate the total points awarded to the proposer. The more points, the higher the proposer is ranked. The highest ranked proposer reflects the best combination of price and qualifications for the Project.

B. District Investigations

The District may perform investigations of proposing parties that extend beyond contacting the references identified in the proposals.

C. Selection Process

RFQ/P Packets shall be evaluated and the Project awarded in the following manner:

1. All proposals received shall be reviewed to determine those that meet the format requirements and the standards specified in RFQ/P.

2. District shall evaluate the qualifications of the Respondents based solely upon the adopted criteria and evaluation methodology, and shall assign a best value score to each proposal. Once the evaluation is complete, all responsive proposals shall be ranked from the highest best value to the lowest best value to the District.

3. The District's Governing Board shall award the Project to the responsive proposer whose proposal is determined, in writing by the Governing Board, to be the best value to the District.

4. If the selected developer refuses or fails to execute the tendered proposed contract, the Governing Board may award the contract to the proposer with the second highest best value score if it deems it to be for the best interest of the District. If the second selected developer refuses or fails to execute the tendered instrument, the Governing Board may award the instrument to the proposer with the third highest best value score if it deems it to be for the best interest of the District.

5. Notwithstanding any other law, upon issuance of a contract award, the District shall publicly announce its award, identifying the entity to which the award is made, along with a statement regarding the basis of the award. The statement regarding the District's contract award and the contract file shall provide sufficient information to satisfy an external audit.

D. Interviews

The District may, at its option, invite some of the finalists to meet with a District selection committee. Key proposed Project staff will be expected to attend the interview. The interview will be an opportunity for the District selection committee to review the proposal, the firm's history, and other matters the committee deems relevant to firm evaluation with the firm. The interview will start with the firm presenting its proposal and its Project team. The finalists may be required to submit in advance of the interview a more detailed fee proposal. If requested, this fee proposal shall include all charges and costs proposed to be charged to the District, including rates for extra work.

E. Final Determination and Award

It is expected that the selection committee will make recommendations to District staff regarding the candidates and awarding the contract. The awarding of contract(s) is at the sole discretion of the District.

The District reserves the right to contract with any entity responding to this RFQ/P for all or any portion of the work described herein and/or in an agreement offered to the entity, to reject any proposal as non-responsive, and/or not to contract with any firm for the services described herein. The District makes no representation that participation in the RFQ/P process will lead to an award of contract or any consideration whatsoever. The District reserves the right to seek proposals from or to contract with any firm not participating in this process. The District shall in no event be responsible for the cost of preparing any RFQ/P Packet in response to this RFQ/P.

The RFQ/P packet, and any other supporting materials submitted to the District in response to this RFQ/P will not be returned and will become the property of the District unless portions of the materials are designated as proprietary at the time of submittal, and are specifically requested to be returned. This RFQ/P does not commit the District to negotiate an agreement with any proposing firm or individual.

VIII. SUBMISSION GUIDELINES

Respondents to this RFQ/P should mail or deliver five (5) bound copies, one (1) unbound copy, and one (1) electronic copy on CD or DVD of the RFQ/P Packet conforming to the requirements of this RFQ/P to:

Stockton Unified SCHOOL DISTRICT
ATTN: Tony Lopez
2141 Robindale Ave.
Stockton, CA 95205
RE: RFQ/P # 24.043

ALL RESPONSES ARE DUE BY 2:00 P.M., On August 16, 2024 Oral, telegraphic, facsimile, telephone or email RFQ/P Packets will not be accepted. RFQ/P Packets received after this date and time will not be accepted and returned unopened.

Each submittal must conform and be responsive to the requirements set forth in this RFQ/P. The District reserves the right to waive any informalities or irregularities in the RFQ/P Packets. The District also reserves the right to reject any and all RFQ/P Packets and to negotiate contract terms with one or more Respondents. The District retains the sole discretion to determine issues of compliance and to determine whether a program management respondent is responsive, responsible, and qualified.

The District hereby notifies all Respondents that it will affirmatively insure that, in any contract entered into pursuant to this advertisement, no respondent will be discriminated against on the grounds of race, color, sex, age, ancestry, religion, marital status, national origin, medical condition or physical disability on consideration for the award.

WE THANK YOU FOR YOUR INTEREST IN THE DISTRICT'S PROJECT.

APPENDIX A
Project Description

Project Name: Stagg High School Agriculture Mechanics Shop Renovation Project.

ALTERATION OF APPROXIMATELY 3,000 SF OF EXISTING AUTO SHOP/CLASSROOM INTO AN AG MECHANICS SHOP/CLASSROOM. INCLUDING ASSOCIATED SITE WORK AND PAVING AS SHOWN ON APPROVED DRAWINGS AND SPECIFICATIONS.

Completion Date: June 05, 2025.

Project Estimate: $1,962,898.18.

Architect: Community Architecture, Inc.

APPENDIX B
FACILITIES LEASE

For all or a portion of the following Site:

Stagg High School Agriculture Mechanics Shop Renovation Project
1621 Brookside Road
Stockton, Ca. 95207
APN: 11009004

By and between

Stockton Unified School District
56 South Lincoln Street
Stockton, CA 95203

And

[Developer]
[Address]

Dated as of _____, 20__

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Exhibits A - H

FACILITIES LEASE

This facilities lease ("Facilities Lease"), dated as of _____, 202_ ("Effective Date"), is made and entered into by and between [Name of Developer] ("Developer"), a [California corporation] duly organized and existing under the laws of the State of [California], as sublessor, and Stockton Unified School District, a school district duly organized and validly existing under the laws of the State of California, as sublessee ("District") (together, the "Parties").

RECITALS

WHEREAS, the District is authorized under Section 17406 of the Education Code of the State of California to lease a site to a developer and to have that developer develop and construct the project on the site and to lease back to the District the site and the completed project; and

WHEREAS, the District desires to provide for the development and construction of certain work to be performed on portions of the School Site ("Project Site"), which includes construction of improvements to be known as the [Name of] Project ("Project"); and

WHEREAS, on the date hereof, the District has leased to Developer, a parcel of land located at [Address], known as [Name of] School, particularly described in **Exhibit A** ("School Site") and shown on **Exhibit B** (Description of Project Site), both attached hereto and incorporated herein by reference; and

WHEREAS, District and Developer have executed a Site Lease at the same time as this Facilities Lease whereby the District is leasing the Project Site to Developer ("Site Lease"); and

WHEREAS, District has retained Community Architecture, Inc. ("Architect") to prepare plans and specifications for the Project ("Plans and Specifications") and to act as the Design Professional in General Responsible Charge for the Project; and

WHEREAS, the Governing Board of the District ("Board") has determined that it is in the best interests of the District and for the common benefit of the citizens residing in the District to construct the Project by leasing the Project Site to Developer and by simultaneously entering into this Facilities Lease under which the District will lease back the Project Site and the Project from Developer and, if necessary, make Lease Payments; and

WHEREAS, the District further acknowledges and agrees that it has entered into the Site Lease and the Facilities Lease, pursuant to Education Code Section 17406, as the best available and most expeditious means for the District to satisfy its substantial need for the facilities to be provided by the Project and to accommodate and educate District students and to utilize its facilities proceeds expeditiously; and

WHEREAS, this Site Lease and Facilities Lease are awarded based a competitive solicitation process, pursuant to Education Code section 17406, and in compliance with the

required procedures and guidelines for evaluating the qualifications of proposers adopted and published by the Board to the proposer providing the best value to the school district, taking into consideration the proposer's demonstrated competence and professional qualifications necessary for the satisfactory performance of the services required; and

WHEREAS, the selection of Developer was conducted in a fair and impartial manner; and

WHEREAS, Developer has reviewed the Lease Documents; and

WHEREAS, Developer represents that it has the expertise and experience to perform the services set forth in this Facilities Lease; and

WHEREAS, the Parties have performed all acts, conditions and things required by law to exist, to have happened and to have been performed precedent to and in connection with the execution and entering into of this Facilities Lease and all those conditions precedent do exist, have happened and have been performed in regular and due time, form and manner as required by law, and the Parties hereto are now duly authorized to execute and enter into this Facilities Lease; and

WHEREAS, Developer is authorized to lease the Project Site as lessee and to develop the Project and to have the Project constructed on the Project Site and to lease the Project and the Project Site back to the District, and has duly authorized the execution and delivery of this Facilities Lease.

NOW, THEREFORE, in consideration of the above recitals and of the mutual covenants hereinafter contained, the Parties hereto do hereby agree as follows:

1. Definitions

In addition to the terms and entities defined above or in subsequent provisions, and unless the context otherwise requires, the terms defined in this section shall, for all purposes of this Facilities Lease, have the meanings herein specified.

1.1 "**Developer**" or "**Lessor**" means _____, a [California corporation], organized and existing under the laws of the State of [California], Contractor's license number _____ issued by the State of [California], Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code, and its successors and assigns.

1.2 "**Developer's Representative**" means the Managing Member of Developer, or any person authorized to act on behalf of Developer under or with respect to this Facilities Lease.

1.3 "**Contract Documents**" are defined in **Exhibit D** to this Facilities Lease.

1.4 "**District**" or "**Lessee**" means the Stockton Unified School District, a school district duly organized and existing under the laws of the State of California.

1.5 "**District Representative**" means the Superintendent of the District, or any other person authorized by the Governing Board of the District to act on behalf of the District under or with respect to this Facilities Lease.

1.6 "**Permitted Encumbrances**" means, as of any particular time:

1.6.1 Liens for general ad valorem taxes and assessments, if any, not then delinquent, or which the District may permit to remain unpaid;

1.6.2 The Site Lease.

1.6.3 This Facilities Lease.

1.6.4 Easements, rights of way, mineral rights, drilling rights and other rights, reservations, covenants, conditions or restrictions which exist of record as of the date of this Facilities Lease.

1.6.5 Easements, rights of way, mineral rights, drilling rights and other rights, reservations, covenants, conditions or restrictions established following the date of recordation of this Facilities Lease and to which Developer and the District consent in writing which will not impair or impede the operation of the Project Site.

2. Exhibits

The following Exhibits are attached to and by reference incorporated and made a part of this Facilities Lease:

2.1 Exhibit A - Legal Description of the School Site: The description of the real property constituting the School Site.

2.2 Exhibit B - Description of the Project Site: The map or diagram depiction of the Project Site.

2.3 Exhibit C - Guaranteed Maximum Price and Other Project Cost, Funding, and Payment Provisions: A detailed description of the Guaranteed Maximum Price and the provisions related to the payment of that amount to Developer, including Attachment 3, the Schedule of Lease Payments and Payoff Dates and Amounts.

2.4 Exhibit D - General Construction Provisions: The provisions generally describing the Project's construction.

2.5 Exhibit D-1 – Special Conditions Provisions: The provisions describing conditions specific to the Project's construction.

2.6 Exhibit E - Memorandum of Commencement Date: The Memorandum which will memorialize the commencement and expiration dates of the Lease Term.

2.7 Exhibit F - Construction Schedule

2.8 Exhibit G – Schedule of Values

2.9 Exhibit H – Project Labor Agreement

3. Lease of Project and Project Site

3.1 Developer hereby leases the Project and the Project Site to the District, and the District hereby leases said Project and Project Site from Developer upon the terms and conditions set forth in this Facilities Lease.

3.2 The leasing by Developer to the District of the Project Site shall not affect or result in a merger of the District's leasehold estate pursuant to this Facilities Lease and its fee estate as lessor under the Site Lease. Developer shall continue to have and hold a leasehold estate in the Project Site pursuant to the Site Lease throughout the Term thereof and the Term of this Facilities Lease.

3.3 As to the Project Site, this Facilities Lease shall be deemed and constitute a sublease.

4. Term

4.1 Facilities Lease is Legally Binding

This Facilities Lease is legally binding on the Parties upon execution by the Parties and the District Board's approval of this Facilities Lease. The "Term" of this Facilities Lease for the purposes of District's obligation to make Lease Payments shall commence on the date when Developer delivers possession of the Project and the Project Site to District and when all improvements to be provided by Developer are determined by the District to be completed as set forth in **Exhibit D** to this Facilities Lease.

Unless earlier terminated pursuant to the provisions of the Contract Documents, the Term of this Facilities Lease for the purposes of District's obligations to make Lease Payments shall terminate [one (1) year] thereafter or upon payment of the final lease payment.

4.2 After Developer has completed construction of the Project and the District has accepted the Project, the Parties shall execute the Memorandum of Commencement Date, attached hereto as **Exhibit E,** to memorialize the commencement date of the Lease Payments and expiration date of the Term. Notwithstanding this Term, the Parties hereby acknowledge that each has obligations, duties, and rights under this Facilities Lease that exist upon execution of this Facilities Lease and prior to the beginning of the Lease Payment obligations.

4.3 The Term may be extended or shortened upon the occurrence of the earliest of any of the following events, which shall constitute the end of the Term:

4.3.1 An Event of Default by District as defined herein and Developer's election to terminate this Facilities Lease as permitted herein; or

4.3.2 An Event of Default by Developer as defined herein and District's election to terminate this Facilities Lease as permitted herein; or

4.3.3 Consummation of the District's purchase option pursuant to the Guaranteed Maximum Price and Other Project Cost, Funding, and Payment Provisions indicated in **Exhibit C** ("Guaranteed Maximum Price Provisions"); or

4.3.4 A third-party taking of the Project under Eminent Domain, only if the Term is ended as indicated more specifically herein; or

4.3.5 Damage or destruction of the Project, only if the Term is ended as indicated more specifically herein.

5. Payment

In consideration for the lease of the Project and the Project Site by Developer back to the District and for other good and valuable consideration, the District shall make all necessary payments pursuant to the Guaranteed Maximum Price Provisions indicated in **Exhibit C.**

6. Title

6.1 During the Term of this Facilities Lease, the District shall hold fee title to the School Site, including the Project Site, and nothing in this Facilities Lease or the Site Lease shall change, in any way, the District's ownership interest.

6.2 During the Term of this Facilities Lease, Developer shall have a leasehold interest in the Project Site pursuant to the Site Lease.

6.3 During the Term of this Facilities Lease, Developer shall hold title to the Project improvements provided by Developer, which comprise fixtures, repairs, replacements or modifications thereto.

6.4 If the District exercises its Purchase Option pursuant to the Guaranteed Maximum Price Provisions indicated in **Exhibit C** or if District makes all necessary payments under the Guaranteed Maximum Price Provisions indicated in **Exhibit C**, all right, title and interest of Developer, its assigns and successors in interest in and to the Project and the Project Site shall be transferred to and vested in the District at the end of the Term. Title shall be transferred to and vested in the District hereunder without the necessity for any further instrument of transfer; provided, however, that Developer agrees to execute any instrument requested by District to memorialize the termination of this Facilities Lease and transfer of title to the Project.

7. Quiet Enjoyment

Upon District's possession of the Project, Developer shall thereafter provide the District with quiet use and enjoyment of the Project, and the District shall during the Term peaceably and quietly have and hold and enjoy the Project, without suit, trouble or hindrance from Developer, except as otherwise may be set forth in this Facilities Lease. Developer will, at the request of the District and at Developer's cost, join in any legal action in which the District asserts its right to such possession and enjoyment to the extent Developer may lawfully do so. Notwithstanding the foregoing, Developer shall have the right to inspect the Project and the Project Site as provided herein.

8. Representations of the District

The District represents, covenants and warrants to Developer as follows:

8.1 Due Organization and Existence

The District is a school district, duly organized and existing under the Constitution and laws of the State of California.

8.2 Authorization

The District has the full power and authority to enter into, to execute and to deliver this Facilities Lease, and to perform all of its duties and obligations hereunder, and has duly authorized the execution of this Facilities Lease.

8.3 No Violations

Neither the execution and delivery of this Facilities Lease nor the Site Lease, nor the fulfillment of or compliance with the terms and conditions hereof or thereof, nor the consummation of the transactions contemplated hereby or thereby, conflicts with or results in a breach of the terms, conditions or provisions of any restriction or any agreement or instrument to which the District is now a party or by which the District is bound, or constitutes a default under any of the foregoing, or results in the creation or imposition of any lien, charge or encumbrance whatsoever upon any of the property or assets of the District, or upon the Project Site, except Permitted Encumbrances.

8.4 Condemnation Proceedings

8.4.1 District covenants and agrees, but only to the extent that it may lawfully do so, that so long as this Facilities Lease remains in effect, the District will not seek to exercise the power of eminent domain with respect to the Project so as to cause a full or partial termination of this Facilities Lease.

8.4.2 If for any reason the foregoing covenant is determined to be unenforceable or in some way invalid, or if District should fail or refuse to abide by such covenant, then, to the extent it may lawfully do so, District agrees that the financial interest of Developer shall be as indicated in this Facilities Lease.

9. Representations of Developer

Developer represents, covenants and warrants to the District as follows:

9.1 Due Organization and Existence

Developer has the power to enter into this Facilities Lease and the Site Lease; is possessed of full power to lease, lease back, and hold real and personal property and has duly authorized the execution and delivery of all of the aforesaid agreements.

9.2 Authorization

Developer has the full power and authority to enter into, to execute and to deliver this Facilities Lease, and to perform all of its duties and obligations hereunder, and has duly authorized the execution of this Facilities Lease.

9.3 No Violations

Neither the execution and delivery of this Facilities Lease and the Site Lease, nor the fulfillment of or compliance with the terms and conditions hereof or thereof, nor the consummation of the transactions contemplated hereby or thereby, conflicts with or results in a breach of the terms, conditions or provisions of any restriction or any agreement or instrument to which Developer is now a party or by which Developer is bound, or constitutes a default under any of the foregoing, or results in the creation or imposition of any lien, charge or encumbrance whatsoever upon any of the property or assets of Developer, or upon the Project Site, except Permitted Encumbrances.

9.4 No Bankruptcy

Developer is not now nor has it ever been in bankruptcy or receivership.

9.5 No Encumbrances

Developer shall not pledge any District payments of any kind, related to the Site Lease, this Facilities Lease, or in any way derived from the Project Site, and shall not mortgage or encumber the Project Site, except as may be specifically permitted pursuant to the provisions of this Facilities Lease related to Developer's financing the construction of the project.

9.6 Continued Existence

Developer shall not voluntarily commence any act intended to dissolve or terminate the legal existence of Developer, at or before the latest of the following:

9.6.1 Eighteen (18) months following completion of the Project.

9.6.2 One (1) year following expiration or earlier termination of the Term.

9.6.3 After dismissal and final resolution of any and all disputes between the Parties and/or any third-party claims related, in any way, to the Project.

While the lease documents are in effect, Developer shall give District one hundred twenty (120) days written notice prior to dissolving or terminating the legal existence of Developer.

10. Preconstruction Services

10.1 Scope of the Preconstruction Services

Developer shall perform management and coordination services, plan and specification constructability reviews, provide value-engineering reviews and recommendations and other reviews as necessary to verify that the drawings and specifications are clear and reasonably accurate to minimize the need for changes during the construction phase of the project, including but not limited to the following:

10.1.1 General Services

10.1.1.1 Developer shall attend meetings between the Architect, the District, District site personnel, and any other applicable consultants of

the District as required to discuss the Project, including budget, scope and schedule.

10.1.1.2 Developer shall assist the Architect with making formal presentations to the governing board of District. Such assistance is anticipated to include floor plans and elevations necessary for any architectural presentation.

10.1.1.3 Developer shall prepare a rough schedule in a format acceptable to District, and update as necessary.

10.1.1.4 Developer shall prepare and update the components of the Guaranteed Maximum Price and shall be primarily responsible for ensuring that the Project can and is constructed for no more than that amount.

10.1.1.5 While the Architect is anticipated to provide primary assistance, Developer shall assist District with City land use issues.

10.1.1.6 Architect shall act as lead and Developer will assist District and Architect with DSA review, input, and timeframe for same.

10.1.1.7 Architect shall act as lead and Developer will assist with review and comment upon geotechnical / soils investigation and report.

10.1.1.8 Architect shall act as lead and Developer will assist with review and comment upon survey of the Project site.

10.1.1.9 When requested, Developer will prepare meeting minutes.

10.1.1.10 Prepare schedule for preconstruction deliverables, subject to District's approval, and provide preconstruction deliverables within time frames of approved preconstruction schedule.

10.1.2 Review of Design Documents.

10.1.2.1 Review Project design and budget with District and Architect based on the 100% Construction Documents submitted to DSA to:

10.1.2.1.1 Provide recommendations on site use and improvements, selection of materials, building systems and equipment and methods of Project delivery;

10.1.2.1.2 Provide recommendations on relative feasibility of construction methods, availability of materials and labor, time requirements for procurement, installation and construction of the Project and subparts thereof if requested, and factors relating to cost including, but not limited to, construction costs of alternate designs of materials, preliminary budgets and possible economics that could be achieved through alternate methods or substitutions;

10.1.2.1.3 Provide recommendations on relative feasibility of construction methods, availability of materials and labor, time requirements for procurement, installation and construction of the Project and subparts thereof if requested, and factors relating to cost including, but not limited to, construction costs of alternate designs of materials, preliminary budgets and possible economics that could be achieved through alternate methods or substitutions;

10.1.2.1.4 Provide plan review.

10.1.2.1.5 Value-engineering. Prepare a value-engineering report for District review and approval that:

10.1.2.1.5.1 Details areas of cost saving (e.g. construction processes/procedures, specified materials and equipment, and equipment or other aspects of the design documents that can be modified to reduce costs and/or the time for achieving final completion of the Project and/or to extend life-cycle and/or to reduce maintenance/operations costs, without diminution in the quality of materials/equipment/workmanship, scope or intended purposes of the Project);

10.1.2.1.5.2 Provides detailed estimate for proposed value-engineering items;

10.1.2.1.5.3 Defines methodology or approaches that maximize value; and

10.1.2.1.5.4 Identifies design choices that can be more economically delivered.

10.1.2.1.6 Constructability Review. Prepare detailed interdisciplinary constructability review within Fourteen (14) days of receipt of the plans from the District that:

10.1.2.1.6.1 Ensures construction documents are well coordinated and reviewed for errors;

10.1.2.1.6.2 Identifies to the extent known, construction deficiencies and areas of concern;

10.1.2.1.6.3 Back-checks design documents for inclusion of modifications; and

10.1.2.1.6.4 Provides the District with written confirmation that:

10.1.2.1.6.4.1 Requirements noted in the design documents prepared for the Project are consistent with and conform to the District's Project requirements and design standards.

10.1.2.1.6.4.2 Various components have been coordinated and are consistent with each other so as to minimize conflicts within or between components of the design documents.

10.1.2.2 Confirm Modifications to Design Documents. If the District accepts Developer's comments, including the value-engineering and/or constructability review comments, review the design documents to confirm that those comments are properly incorporated into the final design documents.

10.1.2.3 In doing so, it is recognized that Developer is not acting in the capacity of a licensed design professional, and that Developer's examination is made in good faith to facilitate construction and does not create an affirmative responsibility of a design professional to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. However, nothing in this provision shall abrogate Developer's responsibilities for discovering and reporting any error, inconsistency, or omission pursuant to the Contract within the Developer's standard of care including, without limitation, any applicable laws, ordinance, rules, or regulations.

10.1.3 Budget of Project Costs.

10.1.3.1 At each stage of plan review indicated above, Developer will update and refine the budget of the Guaranteed Maximum Price based on the most recent set of design documents. Developer shall also advise the District and the Architect if it appears that the total construction costs may exceed the Guaranteed Maximum Price established by the District and shall make recommendations for corrective action. Developer will further provide input to the District and Architect relative to value of construction, means and methods for construction, duration of construction of various building methods and constructability.

10.1.3.2 In each budget of the Guaranteed Maximum Price, Developer shall include values of scopes of Work subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. This budget of the Guaranteed Maximum Price shall include, at a minimum, the following information divided into at least the following categories for each site:

10.1.3.2.1 Overhead and profit;

10.1.3.2.2 Supervision;

10.1.3.2.3 General conditions;

10.1.3.2.4 Layout & Mobilization (not more than 1%);

10.1.3.2.5 Submittals, samples, shop drawings (not more than 3%);

10.1.3.2.6 Bonds and insurance (not more than 2%);

10.1.3.2.7 Close-out documentation (not less than 3%);

10.1.3.2.8 Demolition;

10.1.3.2.9 Installation;

10.1.3.2.10 Rough-in;

10.1.3.2.11 Finishes;

10.1.3.2.12 Testing;

10.1.3.2.13 Owner and Maintenance Manuals; and

10.1.3.2.14 Punchlist and District acceptance.

10.1.4 Construction Schedule and Phasing Plan

Developer shall prepare a preconstruction schedule to guide the design team through to bid dates. That schedule shall show the multiple phases and interrelations of design, constructability review, and estimating. Developer shall also prepare a full construction schedule for the Project detailing the construction activities. Developer shall further investigate, recommend and prepare a schedule for the purchase of materials and equipment requiring long lead time procurement, and coordinate the schedule with the early preparation of portions of the Contract Documents by the Architect.

10.1.5 Construction Planning and Bidding

10.1.5.1 For all of Developer's activities relating to construction planning and bidding, Developer shall comply with all applicable legal requirements including, but not limited to, those set forth in Education Code section 17406.

10.1.5.2 Consult with District staff in relation to the existing site. Developer should make site visits, as needed to review the current site conditions. During this evaluation, Developer may make recommendations relating to soils investigations and utility locations and capacities, in order to minimize unforeseen conditions.

10.1.5.3 Attend meetings at the Project site with the Architect and the design team as needed.

10.1.5.4 Provide plan review and constructability services with an emphasis on ensuring that the Project can be completed within the established schedule and within the available budget.

10.1.5.5 Provide a detailed analysis of all major Project systems with an emphasis on possible value engineering possibilities.

10.1.5.6 Prepare and distribute specifications and drawings provided by District to facilitate bidding to Developer's subcontractors.

10.1.5.7 Review the drawings and specifications to eliminate areas of conflict and overlapping in the Work to be performed by various subcontractors, and with a view to eliminating change order requests by the Architect or subcontractors.

10.1.5.8 Conduct pre-bid conferences. Coordinate with District and the Architect in responding to subcontractor questions or providing clarification to all subcontractors.

10.1.5.9 DSA approved plans shall be utilized to receive subcontractor bids and develop the GMP in accordance with the lease-leaseback agreement forms, including the requirement that Developer engage in competitive bidding for subcontractors for all scopes of Work on the Project that constitute more than one half of one percent (0.5%) of the GMP. The District representative shall be present during the receipt of bids from subcontractors.

10.1.5.10 Each phase GMP shall be presented to the District in the following manner within a three ring binder as well as electronically on an external memory device such as a CD, USB drive, or other comparable device:

10.1.5.10.1 Cover sheet, signed by Developer indicating the GMP dollar amount with a certification, indicating that the GMP is all inclusive per the plans, specifications and addenda (contract documents). Also include certification stating, "Developer hereby certifies that they have reviewed all subcontractor proposals and whether the subcontractor excluded portions of their scope Developer has included all costs for a complete GMP in accordance with plans, specifications and addenda."

10.1.5.10.2 A bid tabulation sheet indicating the breakdown by subcontractor/trade along with the appropriate general condition amount, other fees (as submitted with the response to the RFQ/P).

10.1.5.10.3 Behind the bid tabulation sheet mentioned in subdivision 10.1.5.10.2 above should be a sheet that indicates what is included in the general conditions, which should match what was submitted in the response to the RFQ/P.

10.1.5.10.4 Copies of all subcontractor bids received divided by trade that corresponds to the final spread sheet with a cover sheet indicating the scope and subcontractors that provided bids, as well as those that were asked to bid, but did not submit a proposal. This sheet should have the dollar amounts for each subcontractor that provided a bid with the first column being the proposed subcontractor for that trade.

10.1.5.10.5 Behind subdivision 10.1.5.5.4 documents, above, should be the bids for that trade with the proposed subcontractor bid on top and the other subcontractor bids in descending order based on best value score.

10.1.5.10.6 The minimum number of bona fide bids from contractors for a specific trade shall be as follows:

10.1.5.10.6.1 Two (2) bids for subcontracts up to One Hundred Thousand Dollars ($100,000);

10.1.5.10.6.2 Three (3) bids for subcontracts over One Hundred Thousand Dollars ($100,000).

10.1.5.10.7 If Developer intends to propose to self-perform portion(s) of the construction of the Project, it must receive the District's prior written approval. If approved, Developer must provide its pricing (its bid) to the District twenty-four (24) hours prior to Developer's receipt of Subcontractor bids for those portion(s) of the Work.

10.1.5.10.7.1 Regardless of the scope of Work and not in any way reducing the number of Subcontractor bids based on the other requirements of the Contract Documents, the minimum number of bona fide bids from Subcontractors for scope(s) of Work that Developer is bidding to self-perform shall be Two (2) Bids, not including Developer's pricing/bid.

10.1.5.11 Produce detailed construction Critical Path Method schedules to be incorporated into the Project documents including identification of the Project critical path and agency approvals.

10.1.5.12 Plan the phases and staging of construction, staging areas, temporary fencing, office trailer placement, access, etc. as required.

10.1.5.13 Any other services that are reasonable and necessary to control the budget and schedule. List those areas where subconsultants will be required and where the Developer has in-house expertise. Provide resumes of persons providing each of these services and for key personnel assigned to the Project.

10.2 Schedule

Preconstruction services outlined above will commence on the date the District issues a Notice to Proceed with Preconstruction Services for the Agreement, and conclude upon approval of the Amendment to the Lease Agreements by District's Board, or termination of this Agreement by either party per the Agreement's terms. Any extension shall be subject to reasonable approval in writing by the Parties.

10.3 Ownership of Records

The Parties mutually agreed that all materials prepared by Developer under this Agreement shall become the property of the District, and Developer shall have no property right therein whatsoever. Developer hereby assigns to District any copyrights associated with the materials prepared pursuant to the Agreement.

10.4 Open Book Policy

There will be an open book policy with Developer and its construction team. District shall have prompt access to all subcontractor bids, value engineering back-up, contingency breakdown & tracking, and Developer fees.

10.5 Compensation to Developer for Preconstruction Services

District agrees to reimburse Developer in the total amount not to exceed [AMOUNT IN WORDS] DOLLARS ($[AMOUNT IN NUMBERS]), for the performance of services contemplated by this Agreement. Developer shall be paid monthly for the actual fees and allowed costs and expenses for all time and materials required and expended for Work requested and specified by the District as completed. Said amount shall be paid within thirty (30) days upon submittal to and verification by the District of a monthly billing statement showing completion of the tasks for that month on a line item basis. In the event Developer and District continue with the lease/leaseback agreements for the development of the Project, this compensation for services rendered will be included as part of the Guaranteed Maximum Price ("GMP") to be paid to Developer by District.

Developer shall be responsible for any and all costs and expenses incurred by Developer including, but not limited to, the costs of hiring sub-consultants, contractors and other professionals, review of the Project's Plans and Specifications, review and preparation of necessary documentation relating to the development of the Project, all travel-related expenses, for meetings with District and its representatives, long distance telephone charges, copying expenses, salaries of Developer staff and employees working on the Project, overhead, and any other reasonable expenses incurred by Developer in performance of the services contemplated by this Agreement.

10.6 Termination before Construction Phase

10.6.1 Before the notice to proceed with the Construction Phase is issued by the District, this Agreement may be terminated at any time without cause by District upon fourteen (14) days written notice to Developer. In the event of such a termination by District, the District shall pay Developer for all undisputed services performed and expenses incurred per this Agreement, supported by documentary evidence including, but not limited to, payroll records, invoices from third parties retained by Developer pursuant to this Agreement, and expense reports up until the date of notice of termination plus any sums due Developer for Board-approved extra services. In ascertaining the services actually rendered hereunder up to the date of termination of this Agreement, consideration shall be given to completed Work and Work in process that would best serve the District if a completed product was presented.

10.6.2 In the event that the Parties do not reach an agreement on the GMP, this Agreement will be terminated at that time. In the event of such a

termination, the District shall pay Developer no more than the not to exceed amount in Section 10.5 above.

10.7 Construction Phase

Developer shall not commence Work for which a contractor: (1) is required to be licensed in accordance with Article 5 (commencing with Section 7065) of Chapter 9 of Division 3 of the Business and Professions Code, and (2) before receipt of the required Division of the State Architect ("DSA") approval for which DSA approval is required for Work to be performed.

11. Construction of Project

11.1 Construction of Project

11.1.1 Developer agrees to cause the Project to be developed, constructed, and installed in accordance with the terms hereof and the Construction Provisions set forth in **Exhibit D**, including those things reasonably inferred from the Contract Documents as being within the scope of the Project and necessary to produce the stated result even though no mention is made in the Contract Documents.

11.1.2 Contract Time / Construction Schedule

It is hereby understood and agreed that the Contract Time for this Project shall be [days in words] ([days in numbers]) calendar days, commencing with the date upon which the Facilities Lease and the Site Lease are fully executed and delivered to both Parties and ending with completion of the Work, which will occur no later than [Date] ("Contract Time"). The Construction Schedule must be approved by the District.

11.1.3 Schedule of Values

Developer will provide a schedule of values, approved by the District, which will be attached hereto as **Exhibit G** ("Schedule of Values"). The Schedule of Values must be approved by the District.

11.1.4 Liquidated Damages

Time is of the essence for all Work Developer must perform to complete the Project. The Parties understand and agree that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Developer's delay; therefore, Developer agrees that it shall pay to the District the sum of **five-hundred and no/00 Dollars ($500.00) per day** as liquidated damages for each and every day's delay beyond the Contract Time.

11.1.4.1 The Parties understand and agree that this amount is not a penalty.

11.1.4.2 In the event any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due Developer under this Facilities

Lease. The District's right to assess liquidated damages is as indicated herein and in **Exhibit D**.

11.1.4.3 The time during which the construction of the Project is delayed for cause as hereinafter specified may extend the time of completion for a reasonable time as the District may grant.

11.1.5 Guaranteed Maximum Price

Developer will cause the Project to be constructed within the GMP as set forth and defined in the GMP provisions in **Exhibit C,** and Developer will not seek additional compensation from District in excess of that amount.

11.1.6 Modifications

If the DSA requires changes to the Contract Documents submitted by District to Developer, and those changes change the construction costs and/or construction time for the Project, then those changed costs or time will be handled as a modification pursuant to the provisions of **Exhibit D**.

11.1.7 Labor Compliance Monitoring and Enforcement by Department of Industrial Relations

This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Developer specifically acknowledges and understands that it shall perform the Work of this Contract while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code (Labor Code §§ 1770, et seq.).

12. Maintenance

Following delivery of possession of the Project by Developer to District, the repair, improvement, replacement and maintenance of the Project and the Project Site shall be at the sole cost and expense and the sole responsibility of the District, subject only to all punch list items and warranties against defects in materials and workmanship of Developer as provided in **Exhibit D**. The District shall pay for or otherwise arrange for the payment of the cost of the repair and replacement of the Project resulting from ordinary wear and tear. The District waives the benefits of subsections 1 and 2 of Section 1932 of the California Civil Code, but such waiver shall not limit any of the rights of the District under the terms of this Facilities Lease.

13. Utilities

Following delivery of possession of the Project by Developer to District, the cost and expenses for all utility services including, but not limited to, electricity, natural gas, telephone, water, sewer, trash removal, cable television, janitorial service, security, heating, water, internet service, data transmission, and all other utilities of any type shall be paid by District.

14. Taxes and Other Impositions

All ad valorem real property taxes, special taxes, possessory interest taxes, bonds and special lien assessments or other impositions of any kind with respect to the Project, the Project Site

and the improvements thereon, charged to or imposed upon either Developer or the District or their respective interests or estates in the Project, shall at all times be paid by District. In the event any possessory interest tax is levied on Developer, its successors and assigns, by virtue of this Facilities Lease or the Site Lease, District shall pay such possessory interest tax directly, if possible, or shall reimburse Developer, its successors and assigns for the full amount thereof within forty-five (45) days after presentation of proof of payment by Developer.

15. Insurance

15.1 Developer's Insurance

Developer shall comply with the insurance requirements as indicated here and in **Exhibit D.**

15.1.1 Commercial General Liability and Automobile Liability Insurance

15.1.1.1 Developer shall procure and maintain, during the life of the Project, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Developer, District, its Board Members, employees, agents, Construction Manager(s), Project Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from, or in connection with, operations under the Project. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 00 01 11 88. Developer shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability coverage, and Automobile Liability coverage including owned, non-owned, and hired automobiles, are included within the above policies and at the required limits, or Developer shall procure and maintain these coverages separately.

15.1.1.2 Developer's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed five thousand dollars ($5,000) for deductible or twenty-five thousand dollars ($25,000) for self-insured retention, respectively, unless approved in writing by District.

15.1.1.3 All such policies shall be written on an occurrence form.

15.1.2 Excess Liability Insurance

15.1.2.1 If Developer's underlying policy limits are less than required, subject to 15.1.2.3 below, Developer may procure and maintain, during the life of the Project, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies in order to satisfy, in aggregate with its underlying policy, the insurance requirements herein.

15.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the

Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall protect Developer, District, its Board Members, employees, agents, Construction Manager(s), Project Manager(s), Project Inspector(s), and Architect(s) in amounts and including the provisions as set forth in **Exhibit D** and/or the Supplementary Conditions (if any), and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

15.1.2.3 The District, in its sole discretion, may accept the Excess Liability Insurance Policy that brings Developer's primary limits to the minimum requirements herein.

15.1.3 Subcontractor

Developer shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part, the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with minimum limits at least equal to the amount required of Developer except where smaller minimum limits are permitted as set forth below.

15.1.4 Workers' Compensation and Employers' Liability Insurance

15.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, Developer and every Subcontractor shall be required to secure the payment of compensation to its employees.

15.1.4.2 Developer shall procure and maintain, during the life of the Project, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in Work under the Project, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Developer shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Developer's insurance. If any class of employee or employees engaged in Work on the Project, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Developer shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence Work.

15.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

15.1.5.1 Developer shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the

total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, rain, dust, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

15.1.6 Pollution Liability Insurance

15.1.6.1 Developer shall procure and maintain Pollution Liability Insurance that shall protect Developer, District, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Facilities Lease, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Developer shall procure and maintain these coverages separately.

15.1.6.2 Developer warrants that any retroactive date applicable to coverage under the policy shall predate the Effective Date of this Facilities Lease and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

15.1.6.3 If Developer is responsible for removing any pollutants from a site, then Developer shall ensure that any auto, including owned, non-owned, and hired, are included within the above policies and at the required limits, to cover its automobile exposure for transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

15.1.7 Proof of Carriage of Insurance and Other Requirements Endorsements and Certificates

15.1.7.1 Developer shall not commence Work or allow any Subcontractor to commence Work on the Project, until Developer

and its Subcontractor(s) have procured all required insurance and Developer has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

15.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

15.1.7.2.1 A clause stating the following, or other language acceptable to the District:

"This policy shall not be canceled and the coverage amounts shall not be reduced until notice has been mailed to District, Architect, and Construction Manager stating date of cancellation by the insurance carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

15.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation notice will be sent, and length of notice period.

15.1.7.3 All endorsements, certificates and insurance policies shall state that District, its Board Members, employees and agents, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

15.1.7.4 All endorsements shall waive any right to subrogation against any of the named additional insureds.

15.1.7.5 Developer's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its Board Members, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

15.1.7.6 Developer's insurance limit shall apply separately to each insured against whom a claim is made or suit is brought.

15.1.7.7 No policy shall be amended, canceled, or modified, and the coverage amounts shall not be reduced, until Developer or Developer's broker has provided written notice to District, Architect, and Construction Manager stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

15.1.7.8 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Developer's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by Developer and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Facilities Lease. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Facilities Lease, and will cover Developer and all Subcontractors for all claims made.

15.1.7.9 Developer's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its Board Members, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

15.1.7.10 All endorsements shall waive any right to subrogation against any of the named additional insureds.

15.1.7.11 All policies shall be written on an occurrence form.

15.1.7.12 All of Developer's insurance shall be with insurance companies with an A.M. Best rating of no less than A: XI.

15.1.7.13 The insurance requirements set forth herein shall in no way limit Developer's liability arising out of or relating to the performance of the Work or related activities.

15.1.7.14 Failure of Developer and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Facilities Lease and constitute a Default by Developer pursuant to this Facilities Lease.

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15.1.8 Insurance Policy Limits

The limits of insurance shall not be less than the following amounts:

COMMERCIAL GENERAL LIABILITY	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	$5,000,000 per occurrence; $10,000,000 in aggregate
AUTOMOBILE LIABILITY – ANY AUTO	Combined Single Limit	$1,000,000
WORKERS COMPENSATION		Statutory limits pursuant to State law
EMPLOYERS' LIABILITY		$1,000,000
BUILDER'S RISK (COURSE OF CONSTRUCTION)		Issued for the value and scope of Work indicated herein.
POLLUTION LIABILITY		$1,000,000 per claim; $2,000,000 aggregate

If Developer normally carries insurance in an amount greater than the minimum amounts required by District, that greater amount shall become the minimum required amount of insurance for purposes of the Contract. Therefore, Developer hereby acknowledges and agrees that all insurance carried by it shall be deemed liability coverage for all actions it performs in connection with the Contract.

The limits of insurance for those subcontractors whose subcontract does not exceed One Million Dollars ($1,000,000) shall not be less than the following amounts:

COMMERCIAL GENERAL LIABILITY	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	$2,000,000 per occurrence; $4,000,000 in aggregate
AUTOMOBILE LIABILITY - ANY AUTO	Combined Single Limit	$1,000,000
WORKERS COMPENSATION		Statutory limits pursuant to State law
EMPLOYERS' LIABILITY		$1,000,000

Notwithstanding anything in this Facilities Lease to the contrary, the above insurance requirements may be modified as appropriate for subcontractors, with District's prior written approval.

15.2 District's Insurance

15.2.1 Rental Interruption Insurance

District shall at all times from and after District's acceptance of the Project, for the benefit of District and Developer, as their interests may appear, maintain rental interruption insurance to cover loss, total or partial, of the use of the Project due to damage or destruction, in an amount at least equal to the maximum estimated Lease Payments payable under this Facilities Lease during the current or any future twenty-four (24) month period. This insurance may be maintained as part of or in conjunction with any other insurance coverage carried by the District, and such insurance may be maintained in whole or in part in the form of participation by the District in a joint powers agency or other program providing pooled insurance. This insurance may not be maintained in the form of self-insurance.

15.2.2 Property Insurance

District shall at all times from and after District's acceptance of the Project, carry and maintain in force a policy of property insurance for 100% of the insurable replacement value with no coinsurance penalty, on the Project Site and the Project, together with all improvements thereon, under a standard "all risk" contract insuring against loss or damage. Developer shall be named as additional insureds or co-insureds thereon by way of endorsement. District shall have the right to procure the required insurance through a joint powers agency or to self-insure against such losses or portion thereof as is deemed prudent by District.

16. Indemnification and Defense

16.1 To the fullest extent permitted by California law, Developer shall indemnify, keep and hold harmless the District, the Architect(s) and Construction Manager(s), their respective consultants, separate contractors, board members, officers, representatives, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, injury, damages, losses, and expenses ("Claims") including, but not limited to, attorney's fees and costs, caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by Developer or its Subcontractors, vendors and/or suppliers. However, Developer's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent the Claim(s) is/are caused wholly by the active negligence or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. This indemnification and hold harmless obligation of Developer shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist or arise as to any Indemnitee or other person described herein. This indemnification and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Developer to comply with any law and/or provision of the Contract Documents in strict accordance with their terms and, without limitation, any failure or alleged failure of Developer's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR.

16.2 To the fullest extent permitted by California law, Developer shall also defend Indemnitees, at its own expense including, but not limited to, attorneys' fees and costs, against all Claims caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Facilities Lease by Developer, its Subcontractors, vendors, or suppliers. However, without impacting Developer's obligation to provide an immediate and ongoing defense of Indemnitees, Developer's defense obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction. The District shall have the right to accept or reject any legal representation that Developer proposes to defend the Indemnitees. If any Indemnitee provides its own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Developer shall reimburse such Indemnitee for any expenditures. Developer's defense obligation shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any Indemnitee or other person described herein. Developer's defense obligation includes, but is not limited to, any failure or alleged failure by Developer to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Developer's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the DIR. Developer shall give prompt notice to the District in the event of any Claim(s).

16.3 Without limitation of the provisions herein, if Developer's obligation to indemnify and hold harmless the Indemnitees or its obligation to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the Parties that these circumstances shall not otherwise affect the validity or enforceability of Developer's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, Developer shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

16.4 Pursuant to Public Contract Code section 9201, the District shall provide timely notification to Developer of the receipt of any third-party Claim relating to this Contract. The District shall be entitled to recover its reasonable costs incurred in providing said notification.

16.5 In any and all Claims against any of the Indemnitees by any employee of Developer, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, Developer's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Developer or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

16.6 The District may retain so much of the moneys due to Developer as shall be considered necessary, until disposition of any such Claims or until the District, Architect(s) and Construction Manager(s) have received written agreement from Developer that Developer will unconditionally defend the District, the Architect(s) and Construction Manager(s), their respective officers, agents and employees, and pay any damages due by reason of settlement or judgment.

16.7 Developer's defense and indemnification obligations hereunder shall survive the completion of Work, including the warranty/guarantee period and/or the termination of the Contract.

17. Eminent Domain

17.1 Total Taking After Project Delivery

If, following delivery of possession of the Project and Project Site by Developer to District, all of the Project and the Project Site is taken permanently under the power of eminent domain, the Term shall cease as of the day possession shall be so taken.

17.1.1 The financial interest of Developer shall be limited to the amount of principal payments pursuant to the GMP provisions indicated in **Exhibit C** that are then due or past due together with all remaining and succeeding principal payments pursuant to the GMP provisions indicated in **Exhibit C** for the remainder of the original Term. For example, if all of the Project and the Project Site is taken at the end of the third year of the Term, Developer shall be entitled to receive from the eminent domain award the sum of all principal payments pursuant to the GMP provisions indicated in **Exhibit C** that would have been owing for the fourth year through the end of the Term had there been no taking.

17.1.2 The balance of the award, if any, shall be paid to the District.

17.2 Total Taking Prior to Project Delivery

If all of the Project and the Project Site is taken permanently under the power of eminent domain and Developer is still performing the Work of the Project and has not yet delivered possession of the Project to District, the Term shall cease as of the day possession shall be so taken. The financial interest of Developer shall be the amount Developer has expended to date for Work performed on the Project, subject to documentation reasonably satisfactory to the District.

17.3 Partial Taking

If, following delivery of possession of the Project by Developer to District, less than all of the Project and the Project Site is taken permanently, or if all of the Project and the Project Site or any part thereof is taken temporarily, under the power of eminent domain.

17.3.1 This Facilities Lease shall continue in full force and effect and shall not be terminated by virtue of that partial taking and the Parties waive the benefit of any law to the contrary, and

17.3.2 There shall be a partial abatement of any principal payments pursuant to the GMP provisions indicated in **Exhibit C** as a result of the application of the net proceeds of any eminent domain award to the prepayment of those payments hereunder. The Parties agree to negotiate, in good faith, for an equitable split of the net proceeds of any eminent domain award and a corresponding reduction in the payments required pursuant to the GMP provisions indicated in **Exhibit C**.

18. Damage and Destruction

If, following delivery of possession of all or a portion of the Project and the Project Site by Developer to District, the Project is totally or partially destroyed due to fire, acts of vandalism, flood, storm, earthquake, Acts of God, or other casualty beyond the control of either party hereto, the Term shall end and District shall no longer be required to make any payments required pursuant to the GMP provisions indicated in **Exhibit C** that are then due or past due or any remaining and succeeding principal payments pursuant to the GMP provisions indicated in **Exhibit C** for the remainder of the original Term.

19. Abatement

19.1 If, after the Parties have executed the Memorandum of Commencement Date attached hereto as **Exhibit E,** the Project becomes destroyed or damaged beyond repair, the District may determine its use of the Project abated. Thereafter, the District shall have no obligation to make, nor shall Developer have the right to demand, the Lease Payments as indicated in the GMP provisions indicated in **Exhibit C** to this Facilities Lease. The Term shall cease at that time.

19.2 The Parties hereby agree that the net proceeds of the District's rental interruption insurance that the District must maintain during the Term, as required herein, shall constitute a special fund for the payment of the Lease Payments indicated in the GMP provisions indicated in **Exhibit C**.

19.3 The District shall as soon as practicable after such event, apply the net proceeds of its insurance policy intended to cover that loss ("Net Proceeds"), either to:

19.3.1 Repair the Project to full use.

19.3.2 Replace the Project, at the District's sole cost and expense, with property of equal or greater value to the Project immediately prior to the time of the destruction or damage, and that replacement, once completed, shall be substituted in this Facilities Lease by appropriate endorsement; or

19.3.3 Exercise the District's purchase option as indicated in the GMP provisions indicated in **Exhibit C** to this Facilities Lease.

19.4 The District shall notify Developer of which course of action it desires to take within thirty (30) days after the occurrence of the destruction or damage. The Net Proceeds of all insurance payable with respect to the Project shall be available to the District and shall be used to discharge the District's obligations under this Section.

20. Access

20.1 By Developer

Developer shall have the right at all reasonable times to enter upon the Project Site to construct the Project pursuant to this Facilities Lease. Following the acceptance of the Project by District, Developer may enter the Project at reasonable times with advance notice and arrangement with District for purposes of making any repairs required to be made by Developer.

20.2 By District

The District shall have the right to enter upon the Project Site at all times. District shall comply with all safety precautions and procedures required by Developer.

21. Assignment, Subleasing

21.1 Assignment and Subleasing by the District

Any assignment or sublease by District shall be subject to all of the following conditions:

21.1.1 This Facilities Lease and the obligation of the District to make the payments required pursuant to the GMP provisions indicated in **Exhibit C** shall remain obligations of the District; and

21.1.2 The District shall, within thirty (30) days after the delivery thereof, furnish or cause to be furnished to Developer a true and complete copy of any assignment or sublease.

21.2 Assignment by Developer

Developer may assign its right, title and interest in this Facilities Lease, in whole or in part to one or more assignees, only after the written consent of District, which District will not unreasonably withhold. No assignment shall be effective against the District unless and until the District has consented in writing. Notwithstanding anything to the contrary contained in this Facilities Lease, no consent from the District shall be required in connection with any assignment by Developer to a lender for purposes of financing the Project as long as there are not additional costs to the District.

22. Termination, Default And Suspension

22.1 Termination; Lease Terminable Only As Set Forth Herein

22.1.1 Except as otherwise expressly provided in this Facilities Lease, this Facilities Lease shall not terminate, nor shall District have any right to terminate this Facilities Lease or be entitled to the abatement of any necessary payments pursuant to the GMP provisions in **Exhibit C** or any reduction thereof. The obligations hereunder of District shall not be otherwise affected by reason of any damage to or destruction of all or any part of the Project; the taking of the Project or any portion thereof by condemnation or otherwise; the prohibition, limitation or restriction of District's use of the Project; the interference with such use by any private person or contractor; the District's acquisition of the ownership of the Project (other than pursuant to an express provision of this Facilities Lease); any present or future law to the contrary notwithstanding. It is the intention of the Parties hereto that all necessary payments pursuant to the GMP provisions indicated in **Exhibit C** shall continue to be payable in all events, and the obligations of the District hereunder shall continue unaffected unless the requirement to pay or perform the same shall be terminated or modified pursuant to an express provision of this Facilities Lease.

22.1.2 Nothing contained herein shall be deemed a waiver by the District of any rights that it may have to bring a separate action with respect to any Event

of Default by Developer hereunder or under any other agreement to recover the costs and expenses associated with that action. The District covenants and agrees that it will remain obligated under this Facilities Lease in accordance with its terms.

22.1.3 Following completion of the Project, the District will not take any action to terminate, rescind or avoid this Facilities Lease, notwithstanding the bankruptcy, insolvency, reorganization, composition, readjustment, liquidation, dissolution, winding-up or other proceeding affecting Developer or any assignee of Developer in any such proceeding, and notwithstanding any action with respect to this Facilities Lease which may be taken by any trustee or receiver of Developer or of any assignee of Developer in any such proceeding or by any court in any such proceeding. Following completion of the Project, except as otherwise expressly provided in this Facilities Lease, District waives all rights now or hereafter conferred by law to quit, terminate or surrender this Facilities Lease or the Project or any part thereof.

22.1.4 District acknowledges that Developer may assign an interest in some or all of the necessary payments pursuant to the GMP provisions indicated in **Exhibit C** to a lender in order to obtain financing for the cost of constructing the Project and that the lender may rely on the foregoing covenants and provisions in connection with such financing.

22.2 District's Request for Assurances

If District at any time reasonably believes Developer is or may be in default under this Contract, District may in its sole discretion notify Developer of this fact and request written assurances from Developer of performance of Work and a written plan from Developer to remedy any potential default under the terms of this Contract that the District may advise Developer of in writing. Developer shall, within ten (10) calendar days of District's request, deliver a written cure plan that meets the District's requirements in its request for assurances. Developer's failure to provide such written assurances of performance and the required written plan, within ten (10) calendar days of request, will constitute a material breach of this Contract sufficient to justify termination for cause.

22.3 District's Right to Terminate Developer for Cause

22.3.1 Grounds for Termination

The District, in its sole discretion, without prejudice to any other right or remedy, may terminate the Site Lease and Facilities Lease and/or terminate Developer's right to perform the Work of the Facilities Lease based upon any of the following:

22.3.1.1 Developer refuses or fails to execute the Work or any separable part thereof; or

22.3.1.2 Developer fails to complete said Work within the time specified or any extension thereof; or

22.3.1.3 Developer persistently fails or refuses to perform Work or provide material of sufficient quality as to be in compliance with the Facilities Lease; or

22.3.1.4 Prior to completion of the Project, Developer is adjudged a bankrupt, files a petition for relief as a debtor, or a petition is filed against Developer without its consent, and the petition not dismissed within sixty (60) days; or

22.3.1.5 Prior to the completion of the Project, Developer makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency; or

22.3.1.6 Developer persistently or repeatedly refuses and/or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

22.3.1.7 Developer fails to make prompt payment to Subcontractors, or for material, or for labor; or

22.3.1.8 Developer persistently disregards laws, or ordinances, or instructions of District as indicated in **Exhibit D**, or otherwise in violation of **Exhibit D**; or

22.3.1.9 Developer fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

22.3.1.10 Developer or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Facilities Lease, including but not limited to a lapse in licensing or registration.

22.3.2 Notification of Termination

22.3.2.1 Upon the occurrence of any of the above conditions, or upon Developer's failure to perform any material covenant, condition or agreement in this Facilities Lease, District may, at District's sole determination, without prejudice to any other right or remedy, serve written notice upon Developer and its Surety of District's termination of this Facilities Lease and/or Developer's right to perform the Work of this Facilities Lease. This notice will contain the reasons for termination.

22.3.2.2 Unless, within fifteen (15) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Facilities Lease and the Site Lease shall cease and terminate; provided, however, if the failure stated in the notice cannot be corrected within fifteen (15) days after the service of notice, District

may consent to an extension of time, provided Developer instituted and diligently pursued corrective action within the applicable fifteen (15)-day period and until the violation is corrected. Upon District determination, Developer shall not be entitled to receive any further payment until the entire Work is finished.

22.3.2.3 Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Facilities Lease only if Surety:

22.3.2.3.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Facilities Lease; and

22.3.2.3.2 Commences performance of this Facilities Lease within three (3) days from date of serving of its notice to District.

22.3.2.4 Surety shall not utilize Developer in completing the Project if the District notifies Surety of the District's objection to Developer's further participation in the completion of the Project. Surety expressly agrees that any developer that Surety proposes to fulfill Surety's obligations is subject to District's approval.

22.3.2.5 If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Developer and/or its Surety. Developer and its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Facilities Lease. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the Work all materials, appliances, plan, and other property belonging to Developer as may be on the Site of the Work, in bonded storage, or previously paid for.

22.3.3 Effect of Termination

22.3.3.1 If District terminates the Site Lease and the Facilities Lease pursuant to this section, the Project Site and any improvements built upon the Project Site shall vest in District upon termination of the Site Lease and Facilities Lease, and District shall thereafter be required to pay only the principal amounts then due and owing pursuant to the GMP provisions indicated in **Exhibit C**, less any damages incurred by District due to Developer's default, acts, or omissions.

22.3.3.2 The District shall retain all rights it possesses pursuant to this Facilities Lease including, without limitation:

22.3.3.2.1 The right to assess liquidated damages due because of any project delay; and

22.3.3.2.2 All rights the District holds to demand performance pursuant to Developer's required performance bond.

22.3.3.3 Developer shall, only if ordered to do so by the District, immediately remove from the Project Site all or any materials and personal property belonging to Developer that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Developer that have not been incorporated in the construction of the Work, or which are not in place in the Work. Developer and its Surety shall be liable upon the performance bond for all damages caused the District by reason of Developer's failure to complete the Work under this Facilities Lease.

22.3.3.4 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to Developer in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

22.3.3.5 In the event termination for cause is determined to have not been for cause, the termination shall be deemed to have been a termination for convenience effective as of the same date as the purported termination for cause.

22.3.3.6 In the event that the Site Lease and Facilities Lease are terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by Developer or any impact or impairment of Developer's bonding capacity.

22.3.3.7 If the expense to the District to finish the Work exceeds the unpaid Guaranteed Maximum Price, Developer and Surety shall pay difference to District within twenty-one (21) days of District's request. District may apply any amounts otherwise due to Developer to this difference.

22.3.3.8 The District shall have the right, but shall have no obligation, to assume and/or assign to a replacement contractor or construction manager, or other third party who is qualified and has sufficient resources to complete the Work, the rights of Developer under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Facilities Lease. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, Developer shall execute and deliver all documents

and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of its Subcontractors under Subcontracts or other obligations or commitments. Developer must include this assignment provision in all of its Facilities Leases with its Subcontractors.

22.3.3.9 All payments due Developer hereunder shall be subject to a right of offset by the District for expenses, damages, losses, costs, claims, or reimbursements suffered by, or due to, the District as a result of any default, acts, or omissions of Developer.

22.3.3.10 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

22.4 Termination of Developer for Convenience

22.4.1 District in its sole discretion may terminate the Facilities Lease in whole or in part upon three (3) days written notice to Developer.

22.4.2 Upon notice, Developer shall:

22.4.2.1 Cease operations as directed by the District in the notice;

22.4.2.2 Take necessary actions for the protection and preservation of the Work as soon as possible; and

22.4.2.3 Terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

22.4.3 Within 30 days of the notice, Developer shall submit to the District a payment application for the actual cost for labor, materials, and services performed, including all Developer's and Subcontractor(s)' mobilization and/or demobilization costs, that is unpaid. Developer shall have no claims against the District except for the actual cost for labor, materials, and services performed that adequately documented through timesheets, invoices, receipts, or otherwise. District shall pay all undisputed invoice(s) for Work performed until the notice of termination.

22.4.4 Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause.

22.5 Developer Remedies Upon District Default

22.5.1 Events of Default by District Defined

The following shall be "Events of Default" of the District under this Facilities Lease. The terms "Event of Default" and "Default," whenever they are used as to the District in the Site Lease or this Facilities Lease, shall only mean one or more of the following events:

22.5.1.1 Failure by the District to pay payments required pursuant to the GMP provisions in **Exhibit C**, and the continuation of this failure for a period of forty-five (45) days.

22.5.1.2 Failure by the District to perform any material covenant, condition or agreement in this Facilities Lease and that failure continues for a period of forty-five (45) days after Developer provides District with written notice specifying that failure and requesting that the failure be remedied; provided, however, if the failure stated in the notice cannot be corrected within the applicable period, Developer shall not withhold its consent to an extension of time if corrective action is instituted by the District within the applicable period and diligently pursued until the default is corrected.

22.5.2 Remedies on District's Default

If there has been an Event of Default on the District's part, Developer may exercise any and all remedies granted pursuant to this Facilities Lease; provided, however, there shall be no right under any circumstances to accelerate any of the payments required pursuant to the GMP provisions in **Exhibit C** or otherwise declare those payments not then past due to be immediately due and payable.

22.5.2.1 Developer may rescind its leaseback of the Project Site to the District under this Facilities Lease and re-rent the Project Site to another lessee for the remaining Term for no less than the fair market value for leasing the Project Site, which shall be:

22.5.2.1.1 An amount determined by a mutually-agreed upon appraiser; or

22.5.2.1.2 If an appraiser cannot be agreed to, an amount equal to the mean between a District appraisal and a Developer appraisal for the Project Site, both prepared by MAI-certified appraisers.

22.5.2.2 District's obligation to make the payments required pursuant to the GMP provisions indicated in **Exhibit C** shall be:

22.5.2.2.1 Increased by the amount of costs, expenses, and damages incurred by Developer in re-renting the Project Site; and

22.5.2.2.2 Decreased by the amount of rent Developer receives in re-letting the Project Site.

22.5.2.3 District agrees that the terms of this Facilities Lease constitute full and sufficient notice of the right of Developer to re-rent the Project Site in the Event of Default without effecting a surrender of this Facilities Lease, and further agrees that no acts of Developer in re-renting as permitted herein shall constitute a surrender or termination of this Facilities Lease, but that, on the

contrary, in the event of an Event of Default by the District the right to re-rent the Project Site shall vest in Developer as indicated herein.

22.5.3 District's Continuing Obligation

Unless there has been damage, destruction, a Taking (as described in Article 17, above), or Developer has acted, failed to act, or is in default as indicated above providing District with the right to terminate for cause, the District shall continue to remain liable for the payments required pursuant to the GMP provisions in **Exhibit C** and those amounts shall be payable to Developer at the time and in the manner therein provided.

22.5.4 No Remedy Exclusive

No remedy herein conferred upon or reserved to Developer is intended to be exclusive and every such remedy shall be cumulative and shall be in addition to every other remedy given under this Facilities Lease or now or hereafter existing at law or in equity. No delay or omission to exercise any right or power accruing upon any Default shall impair any such right or power or shall be construed to be a waiver thereof, but any such right and power may be exercised from time to time and as often as may be deemed expedient. In order to entitle Developer to exercise any remedy reserved to it in this article, it shall not be necessary to give any notice, other than such notice as may be required in this Article or by law.

22.6 Emergency Termination Pursuant to Public Contracts Act of 1949

22.6.1 This Facilities Lease is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

22.6.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the Work, then the public agency and the contractor may, by written agreement, terminate said contract.

22.6.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

22.6.2 Compensation to Developer shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price may control. The District, at its sole discretion, may adopt the Schedule of Values Price as the value of the Work done or any portion thereof.

22.7 Suspension of Work

22.7.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to Developer.

22.7.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any suspension, delay or interruption. No adjustment shall be made to the extent:

22.7.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Developer is responsible; or

22.7.1.1.2 That an equitable adjustment is made or denied under another provision of the Site Lease or the Facilities Lease; or

22.7.1.1.3 That the suspension of Work was the direct or indirect result of Developer's failure to perform any of its obligations hereunder.

22.7.1.1.4 The delay could not have been avoided or mitigated by Developer's reasonable diligence.

22.7.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order in **Exhibit D**. This amount shall be full compensation for all Developer's and its Subcontractor(s)' changes in the cost of performance of the Facilities Lease caused by any such suspension, delay or interruption.

23. Limitation of District Liability

District's financial obligations under this Contract shall be limited to the payment of the compensation provided in this Contract. Notwithstanding any other provision of this Contract, in no event shall District be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages including, but not limited to, lost profits or revenue, lost bonding capacity, arising out of or in connection with this Contract for the services performed in connection with this Contract.

24. Notices

All notices, certificates or other communications hereunder shall be sufficiently given and shall be deemed to have been received five (5) days after deposit in the United States mail in registered or certified form with postage fully prepaid or one (1) business day after deposit with an overnight delivery service with proof of actual delivery:

If to District:	**If to Developer:**
Stockton Unified School District 56 S. Lincoln Street Stockton, CA 95203 Attn: Vickie Brum, Director of Facilities & Planning	[Developer] [Address] Attn: [Name, Title]

Developer and District, by notice given hereunder, may designate different addresses to which subsequent notices, certificates or other communications will be sent.

25. Binding Effect

This Facilities Lease shall inure to the benefit of and shall be binding upon Developer and District and their respective successors, transferees and assigns.

26. No Additional Waiver Implied by One Waiver

In the event any agreement contained in this Facilities Lease should be breached by either party and thereafter waived by the other party, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive any other breach hereunder.

27. Severability

In the event any provision of this Facilities Lease shall be held invalid or unenforceable by any court of competent jurisdiction, that holding shall not invalidate or render unenforceable any other provision hereof, unless elimination of the invalid provision materially alters the rights and obligations embodied in this Facilities Lease or the Site Lease.

28. Amendments, Changes and Modifications

Except as to the termination rights of both Parties as indicated herein, this Facilities Lease may not be amended, changed, modified, altered or terminated without the written agreement of both Parties hereto.

29. Net-Net-Net Lease

This Facilities Lease shall be deemed and construed to be a "net-net-net lease" and the District hereby agrees that all payments it makes pursuant to the GMP provisions in **Exhibit C** shall be an absolute net return to Developer, free and clear of any expenses, charges or set-offs.

30. Execution in Counterparts

This Facilities Lease may be executed in several counterparts, each of which shall be an original and all of which shall constitute one and the same instrument.

31. Developer and District Representatives

Whenever under the provisions of this Facilities Lease the approval of Developer or the District is required, or Developer or the District is required to take some action at the request of the other, the approval or request shall be given for Developer by Developer's Representative and for the District by the District's Representative, and any party hereto shall be authorized to rely upon any such approval or request.

32. Applicable Law

This Facilities Lease shall be governed by and construed in accordance with the laws of the State of California, and venued in the County within which the School Site is located.

33. Attorneys' Fees

If either party brings an action or proceeding involving the Property or to enforce the terms of this Facilities Lease or to declare rights hereunder, each party shall bear the cost of its own attorneys' fees.

34. Captions

The captions or headings in this Facilities Lease are for convenience only and in no way define, limit or describe the scope or intent of any provisions or sections of this Facilities Lease.

35. Prior Agreements

This Facilities Lease and the corresponding Site Lease collectively contain all of the agreements of the Parties hereto with respect to any matter covered or mentioned in this Facilities Lease and no prior agreements or understanding pertaining to any matter shall be effective for any purpose.

36. Further Assurances

Parties shall promptly execute and deliver all documents and instruments reasonably requested to give effect to the provisions of this Facilities Lease.

37. Recitals and Exhibits Incorporated

The Recitals set forth at the beginning of this Facilities Lease and the attached Exhibits are hereby incorporated into its terms and provisions by this reference.

38. Time of the Essence

Time is of the essence with respect to each of the terms, covenants, and conditions of this Facilities Lease.

39. Force Majeure

A party shall be excused from the performance of any obligation imposed in this Facilities Lease and the exhibits hereto for any period and to the extent that a party is prevented from performing that obligation, in whole or in part, as a result of delays caused by the other party or third parties, a governmental agency or entity, an act of God, war, terrorism, civil disturbance, forces of nature, fire, flood, earthquake, strikes, or lockouts, and that non-performance will not be a default hereunder or a grounds for termination of this Facilities Lease.

40. Interpretation

None of the Parties hereto, nor their respective counsel, shall be deemed the drafters of this Facilities Lease for purposes of construing the provisions thereof. The language in all parts of this Facilities Lease shall in all cases be construed according to its fair meaning, not strictly for or against any of the Parties hereto.

[SIGNATURES ON NEXT PAGE]

IN WITNESS WHEREOF, the Parties have caused this Facilities Lease to be executed by their respective officers who are duly authorized, as of the Effective Date.

ACCEPTED AND AGREED on the date indicated below:

Dated: _____, 20__	Dated: _____, 20__
Stockton Unified School District	[Developer]
By: _____	By: _____
_____	_____
Name: _____	Name: _____
_____	_____
Title: _____	Title: _____
_____	_____

EXHIBIT A

LEGAL DESCRIPTION OF SCHOOL SITE

Attached is the Legal Description for:

[Name of] Project
[Address]
APN: _____

<INSERT>

EXHIBIT B

DESCRIPTION OF PROJECT SITE

Attached is a map or diagram of the School Site that is subject to this Facilities Lease and upon which Developer will construct the Project.

<INSERT>

EXHIBIT C

GUARANTEED MAXIMUM PRICE AND OTHER PROJECT COST, FUNDING, AND PAYMENT PROVISIONS

Attached are the terms and provisions related to Site Lease payments, the Facilities Lease, the Guaranteed Maximum Price and other related cost, funding, and payment provisions.

EXHIBIT D

GENERAL CONSTRUCTION PROVISIONS

Attached are the general construction terms and conditions for the Project.

EXHIBIT D-1

SPECIAL CONDITIONS

Attached are the special terms and conditions for the Project.

EXHIBIT E

MEMORANDUM OF COMMENCEMENT DATE

This MEMORANDUM OF COMMENCEMENT DATE is dated _____, 202_, and is made by and between _____ ("Developer"), as Lessor, and the Stockton Unified School District ("District"), as Lessee.

1. Developer and District have previously entered into a Facilities Lease dated as of _____, 202_, (the "Lease") for the leasing by Developer to District of the Project Site and Project in [City], California, referenced in the Lease.

2. District hereby confirms the following:

A. That all construction of the Project required to be performed pursuant to the Facilities Lease has been completed by Developer in all respects;

B. That District has accepted and entered into possession of the Project and now occupies same; and

C. That the term for the Lease Payments under the Facilities Lease commenced on _____, 20__ and will expire at 11:59 P.M. on _____, 20__.

THIS MEMORANDUM OF COMMENCEMENT DATE IS ACCEPTED AND AGREED on the date indicated below:

Dated: _____ __ , 20__	Dated: _____ __ , 20__
Stockton Unified School District	[Developer]
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____

EXHIBIT F

CONSTRUCTION SCHEDULE

Attached is a detailed Project Construction Schedule with a duration no longer than the Contract Time, and with specific milestones that Developer shall meet.

[To Be Attached.]

EXHIBIT G

SCHEDULE OF VALUES

Attached is a detailed Schedule of Values that complies with the requirements of the Construction Provisions (Exhibit "D") and that has been approved by the District.

[To Be Attached.]

EXHIBIT H

PROJECT LABOR AGREEMENT

Attached is the Project Labor Agreement applicable to this Project.

APPENDIX C-1

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing
[Title] [Name of Firm]
bid/proposal.

The bid/proposal is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid/proposal is genuine and not collusive or sham. The bidder/proposer has not directly or indirectly induced or solicited any other bidder/proposer to put in a false or sham bid. The bidder/proposer has not directly or indirectly colluded, conspired, connived, or agreed with any bidder/proposer or anyone else to put in a sham bid/proposal, or to refrain from bidding/proposing. The bidder/proposer has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid/proposal price of the bidder/proposer or any other bidder/proposer, or to fix any overhead, profit, or cost element of the bid/proposal price, or of that of any other bidder/proposer. All statements contained in the bid/proposal are true. The bidder/proposer has not, directly or indirectly, submitted his or her bid/proposal price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid/proposal, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder/proposer that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder/proposer.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____,
[Date]
at _____, _____.
[City] [State]

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

APPENDIX C-2

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

Prior to bidding on or submitting a proposal for a contract for goods or services of $1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

☐ **OPTION 1.** Bidder/Proposer is not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b), and we are not a financial institution extending twenty million dollars ($20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

☐ **OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

Vendor Name/Financial Institution (Printed)	*Federal ID Number (or n/a)*
By (Authorized Signature)	
Printed Name and Title of Person Signing	*Date Executed*

END OF DOCUMENT

APPENDIX C-3

Allowable General Condition Costs
Construction Phase Scope Detail

	Project (On Site Jobsite Staff)	Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Operations Manager		X		
2	Project Manager		X		
3	Project Superintendent		X		
4	Project Engineer		X		
5	Home Office Engineer		X		
6	Scheduling Engineer		X		
7	Field Engineer		X		
8	Draftsman/Detailer		X		
9	Record Drawings		X		
10	Field Accountant		X		
11	Time Keeper/Checker		X		
12	Secretarial/Clerk Typist		X		
13	Independent Surveyor	X			
14	Safety &. E.E.O. officer		X		
15	Runner/Water Boy		X		
16	Vacation Time/Job Site Staff		X		
17	Sick Leave/Job Site Staff		X		
18	Bonuses/Job Site Staff			X	
19	Quality Control Program		X		
20	Qualified SWPPP Practitioner (QSP)	X			
21	SWPPP Creation, Approval, Notifications	X			

	Temporary Utilities	Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Telephone Installation		X		
2	Telephone Monthly Charges		X		
3	Elect Power Installation	X			
4	Elect Power Distribution - Wiring/Spider boxes/ Lighting for construction	X			
5	Elect Power Monthly Charges				X
6	Water Service for construction	X			
7	Heating & Cooling Costs for construction	X			
8	Light Bulbs & Misc. Supplies for construction	X			
9	Clean-Up-Periodical	X			
10	Clean-Up-Final	X			
11	Dump Permits and Fees	X			
12	Recycling/Trash Dumpster Removal/Hauling	X			
13	Flagger/Traffic Control	X			
14	Dust Control	X			
15	Temporary Road and Maintenance if	X			
16	Trash Chute & Hopper (if applicable)	X			

Direct Job Costs		Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Wages of Construction Labor	X			
2	Labor/Fringe Benefits & Burden	X			
3	Subcontract Costs	X			
4	Material & Equipment/Included		X		
	a. Contractor Owned Equip, trucks		X		
	b. Small Tools - Purchase		X		
	c. Small Tools - Rental		X		
5	Warranty Work & Coordination			X	

Temporary Facilities		Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Office Trailer including shared office for IOR & CM (office must include lockable door, 2 desks, 2 chairs, 1 file cabinet, and Wi-Fi connection)		X		
2	Storage Trailer & Tool Shed Rental		X		
3	Office Furniture/Equip/computers		X		
4	Xerox Copies/Misc Printing		X		
5	Postage/UPS/FedEx		X		
6	Project Photographs		X		
7	Temporary Toilets		X		
8	Project Sign		X		
9	Temporary Fencing/Enclosures		X		
10	Covered Walkways if required	X			
11	Barricades	X			
12	Temporary Stairs	X			
13	Opening Protection	X			
14	Safety Railing & Nets	X			
15	Drinking Water/Cooler/Cup		X		
16	Safety/First Aid Supplies		X		
17	Fire Fighting Equipment		X		
18	Security Guards		X		
19	Watchman Service		X		
20	Phone/fax lines, cell phones, WiFi		X		
21	Temporary "Swing space" portables to house teachers and students as required for phasing				X
22	Utility connections and civil work needed for temporary "swing space" portables as required for phasing	X			

Miscellaneous Project Costs		Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Performance and Payment Bonds				
2	Developer-provided insurance				
3	Printing - Drwgs & Specs (Max of 15 sets)				X
4	Initial Soils Investigation				X
5	Testing and Inspection				X
6	Maintenance After Occupancy				X
7	Facility Operator/Training	X			
8	Fees				X

Hoisting		Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Hoist & Tower Rental	X			
2	Hoist Landing & Fronts	X			
3	Hoist Operator	X			
4	Hoist Safety Inspections	X			
5	Hoist Material Skips/Hoppers	X			
6	Erect & Dismantle Hoists	X			
7	Crane Rental	X			
8	Crane Operators	X			
9	Crane Safety Inspections	X			
10	Erect & Dismantle Crane	X			
11	Fuel, Repairs, Maintenance	X			
12	Crane Raising/Jumping Costs	X			
13	Safety Inspections	X			
14	Forklift Rental	X			
15	Forklift Operator	X			
16	Forklift Safety Inspections	X			
17	Fuel, Repairs, Maintenance	X			

Contractor's Main Office Staff		Direct Cost of the Work	General Conditions	Overhead and Profit	Paid by District
1	Corporate Executives			X	
2	Principal in Charge			X	
3	Estimating Cost Engineering			X	
4	Value Engineering			X	
5	Scheduling			X	
6	Drafting and Detailing			X	
7	Purchasing & Contracts			X	
8	Accounting & Bookkeeping			X	
9	Safety & E.E.O Officer			X	
10	Secretarial			X	
11	Clerk/Typist			X	
12	Computer/Data Processing			X	
13	Legal (General Services/Pertaining to			X	
14	Travel & Subsistence			X	
15	Fringe Benefits & Burden			X	
16	Vacation Time/Main Office			X	
17	Bonuses/Main Office			X	
General Conditions Total Cost transfer to Fee Proposal			$		

SECTION 011000

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work covered by Contract Documents.
2. Access to site.
3. Coordination with occupants.
4. Work restrictions.
5. Specification and drawing conventions.
6. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Alteration of approximately 3,000 SF of existing Auto Shop/Classroom into an Ag Mechanics Shop/Classroom. Demo of existing freestanding canopy and construction of new 40'x60' freestanding canopy including associated site work and paving as shown on drawings and specifications.

B. Type of Contract.

1. Project will be constructed under a single LLB contract.

1.3 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract Limits and as indicated by requirements of this Section.

C. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to are of work defined within the drawings.
2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations.

1.4 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.

2. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 6 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted on site.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications.

END OF SECTION 011000

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of form provided in Project Manual.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from California Building Code.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include

letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection subject to owner's approval of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Substitution Request Form (Signed by the Architect) Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

b. Requested substitution will not adversely affect Contractor's construction schedule.

c. Requested substitution has received necessary approvals of authorities having jurisdiction.

d. Requested substitution is compatible with other portions of the Work.

e. Requested substitution has been coordinated with other portions of the Work.

f. Requested substitution provides specified warranty.

g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

h. Requested Substitution is, in the opinion of the Architect, appropriate for the work.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within thirty (30) days after commencement of the Work.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

END OF SECTION 012500

COMMUNITY
ARCHITECTURE

Date Submitted: _____ Date Received by Architect: _____

SUBSTITUTION REQUEST FORM

Project:	Submitted by:
Client:	
Project No.:	Subcontractor or Supplier:
DSA A#:	

Reason for Request:

SUBSTITUTION FOR CAUSE ☐ SUBSTITUTION FOR CONVENIENCE ☐

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of request; applicable portions of data are clearly identified.

Attached data also includes a description of changes to Contract Documents which proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on drawings and does not require design changes in the Contract Documents.
2. The undersigned will pay for Architect services and Consultant services involved in the review of and construction costs caused by the request substitution.
3. The proposed substitution will have no adverse affect on the Work, the schedule, or specified warranty requirements.
4. Maintenance and service parts will be readily available for the proposed substitution.

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

OWNER'S BENEFIT: **COST CREDIT OF $** _____ **TIME CREDIT OF DAYS** _____

Submitted by _____

Signature: _____

Contractor _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

For use by Architect

[ ] Accepted.
[ ] Not Accepted.
[ ] Accepted as noted.

By _____

Date _____

Remarks _____

_____

_____

_____

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included in Project Manual.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, 10 after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form included in Project Manual.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on form included in Project Manual. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 012900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of **AIA Document G703** Retain option in first subparagraph below where Contractor's ongoing activities related to Project closeout will be a line item subject to Application for Payment approval.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of ten percent of the Contract Sum.

a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling ten percent of the Contract Sum and subcontract amount.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment. Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit a preliminary Application for Payment to Architect each month, one week prior to the formal Application for Payment. Review preliminary application for payment with project inspector. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application for Payment Forms: Use 6703 or forms acceptable to Owner and Architect for Applications for Payment. Sample copies are included in Project Manual.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

G. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

    1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal subcontractors.
8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the work obtained by contractor.
9. Initial progress report.
10. Certificates of insurance and insurance policies.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

END OF SECTION 012900

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project Website.
4. Project meetings.

B. Related Requirements:
1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Form bound in Project Manual.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.

7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT WEB SITE

A. Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Contract modifications forms and logs.
5. RFI forms and logs.
6. Task and issue management.
7. Photo documentation.
8. Schedule and calendar management.
9. Submittals forms and logs.
10. Payment application forms.
11. Drawing and specification document hosting, viewing, and updating.
12. Online document collaboration.
13. Reminder and tracking functions.
14. Archiving functions.

B. Provide up to seven Project Web site user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for Project Web site users.

C. On completion of Project, provide one complete archive copy of Project Web site files to Owner and to Architect in a digital storage format acceptable to Architect.

D. Provide one of the following Project Web site software packages under their current published licensing agreements:

1. Autodesk, Buzzsaw.
2. Autodesk, Constructware.
3. ProCore.

E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of AIA Document C106 or Agreement acceptable to Owner and Architect.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Procedures for processing field decisions and Change Orders.
    e. Procedures for RFIs.
    f. Procedures for testing and inspecting.
    g. Procedures for processing Applications for Payment.
    h. Distribution of the Contract Documents.
    i. Submittal procedures.
    j. Preparation of record documents.
    k. Use of the premises and existing building.
    l. Work restrictions.
    m. Working hours.
    n. Owner's occupancy requirements.
    o. Responsibility for temporary facilities and controls.
    p. Procedures for moisture and mold control.
    q. Procedures for disruptions and shutdowns.
    r. Construction waste management and recycling.
    s. Parking availability.
    t. Office, work, and storage areas.
    u. Equipment deliveries and priorities.
    v. First aid.
    w. Security.
    x. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Related RFIs.
    c. Related Change Orders.
    d. Purchases.
    e. Deliveries.
    f. Submittals.
    g. Review of mockups.
    h. Possible conflicts.
    i. Compatibility problems.

j. Time schedules.
k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Installation procedures.
u. Coordination with other work.
v. Required performance results.
w. Protection of adjacent work.
x. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Status of documentation.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.

15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

COMMUNITY
ARCHITECTURE

Date: _____ Date Received: _____

REQUEST FOR INFORMATION (RFI) No.

Project:	Submitted by:
Client:	
Project No.:	Subcontractor or Supplier:
DSA A#:	

Specification, Detail or Drawing Reference:						
Cost Impact:		No		Yes		Unknown
Schedule Impact:		No		Yes		Unknown
Information Requested:						
Contractors' Proposed Solution:						

For Community Architecture Use Only
Response:

Contractor is Directed to:

- ☐ Proceed w/ Proposed Solution at No Cost / No Time Impact
- ☐ Do Not Proceed – Additional Information Required
- ☐ Architects' Directive Pending – Provide Cost Proposal

Response By: _____ Date Answered: _____

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's construction schedule.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

a. Electrical Equipment.

b. Mechanical Equipment.

c. Doors and frames.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Limitations of continued occupancies.
c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use of premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project, Primavera, Prolog, Scheduling component of Project Web site software specified in Section 013100 "Project Management and Coordination, Windows operating system.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice of Award.

a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Preparation and processing of submittals.
b. Mobilization and demobilization.
c. Purchase of materials.
d. Delivery.
e. Fabrication.
f. Utility interruptions.
g. Installation.
h. Work by Owner that may affect or be affected by Contractor's activities.
i. Testing.
j. Punch list and final completion.
k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

    b. Architect requires all color/finish related submittals to be provided for a coordinated review – no final selections will be made without a complete submittal of color/finish related items.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow fifteen (15) days for review of each resubmittal.
4. Color/finish related review: Allow 45 days for Architect’s with the owner.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.

   A. Transmittal Form for Paper Submittals: Use facsimile of sample form included in Project Manual.

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals. Submittal does not constitute a Substitution Request.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final (Architect reviewed) submittals to owner, project inspector, manufacturers, subcontractors, suppliers, fabricators, installers, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
2. Informational Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

   a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.

c. Standard color charts.

d. Statement of compliance with specified referenced standards.

e. Testing by recognized testing agency.

f. Application of testing agency labels and seals.

g. Notation of coordination requirements.

h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

a. One digital copy of each submittal. Architect will retain one copy.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit four sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

        1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least four sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

    1. Submit product schedule in the following format:

        a. PDF electronic file.
        b. Four paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action. Submittals that include a Substitution Request will be returned without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

COMMUNITY
ARCHITECTURE

Date Submitted: Date Received by Architect:

SUBMITTAL No.

Project: Submitted by:

Client:

Project No.: Subcontractor or Supplier:

DSA A#:

Item	Quantity	Spec. Section	Description of Submittal Items

Re-Submittal? No ☐ Yes ☐ of Submittal No. _____

For Community Architecture Use Only

Consultant Review:	Date Sent:	Date Returned:
Civil:		
Landscape:		
Structural:		
Mechanical:		
Electrical:		
Food Service:		
Hardware:		

Distribution Following Review:

☐ Contractor

☐ Project Inspector

☐ Client

☐ File

Reviewing is only for conformance with the design concept of the project and compliance with the information given in the contract documents. The Contractor is responsible for dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; and for coordination of the work of all trades. The Architects' approval of a specific item does not indicate approval of an assembly of which the item is a component. Contractor to review and concur with comments prior to proceeding with fabrication.

Remarks:

No Action taken

No Exceptions Taken

Make Correction Noted

Revise and Resubmit

Rejected

By: _____ Date Returned: _____

SECTION 014000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.

8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with

additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify Project Inspector at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections , and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014100

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Work of this contract is subject to the requirements of Group 1, Chapter 4, Part I, Title 24, CCR as follows:

1. Addenda and change orders per Section 4-338.

2. Inspector approved by DSA and Architect.

3. Inspector and continuous inspection of work per Section 4-333(b) and 4-342.

4. Special inspection per Section 4-333(c).

5. Contractor to submit verified reports per Section 4-336 and 4-343(c).

6. Administration of construction per Part I, Title 24 , CCR; duties of architect and structural engineer per Section 4-333(a) and 4-341; duties of contractor per section 4-343; verified reports per section 4-336.

7. A copy of Part I and II of Title 24 to be kept and be available in the field during construction.

8. DSA to be notified on start of construction per Section 4-331.

9. Supervision by the DSA per Section 4-334.

1.02 CODES IN EFFECT

A. The codes that govern this project include but are not necessarily limited to the following:

1. 2022 Building Standards Administrative Code, CCR Title 24, Part 1

2. 2022 California Building Code CCR Title 24, Part 2

3. 2022 California Electrical Code CCR Title 24, Part 6

4. 2021 California Mechanical Code (CMC), CCR Title 24, Part 4

5. 2022 California Plumbing Code (CPC), CCR Title 24, Part 5

6. 2022 California Fire Code (CFC), CCR Title 24, Part 9

7. 2022 California Referenced Standards Code, CCR Title 24, Part 12

8. 2022 California Green building Standards Code CCR Tile 24

9. Title 19 CCR, Public Safety, State Fire Marshal Regulations with current amendments.

10. California amended NFPA 72, National Fire Alarm Code 2022 Edition
11. NFPA 13 Automatic Sprinkler Systems 2022 Edition
12. NFPA 14 Standpipe Systems 2019 Edition
13. See U.L. Standard 1971 for “Visual Devices”.

END OF SECTION 014100

SECTION 014200

REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

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

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

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

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

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

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

END OF SECTION 014200

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, occupants of project, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Provide storm water prevention plan (SWPP) in accordance with the 2010 California Green Building Code.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch-OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading, of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. .

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for internet connection and/or facsimile machine in each field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas.
3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

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

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request.

Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:

   a. Restricted List: Where Specifications include a list of three or more names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of three or more manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Please be aware that satisfying the requirements of the above list does not guarantee Architect's approval of the Contractor's request.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by professional engineer.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements of Section 018113.13

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems**,** and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Recording: At Project Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Project Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Completion procedures.
2. Warranties.
3. Final cleaning.
4. Repair of the Work.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
3. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items.

1.3 CLOSEOUT SUBMITTALS

A. Certificate of Insurance: For continuing coverage.

B. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Completion: Complete the following a minimum of 10 days prior to requesting inspection. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by owner. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain owner's signature for receipt of submittals.

5. Submit test/adjust/balance records.

C. Procedures Prior to Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
11. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
12. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
13. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

D. Inspection: Submit a written request for inspection to determine Completion a minimum of **10** days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Project Inspector will either proceed with inspection or notify Contractor of unfulfilled requirements. Upon completion of unfulfilled requirements or corrections, notify the Architect that the work is ready for the Architect’s final review for acceptance. Architect will prepare a Final Punch List, notifying Contractor of additional items identified by Architect that must be completed or corrected before project is accepted as complete.

D. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1. Results of completed inspection will form the basis of requirements for final completion.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order,
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items.
4. Prepare list with assistance of Project Inspector.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site..
e. 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.
f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
o. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specify condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return one copy.

C. Manual Submittal: Submit each manual in final form prior to requesting final inspection and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents and indicate

Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Freeze or excessive heat.
4. Gas leak.
5. Water leak.
6. Power failure.
7. Water outage.
8. System, subsystem, or equipment failure.
9. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.

4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Submit twos sets of PDF electronic files of scanned record prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy plus annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit two sets paper copies of annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Record data as soon as possible after obtaining it.
    c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
5. Review updated record sets no less than on a monthly basis with the Project Inspector. Review is a pre-requisite for monthly billing. Submission of monthly billings shall serve as a confirmation from the Contractor that the record sets have been properly updated and reviewed with the Project Inspector. Costs to re-verify or re-inspect for the accuracy of the record information shall be borne by the Contractor.

B. Record Digital Data Files: Immediately before request for final inspection, review marked-up record prints with Project Inspector. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: DWG**,** Version Microsoft Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect for resolution.
6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file**.**

C. Insert requirements for record Samples if needed. See Evaluations.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.

e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least fifteen days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Narration: Describe scenes on video recording by audio narration by microphone while dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.

D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 02 41 00 – SITE DEMOLITION

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 00 00, Earthwork.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
B. Coordinate clearing Work with utility companies.
C. Maintain emergency access ways at all times.
D. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.04 SUBMITTALS:

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.05 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

1.06 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety Precautions Prevent damage to existing elements identified to remain or to be salvaged, and prevent injury to the public and workmen engaged on site. Demolish roofs, walls and other building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.

1. Protect existing items which are not indicated to be altered. Protect utilities designated to remain from damage.
2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on drawings.
3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: The contractor shall conform to chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition", at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine conditions of work in place before beginning work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.02 PREPARATION

A. Scheduling:

1. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:

1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact the Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination

1. Locate and identify existing utility, service and irrigation system components affected by work of this contract. Review existing record drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
2. Prior to beginning any demolition, properly disconnect all water, gas and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
3. Prior to demolition or disconnect, obtain Owners approval that such system does not impact facilities or systems beyond the extent of this contract.
4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project Record Documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.

1. The Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by the Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.03 DEMOLITION

A. General Requirements

1. Clear areas required for access to site and execution of Work, including pavements, structures, foundations, vegetation, trash and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:

1. Remove existing fixtures and equipment as identified and shown on drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.04 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts and similar components.

1. Review all contract documents showing crossing paths and potential points of interference.
2. Pot-hole or determine by other means the accurate depth and location of such utilities.
3. Incorporate all costs required to complete work under this contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this contract.
4. No additional cost to the Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on contract drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components.

1. Re-circuit all electrical as required.
2. Re-circuit all landscape irrigation valving and control systems as required.
3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner.

1. Use of explosives prohibited.

3.05 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove concrete paving and curbing at locations shown on drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings.

1. Remove all paving by saw-cutting.
2. Remove paving assembly as required to expose subgrade.

3.06 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, grubbing, and planting demolition.

1. Remove grass and grass roots to a minimum depth of two inches below existing grade.
2. Remove all shrubs, plants and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
3. Remove only those trees which are specifically designated for removal, or as shown on the drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than 1 inch in diameter to a depth of two feet below existing or finished grades, whichever is lower and a minimum of five feet beyond the edge of paving, structure, wall or walkway.
4. Hand cut existing tree roots over 1 inch in diameter as necessary for trenching or other new construction, apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the Geotechnical Engineer.
7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00.
8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
9. Keep drains, catch basins, surface drainage courses and related drainage system components clear of debris and construction materials.
10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.07 DISPOSAL

Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

A. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

B. It is required that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).

C. Burning and Burying of Materials: NOT ALLOWED.

D. Haul Routes:

1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.

2. Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

E. Remove demolished materials and debris from site on a daily basis.

3.08 CLEANING

A. Upon completion of work of this Section promptly remove from the working area all scraps, debris.

B. Clean excess material from surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 02 41 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," **Sections 1 through 5.**
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at the project site

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project: Retain type and color of portland cement from options in first subparagraph below.

1. Portland Cement: ASTM C 150 Type II-V

a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash, pozzolan as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

D. Proportion normal-weight concrete mixture for pier foundations as follows:

1. Minimum Compressive Strength: **3000 psi** at 28 days.
2. Maximum Water-Cementitious Materials Ratio: **0.50**
3. Slump Limit: **4 inches**

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

3.2 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.5 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor topping to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.7 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. See DSA 103 form for additional information

END OF SECTION 03 30 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Non-structural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Sheathing.

E. Roof-mounted curbs.

F. Roofing nailers.

G. Preservative treated wood materials.

H. Fire retardant treated wood materials.

I. Miscellaneous framing and sheathing.

J. Communications and electrical room mounting boards.

K. Concealed wood blocking, nailers, and supports.

L. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

D. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).

E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

H. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

I. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers 2016.

J. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).

K. PS 1 - Structural Plywood 2009.

L. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.

M. PS 20 - American Softwood Lumber Standard 2020.

N. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.

O. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

1.04 **SUBMITTALS**

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Samples: For rough carpentry members that will be exposed to view, submit two samples, 4 by 6 inch in size illustrating wood grain, color, and general appearance.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 **DELIVERY, STORAGE, AND HANDLING**

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 **GENERAL REQUIREMENTS**

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.

2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 **DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR) and Redwood Inspection Service; RIS (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):

1. Species: Douglas Fir-Larch.

2. Grade: No. 2.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

1. Species: Douglas Fir-Larch.

2. Grade: No. 1.

F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Species: Douglas Fir-Larch, Redwood, or Western Cedar (Redwood and Western Cedar shall be used as nailers in Continuous Insulation Assemblies associated with Exterior Cement Plaster, unless otherwise noted or shown in approved details.)

2. Lumber: S4S, No. 2 or Standard Grade.

3. Boards: Standard or No. 3.

2.03 **TIMBERS FOR CONCEALED APPLICATIONS**

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry (19 percent maximum).

D. Beams and Posts 5 inches and over in thickness:

1. Species: Douglas Fir-Larch.

2. Grade: Select Structural.

2.04 **STRUCTURAL COMPOSITE LUMBER**

A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.

B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.

2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.

3. Headers: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.

2.05 **EXPOSED BOARDS**

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 1, 1 Common, or Select.

2.06 **CONSTRUCTION PANELS**

A. Roof Sheathing: Any PS 2 type, rated Structural I Sheathing.

1. Bond Classification: Exterior.

2. Span Rating: 48.

3. Performance Category: 3/4 PERF CAT.

B. Wall Sheathing: Any PS 2 type.

1. Bond Classification: Exposure 1.

2. Grade: Structural I Sheathing.

3. Span Rating: 24.

4. Performance Category: 1/2 PERF CAT.

5. Edge Profile: Square edge.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4-inch-thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:

1. Plywood Concealed from View but Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View but Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.07 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M or stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.

D. Sill Gasket on Top of Foundation Wall: 1/4-inch-thick, plate width, closed cell plastic foam from continuous rolls.

E. Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.

1. Thickness: 68 mils (0.068 inch).
2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
3. Water Vapor Permeance: 0.035 perm (2 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.

F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

G. Water-Resistive Barrier: As specified in Section 07 25 00.

2.08 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:

1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
    a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

b. Do not use treated wood in direct contact with the ground.

2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.

   a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

   b. Treat rough carpentry items as indicated.

   c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:

1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.

   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.

   b. Treat lumber exposed to weather.

   c. Treat lumber in contact with masonry or concrete.

   d. Treat lumber in other locations as indicated.

2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.

   a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.

   b. Treat plywood in contact with masonry or concrete.

   c. Treat plywood in other locations as indicated.

3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.

   a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

   b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Wall-mounted door stops.
4. Chalkboards and marker boards.
5. Wall paneling and trim.
6. Joints of rigid wall coverings that occur between studs.
7. Backing shown on approved drawings that is associated with continuous insulation and exterior cement plaster applications.

3.05 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. At long edges use sheathing clips where joints occur between roof framing members.
2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.

3.07 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

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

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 50 13 - Construction Waste Management and Disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

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. Interior running and standing trim.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For adhesives, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 and 5.504.4.2 (2019 California Green Building Standards Code).
b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For aerosol adhesives, and smaller unit sizes of adhesives, (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

3. Product Data: For composite wood products:

a. Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in California Air Resources Board's (ARB) Air Toxics Control Measure (ATCM) for Composite Wood (CCR Title 17, Section 93120, et seq.) Materials not exempted under the ATCM must meet the specified emission limits as shown in GBC Table 5.504.4.5.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored

in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
2. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece.

C. Woodworking Standard: Where indicated for a specific product comply with specified provision of the following:

1. North American Architectural Woodwork Standards (NAAWS)

D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.2 INTERIOR TRIM

A. Lumber Trim for Opaque Finish (Painted Finish):

1. Species and Grade: Alder; B Finish; NHLA.
2. Maximum Moisture Content: 10 percent.
3. Finger Jointing: Allowed.
4. Face Surface: Surfaced (smooth).
5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 FABRICATION

A. Kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim except shoe and crown molds.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Install trim after gypsum-board joint finishing operations are completed.
2. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 23

SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:
1. Section 06 10 00 “Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
2. Section 12 36 16 “Metal Countertops”

1.3 SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and cabinet hardware and accessories.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For composite wood products:

a. Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in California Air Resources Board’s (ARB) Air Toxics Control Measure (ATCM) for Composite Wood (CCR Title 17, Section 93120, et seq.) Materials not exempted under the ATCM must meet the specified emission limits as shown in GBC Table 5.504.4.5.

C. Shop Drawings: Show location of each item, dimensioned plans, elevations, and sections, large-scale details, attachment devices, and other components.

1. Submit shop drawings in conformance with the requirements of North American Architectural Woodwork Standards.
2. Drawings indicate form and profile concept only. Submit shop drawings to illustrate Fabricator’s understanding of Drawings and to show intended fabrication details. A photocopy or traced copy of Drawings in not acceptable for shop drawings.
3. Prepare shop drawings using field verified dimensions. Report any major discrepancies between Drawings and field dimensions before fabrication of work.
4. For the initial review submit two copies of shop drawings to Architect (11 inch by 17 inch minimum size.) PDF’s are acceptable for initial review.
5. Show details full size.
6. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

7. Show anchoring and attachment method and coordinate with DSA approved details shown on the Drawings.
8. Show method of scribing.
9. Coordinate dimensions of built-in equipment and fixtures.
10. Show casework hardware indicating brand name and model used.
11. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
12. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.
13. Show special accessory components not included in manufacturer's product data.
14. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
2. Wood-grain plastic laminates, 12 by 24 inches, for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
3. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish, with edge banding on one edge.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Qualification Data: For Installer and Fabricator.

F. Product Certificates: For each type of product.

G. Woodwork Quality Standard Compliance Certificates: Woodwork Institute (WI) Certified Compliance Program certificates.

1. Before delivery to the jobsite the woodwork supplier shall provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
2. Each elevation of casework, each laminated top, and each solid surface top shall bear a Woodwork Institute Certified Compliance Label.
3. At completion of installation the woodwork installer shall provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
4. All fees charged by the Woodwork Institute for their Certified Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Fabricator of products or Licensee of WI's Certified Compliance Program.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets and countertops until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets and countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

B. Cabinets and countertops shall acclimate in spaces where they will be installed a minimum of 72 hours before installation.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets and countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets and countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets and countertops by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets and countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
2. Number designations on plans refer to WI Casework Design Series (CDS) numbers in Appendix A of the latest North American Architectural Woodwork Standards (NAAWS).
3. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. Construction Style: A – Frameless.

D. Construction Type: Type I – Multiple Self-Supporting Units.

E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

F. Core Thickness: 3/4 inch, unless otherwise noted.

G. Shelves: Conform to NAAWS requirements, subject to a 50 psf uniformly spaced load not to exceed 200 pounds per shelf.

1. Shelves deeper than 24 inches shall have three supports at each end of shelf.
2. Shelves greater than 24 inches in length shall be at least 1-inch thick. Refer to North American Architectural Woodwork Standards for length limitations of 1-inch thick material and utilize appropriate shelf material for length of cabinets detailed and shown on drawings.

H. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Wilsonart International; Div. of Premark International, Inc.
b. Abet Laminati, Inc.
c. Formica Corporation.
d. Lamin-Art, Inc.
e. Panolam Industries International, Inc.

I. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGL.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade VGS.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

J. Materials for Semi exposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12-inch-thick, matching laminate in color, pattern, and finish.
b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
c. For semi exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade CLS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels, 1/2 inch thick (minimum).

K. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

L. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

M. Drawer Construction:

1. Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
2. Acceptable Joinery Methods:

a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
b. Doweled, glued under pressure.
c. Lock shoulder, glued and pin nailed.
d. Bottoms shall be set into sides, front, and back, 1/4-inch-deep groove, with a minimum 3/8-inch standing shoulder.

N. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range in the following categories:

a. Solid colors, matte finish.
b. Wood grains, matte finish.
c. Patterns, matte finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde or Grade M-2-Exterior Glue (where called for in other areas of the specifications or on the drawings.)
3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, five-knuckle, grade 1 steel hinges made from 0.095-inch- thick metal, and as follows:

1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521. Equal to RPC; #374-P28-B; Chrome Powder Coat Finish.

C. Steel Wire U-Pulls (fully accessible): Back mounted, steel, 5 inches long, 1-1/2 inches deep, and 5/16 inch in diameter. Finish: Nickle-Plated Matte

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Adjustable Shelf Standards and Supports (Display Cabinets and where called for on drawings): BHMA A156.9, B04102; with shelf brackets, B04112.

F. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip. Equal to Vasa #2-7875-104

G. Drawer Slides: BHMA A156.9.

1. Grade 1: Side mounted full-extension type; zinc-plated steel with polymer rollers. Equal to Accuride Model 2632.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides. Equal to Accuride Model 7432 (Grade 1HD-100) and Accuride Model 3640 (Grade 1HD-200).
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1HD-100.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.

H. Cabinet Locks: Cabinet Locks with Interchangeable Cores (IC) shall be keyed to the classroom entrance lock with Schlage “Primus” System, Security Level Three, Type EP keyways per Final Keying System described in Specification Section 08 71 00 “Finish Hardware.”

1. Door Locks: BHMA A156.11, Grade 1. Equal to Schlage Cabinet Deadbolt Locks; CL774R with Full Size IC; 626 Satin Chrome Finish.
2. Drawer Locks: BHMA A156.11, Grade 1. Equal to Schlage Drawer Deadbolt Locks; CL874R with Full Size IC; 626 Satin Chrome Finish.

I. Door Silencers: BHMA A156.16, L03011. Drawer Silencers are not allowed. Closing stops for drawers are to be provided at the rear of the both drawer sides, unless closing stops are built into the slides to prevent drawer front from impacting the cabinet body.

J. Grommets for Cable Passage through Countertops: 2-½ inch OD black, molded-plastic grommets and matching plastic caps with slot for wire passage.

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Toe Kicks: Wood-Preservative-Treated Lumber per Specification Section 06 10 00 “Rough Carpentry.”

C. Anchors: Provide anchorage as indicated in drawings.

D. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide units with smooth surfaces in uniform plane, free of defects. Provide front and end overhang of 1 inch over base cabinets.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets and countertops to average prevailing humidity conditions in installation areas.

B. Before installing cabinets and countertops, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets and countertops to comply with same grade as item to be installed.

B. Assemble cabinets and countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish except at plumbing fixtures and areas subject to excessive moisture.
3. Seal edges subject to excessive moisture with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install cabinets and countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut cabinets and countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Anchor cabinets to anchors or blocking built in or directly attached to substrates as detailed on drawings.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets as detailed on the Drawings.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets and countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean all installed items of pencil and ink marks and broom clean the area of operation, depositing debris in containers provided by the general contractor. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 16

SECTION 06 64 00

PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

B. Manufacturers: Subject to compliance with requirements.

1. Basis-of-Design Product: Subject to compliance with requirements, Marlite FRP or comparable product by one of the following:

    a. Kemlite Company Inc.
    b. Marlite.
    c. Nudo Products, Inc.

2. Low-Emitting Materials: Paneling shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Nominal Thickness: Not less than 0.075 inch.
4. Surface Finish: Pebbled FRP
5. Color: P100 White.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: White

B. Adhesive: As recommended by plastic paneling manufacturer.

1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Sealant: sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

1. Sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches wide.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 64 00

SECTION 07 51 30
COLD-APPLIED BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Master Site Lease.

B. Roof Project Certification.

1.2 SUMMARY

A. This Section includes the following:

1. Cold-process built-up asphalt roofing system, to patch around new installations.
2. At Wood Roof Decks: Rosin Sheathing and Roof Cover/Barrier Board.
3. Cold-process built-up asphalt roofing system.
4. Roof surfacing consisting of mineral granulated MB Cap Sheet and White Cool Roof Coating.
5. Built-up roof flashings and accessories.
6. Manufacturer’s Roof System Quality Assurance Warranty – Maintain existing warranty.

1.3 DEFINITIONS

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

PART 2 - PERFORMANCE

2.1 PERFORMANCE REQUIREMENTS

A. System Description: Cold Process Built-Up Roofing System: Minimum two plies of fiberglass base ply sheets and mineral surfaced modified bitumen cap sheet in cold process adhesive. Final surfacing consists of Title 24 compliant, elastomeric White Cool Roof Coating.

B. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

C. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

D. Integrate roof patches with existing roofing system to maintain integrity of roof system.

2.2 SUBMITTALS

A. Product List: Meeting requirements of Division 1 Section “Product Requirements”, where applicable, or as required by Owner.

B. Product Data: For each type of product indicated.

1. Base, perimeter, and detail flashings, cants, and membrane terminations.
2. Insulation, tapered insulation where indicated, including slopes.
3. Insulation cover/barrier board.
4. Crickets, saddles, and tapered edge strips, including slopes.

C. Samples for Verification: For the following products, upon request:

1. 12-by-12-inch square of ply sheet.
2. 12-by-12-inch square of roof insulation.
3. 12-by12-inch square of granulated MB cap sheet
4. 12-by12-inch square of flashing sheets.

D. Submit evidence of meeting performance requirements, including UL and FMG listing, where applicable, upon request.

E. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

F. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.
2. Local references within 75 miles of same or similar projects that have been installed for minimum 5 years available for inspection.

G. Qualification Data: For Installer, manufacturer, and manufacturer’s technical representative.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for roofing system and system components.

1. Include report-indicating compliance with load-strain properties requirements.

I. Manufacturer Certificates: Indicating compliance of proposed products with requirements, including:

1. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing base and ply sheets, membrane backer and flashing sheets, reinforcement fabric felts and mats, adhesives, mastics, coatings, and sealants.

J. Manufacturer Warranty, Maintenance Data and Training Materials: For roofing system to include in maintenance manuals and Owner's training library.

K. Inspection Reports: Copy of daily and final technical inspection reports of roofing installation.

L. Roofing Project Certification: Provide using District's Standard form.

M. Class A Roof Assembly per CBC, Section 1505.2.

2.3 QUALITY ASSURANCE

A. Installer Qualifications: Utilize the same installers as use on the existing roofing system.

B. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval, where applicable, for roofing system identical to that used for this Project.

C. Manufacturer Shall:

1. Be Associate Member in good standing with National Roofing Contractors Association (NRCA) for at least five (5) years.
2. Be nationally recognized in the roofing, waterproofing and moisture survey industry.
3. Be approved by Owner.
4. Has not been in Chapter 11 bankruptcy during the last five (5) years.
5. Provide a copy of Corporate Health, Safety and Welfare policy upon request.
6. Provide evidence of twenty (20) quarters of continuous plant inspections of roofing manufacturing sites over the previous five (5) years by an independent Nationally Recognized Testing Laboratory (NRTL) as defined in 29 CFR Ch. XVII (7-1-93 Edition) from the Occupational Safety and Health Administration (OSHA).
7. Be ISO 9001 registered for at least the prior five (5) years
8. Furnish a complete Roof System Warranty with ongoing manufacturer's (optional) Service Agreement.
9. Provide Owner names of at least five (5) qualified applicators.
10. Employ full-time Field Technical Services Representatives available for daily job-site monitoring and production of daily reports.
11. Require local Field Representatives to make periodic job-site visits and produce work quality and progress reports as may be required.
12. Provide a Project Closeout Report upon delivery of the project warranty. This report to include:

    a. Project Specifications.
    b. Project Summary.
    c. Progress reports as a result of roof inspections.
    d. Job-site progress photos.
    e. Warranty document.
    f. Owners Manual describing maintenance and emergency repair.

D. Technical Inspector Qualifications: Engage an experienced technical inspector to perform work of this section who has specialized in inspecting roofing similar to that required for this Project; who is employed by the roofing system manufacturer to inspect manufacturer's project. If the manufacturer does not employ full-time technical inspectors, approved inspector must be certified as a Registered Roof Observer by the Roof Consultants Institute.

E. Source Limitations: Obtain components for roofing system from or approved in writing by roofing system manufacturer.

F. Preliminary Roofing and Preinstallation Conferences: Before starting reroofing preparation, conduct conferences at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination", where applicable. Review methods and procedures related to reroofing preparation and roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, testing and inspecting agency representative when applicable, roofing Installer, roofing system manufacturer's representative, and other installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review work restrictions and requirements for temporary facilities and controls.
5. Examine deck 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 flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review governing regulations and requirements for insurance and certificates if applicable.
9. Review temporary protection requirements for roofing system during and after installation.
10. Review roof observation and repair procedures after roofing installation.

2.4 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

1. Where roofing system is indicated as requiring FMG classification or UL listing, containers shall bear label indicating manufacture in compliance with FMG classification or UL listing quality assurance requirements.

B. Do not store materials in open or in contact with ground or roof surface.

C. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Store roll goods on ends only.

D. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturers written instructions for handling, storing, and protecting during installation.

F. Handle and store roofing materials and place equipment in a manner to avoid temporary overloading or permanent deflection of deck.

2.5 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.

2.6 WARRANTY

A. Warranty, General: Maintain existing Warranty. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranty: Manufacturer's Quality Assurance Warranty 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.

C. New Roof Component Coverage: A single manufacturer shall provide specified warranty that includes the Built-Up Roofing specified in this section. The manufacturer's warranty must include labor and material coverage against leakage on all components including those manufactured by others.

1. Included in the warranty coverage are the following:
   a. Insulation materials, cover boards, fasteners and adhesives.
   b. All new and temporary roof membrane components and adhesives.
   c. All metal edge components including cleat strips.
   d. All tapered edge and cant strips.
   e. All surface mastics, coatings, wall waterproofing, stripping plies, etc.
   f. All drain and scupper flashings.
   g. Any roof leak or other problems caused by substrate movement of any component other than the deck shall not be excluded.
   h. Any movement associated with metal edge joints of flanges causing leaks.
   i. Damages caused by wind speed up to 70 miles per hour.
   j. Permanent tie-ins and/or control joints separating new and old roofing.

2. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, all sheet metal-related roofing details, and termination details.

3. Manufacturer will provide, at no cost to owner, the following service in Years 2, 5, and 10.
   a. Inspection by Manufacturer's Technical Service Representative and delivery of a written inspection report documenting roof conditions.

4. Warranty Period: 20 years from date of Substantial Completion.

PART 3 - PRODUCT

3.1 MANUFACTURERS – MATCH EXISTING ROOF IN ALL RESPECTS

A. Basis-of-Design Product: The roof system specified in this section is based upon Tremco, Inc. products named in other Part 2 articles. Subject to compliance with requirements, provide the named product or an approved comparable product by one of the following:

1. Cold- Applied Asphalt Roofing:
   a. Tremco, Inc.
   b. The Garland Company, Inc.
   c. Johns Manville

B. Base Sheet and Ply Sheets: Garland, HPR Premium Glasbase; Tremco, BURmastic Glass Ply; or Johns Manville PermaPly 28: ASTM D 4601, Type II, nonperforated, asphalt-impregnated and coated glass-fiber sheet dusted with fine mineral surfacing on both sides, with the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 90 lbf/in (15.75 kN/m); cross direction, 70 lbf/in (12.25 kN/m).
2. Pliability, ½ inch (12.7 mm) radius bend, ASTM D 146: No failures.
3. Net Dry Mass, minimum, ASTM D 228: 28.0 or 33.0 lb/100 sq ft (1.6 kg/m2).
4. Asphalt, minimum, ASTM D 228: 10.0 lb/100 sq ft (488 g/m2).
5. Mass of desaturated polyester/glass/polyester mat, ASTM D 228: 2.2 lb/100 sq ft (107 g/m2).
6. Asphalt, minimum, ASTM D 228: 10 lb/100 sq ft (488 g/m2).

C. Cap Sheet: Garland VersiPly Mineral or Tremco, PowerPly Standard Plus FR or Johns Manville DynaGlas FR XT: ASTM D 6163, SBS, SEBS, SIS Modified asphalt-impregnated, combination glass-fiber mat and scrim core cap sheet, with white coarse mineral-granule top surfacing and fine mineral surfacing on bottom surface, with the following minimum properties:

1. Tensile Strength: per ASTM D 5147
   a. Machine direction, 160 lbf.
   b. Cross Machine direction, 160 lbf.
2. Elongation: per ASTM D 5147
   a. 6.0% MD
   b. 6.0% XMD

D. Acrylic Cool Roof Coating Primer**:** Garland All-Knight Primer or Tremco, SP Primer or Johns Manville TopGard Base: Roofing Manufacturer's water based, acrylic coating primer.

E. Cool Roof White Coating: Garland , Pyramic Acrylic Coating, or Tremco, Polarcote FR or Johns Mansville, TopGard 4000: Intumescent, fire-retardant, Energy Star Certified, elastomeric, acrylic latex roof coating formulated for use on bituminous roof surfaces, with the following physical properties:

1. Asbestos Content, EPA/600/R-93/116: None.
2. Non-Volatile Content (by weight), minimum, ASTM D 1644: 67 percent.
3. Reflectance, minimum, ASTM E 903: 82 percent.
4. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 30 g/L.
5. Solar Reflectance Index (SRI), ASTM E 1980: 103.

3.2 FLASHING MATERIALS

A. Stripping and Base Flashing Ply: Equal to Tremco, BURmastic Glass Ply or Johns Manville Dynalastic 180S: ASTM D 4601, Type II, nonperforated, asphalt-impregnated

and coated glass-fiber sheet dusted with fine mineral surfacing on both sides, with the following properties:

1. Breaking Strength, minimum, ASTM D 146: machine direction, 90 lbf/in (15.75 kN/m); cross direction, 70 lbf/in (12.25 kN/m).
2. Pliability, ½ inch (12.7 mm) radius bend, ASTM D 146: No failures.
3. Net Dry Mass, minimum, ASTM D 228: 28.0 or 33.0 lb/100 sq ft (1.6 kg/m2).
4. Asphalt, minimum, ASTM D 228: 10.0 lb/100 sq ft (488 g/m2).
5. Mass of desaturated polyester/glass/polyester mat, ASTM D 228: 2.2 lb/100 sq ft (107 g/m2).
6. Asphalt, minimum, ASTM D 228: 10 lb/100 sq ft (488 g/m2).

B. Stripping and Base Flashing Membrane: Equal to Tremco, PowerPly Standard Plus FR or Johns Manville DynaGlas FR XT: ASTM D 6163, SBS, SEBS, SIS Modified asphalt-impregnated, combination glass-fiber mat and scrim core cap sheet, with white coarse mineral-granule top surfacing and fine mineral surfacing on bottom surface, with the following minimum properties:

1. Tensile Strength: per ASTM D 5147
   a. Machine direction, 140 lbf.
   b. Cross Machine direction, 140 lbf.
2. Elongation: per ASTM D 5147
   a. 6.0% MD
   b. 6.0% XMD

C. Single-Ply Elastomeric Flashing Membrane and/or Wall Flashing Membrane (where designated): ASTM D 5019, reinforced CSPE sheet, 0.045 inch thick, equal to Tremco Elastomeric Sheeting, Burke Hypalon, or Johns Manville PVC 60 MilFleeceback in Perma Flash and as follows:

1. Tensile Strength: ASTM D 751: 225 lbf.
2. Elongation at Failure: ASTM D 751: 25 percent minimum.
3. Tear Resistance: ASTM D 751: 95 lbf.
4. Ply Adhesion: ASTM D 413: 15 lbf.
5. Dimensional Stability at 212 deg F: ASTM D1204: 1.25 percent maximum.
6. Low Temperature Flexibility: ASTM D 2136: -40 deg F.
7. Color: White.

3.3 ASPHALT MATERIALS

A. Water Based Asphalt Primer: Garland, Garla Prime WB or Tremco, Improved Tremprime WB, or JM Asphalt Primer.

B. Cold-Applied Adhesive: Equal to Tremco, PowerPly Standard Cold Adhesive LV or Garland, Weahter King Plus WC or MBR Cold Application Adhesive: Standard asphalt-based, one-part asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up roofing membranes and flashings, with low-VOC formulation acceptable to authorities having jurisdiction.

1. Cold-applied adhesive for interply adhesive, of the following properties:
   a. Asbestos Content: EPA 600 R-93/116: None.
   b. Volatile Organic Compounds (VOC): ASTM D 3960: <250 g/L.
   c. Nonvolatile Matter: ASTM D 4479: 75 percent.
   d. Density: 77 deg F: ASTM D 1475: 8.1 lb/gal.
   e. Uniformity and Consistency: ASTM D 4479: pass.
   f. Viscosity: 77 deg F: ASTM D 2196-86(1991): 80-200 Pa * s.

3.4 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.

B. Asphalt Roofing Cement: Garland Flashing Bond Mastic or Tremco, ELS Mastic or MBR Utility Cement and MBR Flashing Cement, ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

C. Cold-Applied Single Ply Elastomeric Flashing Adhesive: Roofing system manufacturer's asphalt-based, one- part, asbestos-free, cold-applied "Sheeting Bond" adhesive specially formulated for compatibility and use with CSPE base flashings.

D. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."

E. Miscellaneous Sealants and Accessories: Provide miscellaneous materials and accessories as recommended and directed by roofing system manufacturer.

3.5 FILM-FORMING PARAPET WALL WATERPROOFING

A. Elastomeric Wall Coating: Elastomeric, single-component, asbestos-free, high-build acrylic, breathable polymer emulsion for masonry and metals.

1. Basis of Design Product: Tremco, Solargard Hy-Build, or Garland, Tuff Coat Wall Coating.
2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: Less than 25 g/L.
3. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D 412: Greater than 325 psi (2240 kPa).
4. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 2370: Greater than 125 percent.
5. Flexibility at -15 deg F (-26 deg C), ASTM D 522: Pass 1/2 inch mandrel.
6. Hardness, Shore A, minimum, ASTM D 2240: Greater than 60.
7. Colors: As selected by Owner and Architect from manufacturer's full range.
8. Latex primer, manufacturers standard primer for Acrylic Coating material.

3.6 INSULATION / ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Tapered Insulation: Where designated, provide factory-tapered polyisocyanurate insulation boards fabricated to slope of 1/8" in 12" (minimum) to the drain, unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated and as directed by Owner for sloping to drain. Fabricate to slopes indicated.

D. Fasteners: Base layer insulation fasteners (where designated) shall be factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

E. Cold Fluid-Applied Insulation and Cover/Barrier Board Adhesive: Manufacturer's standard cold fluid-applied, two component, solvent free elastomeric urethane adhesive formulated to adhere roof insulation and/or cover boards to insulation and substrate, as follows:

1. Roof Insulation Adhesive: Tremco, Low Rise Urethane Foam Insulation Adhesive, or Garland Insulock HR Insulation Adhesive, or JM Two Part UIA.

F. Insulation Cover/Barrier Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate board, ¼" thick

1. Product: Subject to compliance with requirements, provide "Dens-Deck Prime"

G. by Georgia-Pacific Corporation, "or approved equal".

H. Cant Strip: ASTM C 208, Type II, Grade 1, cellulosic-wood fiber.

PART 4 - EXECUTION

4.1 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 set and braced and that roof drains are securely clamped in place.

4.2 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.

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.

4.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer's recommendations.

4.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. At Wood Decks: Install rosin sheeting paper over wood decking. Install cover/barrier boards over rosin sheeting paper with long joints in continuous straight lines with end joints staggered between rows.
   1. Mechanically attach cover/barrier board system to deck with approved fasteners per roofing system manufacturer’s written instructions.

4.5 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.

B. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed 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 membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed. See exhibit “ “
   2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
   3. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Cold Process Asphalt Heating
   1. An in-line heat exchange unit may be used to facilitate application
      a. Do not exceed maximum adhesive temperature of 100° F.

4.6 ROOFING MEMBRANE INSTALLATION

A. Install (2) two ply sheets starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
   1. Embed each ply sheet in cold adhesive applied at rate required by roofing system manufacturer, to form a uniform membrane without ply sheets touching.
   2. Broom in all ply sheets

B. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing system. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.
   1. Embed each ply sheet in cold adhesive applied at rate required by roofing system manufacturer, to form a uniform membrane without ply sheets touching.

4.7 FLASHING AND STRIPPING INSTALLATION

A. Install two ply base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetration flashings through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
   1. Prime substrates with asphalt primer if required by roofing system manufacturer.

2. Two Ply Flashing Application: Adhere flashing ply sheet and flashing membrane sheet(s) to substrate in cold asphalt mastic adhesive applied at rate required by roofing system manufacturer.
3. Single Ply Elastomeric Flashing Sheet Application: Where designated, adhere flashing sheet to substrate in approved cold elastomeric adhesive applied at rate required by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 6 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing per roofing manufacturer's requirements.

D. Install stripping, according to roofing system manufacturer's standard detail drawings and instructions, where metal flanges and edgings are set on built-up roofing.

1. Flashing-Sheet Stripping: Install flashing-sheet stripping in a continuous coating of asphalt roofing cement and extend onto roofing membrane.

E. Flashing Coating: Apply coating material to all designated base flashings, wall flashings and sheet metal flashings as directed by Owner per manufacturers written instructions.

F. Roof Drains: Set 30-by-30-inch metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

1. Install flashing-sheet stripping by same method as installing base flashing.

4.8 COOL ROOF COATING INSTALLATION

A. At all MB Cap Sheet roof and flashing areas, clean surfaces thoroughly, prime and apply coating to roofing membrane and base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.

1. Prior to application of cool roof coating, contractor shall inspect roof with manufacturer's technical representative and repair any deficiencies.
2. Roofing manufacturer's acrylic coating primer shall be applied to all prepared surfaces to be coated at a rate of 1 gallon per 300-350 sq. ft.
3. Apply Cool Roof Coating in 2 layers at a rate of 1.5 gallons per 100sf for each layer. 3 Gallons/SQ Total. Back roll each coat to maintain uniformity of coverage.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and preferred application method to be used.

C. Apply sealants and water repellent coating material on prepared surfaces indicated for treatment per manufacturer's written instructions for application, unless otherwise indicated.

D. Apply a second coat repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

4.9 FIELD QUALITY CONTROL

A. Manufacturer’s Technical Representative: Contractor will engage a qualified manufacturer’s technical representative acceptable to Owner for a minimum of 3 days on site to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
1. Notify Architect (when applicable) and Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

4.10 WALKWAYS

A. Install roofing manufacturer’s walkway pads according to roof plans or as directed by Owner.
1. Adhere to roofing in spot application of mastic per roofing manufacturer’s

4.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 51 30

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formed low-slope roof sheet metal fabrications.
   2. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

   1. Include plans, elevations, sections, and attachment details.
   2. Distinguish between shop- and field-assembled work.
   3. Include identification of finish for each item.
   4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

   1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

E. Recycled Content of Copper-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.

F. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
b. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

2. Color: Match existing colors.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Manufacturer's standard clear acrylic coating on both sides.
2. Exposed Coil-Coated Finish:

   a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

3. Color: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Atlas Roofing Corporation; Summit.
   b. Engineered Coated Products; Nova-Seal II.
   c. Kirsch Building Products, LLC; Sharkskin Comp.
   d. SDP Advanced Polymer Products Inc; Palisade.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT
   b. Henry Company; Blueskin PE200 HT.
   c. Kirsch Building Products, LLC; Sharkskin Ultra SA.
   d. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
   e. Protecto Wrap Company; Protecto Jiffy Seal Ice & Water Guard HT.

2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:
1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

1. Accessories: Wire-ball downspout strainer.

B. Downspouts: Fabricate round downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Hanger Style: Steel.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates.

1. Fabricate from the Following Materials:
   a. Galvanized Steel: 0.028 inch thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal.

1. Fabricate from the Following Materials:
   a. Galvanized Steel: 0.040 inch thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering.
3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 62 00

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers eight samples of materials that will contact or affect joint sealants. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required as requested by Architect.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction compatibility and adhesion test reports.

C. Preconstruction field-adhesion test reports.

D. Field-adhesion test reports.

E. Warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

B. Preinstallation Conference: Conduct conference at Project site.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Dow Corning Corporation.
c. Sika Corporation; Construction Products Division.

2. Type: Single component (S) or multicomponent (M).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Traffic (T).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Bostik, Inc.
c. Sika Corporation; Construction Products Division.

2. Type: Single component (S) or multicomponent (M).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Traffic (T).

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Bostik, Inc.
c. Tremco Incorporated.

2.5 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.

2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:
a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Joints between different materials listed above.
c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: Urethane.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints in exterior insulation and finish systems.
c. Joints between metal panels.
d. Joints between different materials listed above.
e. Perimeter joints between materials listed above and frames of doors windows and louvers.
f. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: Urethane.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in stone flooring.
c. Control and expansion joints in brick flooring.
d. Control and expansion joints in tile flooring.
e. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: Urethane.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.
c. Tile control and expansion joints.
d. Vertical joints on exposed surfaces of concrete walls and partitions.
e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
f. Other joints as indicated.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

a. Acoustical joints where indicated.
b. Other joints as indicated.

2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

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 hollow-metal work.

B. Related Requirements:

1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Installation Instructions: Manufacturer’s written installation instructions for each type of product.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

E. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door & frame to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ceco Door Products; an Assa Abloy Group company.
2. Door Components, Inc.
3. Curries Company; an Assa Abloy Group company.
4. Mesker Door Inc.
5. Pioneer Industries, Inc.; an Assa Abloy Group company
6. Security Metal Products Corp.; an Assa Abloy Group company
7. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door Schedule on drawings.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge), with minimum A60 coating.
d. Edge Construction: Model 2, Seamless.
e. Core: Polyurethane.

1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R-11 when tested according to ASTM C 518.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (14 gauge), with minimum A60 coating.
b. Construction: Full profile welded. (Custom shape, see drawings for profile.)

4. Exposed Finish: Prime.

2.3 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
1. **Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.**
2. **Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.**
3. **Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.**
4. **Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.**

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. **Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.**
2. **Provide flat -head exposed screws and bolts for exposed fasteners unless otherwise indicated.**
3. **Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.**
4. **Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.**
5. **Jamb Anchors: Provide number and spacing of anchors as follows:**

    a. **Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:**

        1) **Three anchors per jamb up to 60 inches high.**
        2) **Four anchors per jamb from 60 to 90 inches high.**
        3) **Five anchors per jamb from 90 to 96 inches high.**
        4) **Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.**

6. **Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.**

7. **Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.**

    a. **Single-Door Frames: Drill stop in strike jamb to receive three door silencers.**
    b. **Double-Door Frames: Drill stop in head jamb to receive two door silencers.**

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. **Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.**
2. **Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.**

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. **Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.**
2. **Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.**
3. **Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.**
4. **Provide loose stops and moldings on inside of hollow-metal work.**
5. **Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.**

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. **Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.**

2.8 ACCESSORIES

A. Metal Security Louvers: Provide louvers for door, where indicated, which comply with SDI 111C.

1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:**
   a. **Anemostat; a Mestek company; PLSL.**
   b. **Air Louvers Inc.; 1500-ASG.**
2. **Blade Type: Vision-proof, inverted Y.**
3. **Metal and Finish: Hot-dip galvanized steel, Frame & Grille: minimum 0.096 inch thick (12 gauge), Louver Blades: minimum 0.040 inch thick (18 gauge), factory primed for paint finish.**

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable stops located on secure side of opening.
   d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.

4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

   a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
   c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
   d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk tamperproof flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

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. **Solid-core doors with wood-veneer faces.**
2. **Factory fitting flush wood doors to frames and factory machining for hardware.**

B. **Related Requirements:**

1. **Section 08 11 13 “Hollow Metal Doors and Frames” for flush wood doors in steel frames.**
2. **Section 08 71 00 “Door Hardware” for door hardware for flush wood doors.**
3. **Section 08 80 00 "Glazing" for glass view panels in flush wood doors.**
4. **Section 09 91 00 “Painting and Finishing” for field finishing doors.**

1.3 SUBMITTALS

A. **Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings.**

B. **Installation Instructions: Manufacturer’s written installation instructions for each type of product.**

C. **California Green Building Standards Code Submittals:**

1. **Laboratory Test Reports: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."**

D. **Laboratory Test Reports: For composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."**

E. **Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:**

1. **Dimensions and locations of blocking.**
2. **Dimensions and locations of mortises and holes for hardware.**
3. **Dimensions and locations of cutouts.**
4. **Undercuts.**
5. **Fire-protection ratings for fire-rated doors.**

F. **Samples for Verification:**

1. **Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.**
2. **Louver blade and frame sections, 6 inches long, for each material and finish specified.**
3. **Frames for light openings, 6 inches long, for each material, type, and finish required.**

G. **Sample Warranty: For special warranty.**

1.4 DELIVERY, STORAGE, AND HANDLING

A. **Comply with requirements of referenced standard and manufacturer's written instructions.**

B. **Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.**

C. **Mark each door on bottom rail with opening number used on Shop Drawings.**

1.5 FIELD CONDITIONS

A. **Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.**

1.6 WARRANTY

A. **A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.**

1. **Failures include, but are not limited to, the following:**

a. **Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.**
b. **Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.**

2. **Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.**
3. **Warranty Period for Solid-Core Interior Doors: Life of installation.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

1. **Graham-Maiman Series Wood Door Products; a Masonite Architectural company.**
2. **ABS – American Building Supply – Doormerica; a Jeld-Wen Company**
3. **VT Industries, Heritage Collection**
4. **Haley Brothers, Inc.**

5. **Oregon Door**
6. **Oshkosh Door Company**
7. **Vancouver Door Company**

B. **Source Limitations: Obtain flush wood doors from single manufacturer.**

2.2 FLUSH WOOD DOORS, GENERAL

A. **Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."**

1. **Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.**

B. **Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."**

C. **WDMA I.S.1-A Performance Grade: Extra Heavy Duty.**

D. **Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.**

1. **Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.**
2. **Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.**
3. **Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.**

E. **Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.**

F. **Particleboard-Core Doors:**

1. **Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.**

G. **Mineral-Core Doors:**

1. **Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.**
2. **Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:**

a. **5-inch top-rail blocking.**
b. **5-inch bottom-rail blocking, in doors indicated to have protection plates.**

c. **5-inch midrail blocking, in doors indicated to have armor plates.**
d. **5-inch midrail blocking, in doors indicated to have exit devices.**

3. **Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.**

a. **Screw-Holding Capability: 550 lbf per WDMA T.M.-10.**

2.3 DOORS FOR OPAQUE FINISH

A. **Interior Solid-Core Doors:**

1. **Grade: Custom.**
2. **Faces: Paint Grade Birch.**
3. **Exposed Vertical and Top Edges: Paint Grade Birch.**
4. **Core: Particleboard.**
5. **Construction: Five plies. Stiles and rails are bonded to core and then entire unit is abrasive planed before veneering.**

2.4 LIGHT FRAMES AND LOUVERS

A. **Metal Frames for Light Openings Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.**

B. **Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.**

C. **Metal Security Louvers: Provide louvers for door, where indicated, which comply with SDI 111C.**

1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:**

a. **Anemostat; a Mestek company; PLSL.**
b. **Air Louvers Inc.; 1500-A.**
c. **L&L Louvers Inc.; SZ-70AS**

2. **Blade Type: Vision-proof, inverted Y.**
3. **Metal and Finish: Hot-dip galvanized steel, Frame & Grille: minimum 0.096-inch-thick (12 gauge), Louver Blades: minimum 0.040-inch-thick (18 gauge), factory primed for paint finish.**

2.5 FABRICATION

A. **Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.**

1. **Comply with NFPA 80 requirements for fire-rated doors.**

B. **Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.**

1. **Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.**

C. **Openings: Factory cut and trim openings through doors.**

1. **Light Openings: Trim openings with moldings of material and profile indicated.**
2. **Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."**
3. **Louvers: Factory install louvers in prepared openings.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. **Examine doors and installed door frames, with Installer present, before hanging doors.**

1. **Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.**
2. **Reject doors with defects.**

B. **Proceed with installation only after unsatisfactory conditions have been corrected.**

3.2 INSTALLATION

A. **Hardware: For installation, see Section 08 71 00 "Door Hardware."**

B. **Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.**

1. **Install fire-rated doors according to NFPA 80.**
2. **Install smoke- and draft-control doors according to NFPA 105.**

C. **Factory-Fitted Doors: Align in frames for uniform clearance at each edge.**

D. **Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.**

1. **Clearances: Provide 1/8 inch) at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.**

a. **Comply with NFPA 80 for fire-rated doors.**
b. **2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.**

2. **Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.**

3.3 ADJUSTING

A. **Operation: Rehang or replace doors that do not swing or operate freely.**

B. **Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.**

END OF SECTION 08 14 16

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Service doors.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.

1. Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.

B. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Show locations of replaceable fusible links.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For overhead coiling doors**,** accessories, and components, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from metal to match curtain slats and finish.

C. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

2.3 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.4 CURTAIN ACCESSORIES

A. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

2.5 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 110513 "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

a. Phase: 3 Phase.
b. Volts: 460V.
c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

D. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction. Provide self-monitoring capability designed to interface with door operator control circuit to detect damage to or disconnection of sensing device.

E. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.

G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

J. Interlock Switch: Provide manufactures standard momentary contact exhaust fan interlock switch.

2.7 DOOR ASSEMBLY

A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Cookson Company.
b. Cornell Iron Works, Inc.
c. Overhead Door Corporation.

B. Operation Cycles: Not less than 10,000.

C. Door Curtain Material: Galvanized steel.

D. Door Curtain Slats: Curved profile slats of 1-1/2-inch center-to-center height.

E. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

F. Hood: Galvanized steel.

1. Shape: Round.
2. Mounting: Face of wall.

G. Locking Devices: Equip door with slide bolt for padlock and chain lock keeper.

1. Locking Device Assembly: Single-jamb side locking bars, operable from inside.

H. Electric Door Operator:

1. Usage Classification: Standard duty, up to 60 cycles per hour.
2. Motor Exposure: Interior.
3. Emergency Manual Operation: Chain type.
4. Obstruction-Detection Device: Automatic photoelectric sensor.
5. Remote-Control Station: Interior.
6. Other Equipment: Audible and visual signals, Fan interlock switch.

I. Door Finish:
1. Factory Prime Finish: Manufacturer's standard color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports, according to manufacturer's written instructions and as specified.

B. Fire-Rated Doors: Install according to NFPA 80.

C. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

D. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08 33 23

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3

A. Registrations: All hardware specified herein shall be registered with the following agencies, as applicable:

1. California State Fire Marshall.

1.4 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Proof of Compliance: (California located Projects): Provide a list of product(s) containing chemicals known to cause cancer or reproductive toxicity as defined by the Office of Environmental Health Hazard Assessment (OEHHA) under Proposition 65 (CA Code of

Regulations, Title 27, Section 27001). The list includes the specific chemical(s), if the chemical will be exposed to consumers, the means of warning, and an illustration of the label.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

F. California Building Code: Provide hardware that complies with CBC Section 11B.

1. All openings as a part of an accessible route shall comply with CBC Section 11B-404.
2. The clear opening width for a door shall be 32” minimum. For a swinging door it shall be measured between the face of the door and the stop, with the door open 90 degrees. There shall be no projections into it below 34” and 4” maximum projections into it between 34” and 80” above the finish floor or ground. Door closers and stops shall be permitted to be 78” minimum above the finish floor or ground. CBC Section 11B-404.2.3.
3. Operable hardware on accessible doors shall comply with CBC Section 11B-309.4 and shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. Operable parts of such hardware shall be 34” minimum and 44” maximum

above finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

4. Hardware (including panic hardware) shall not be provided with “nightlatch” function for any accessible doors or gates unless the following conditions are met:

    a. Such hardware has a ‘dogging’ feature and is dogged during the time the facility is open.
    b. All ‘dogging’ operation is performed only by employees as their job function (non-public use).

5. The force for pushing or pulling open a door shall be in accordance with CBC Section 11B-404.2.9.

    a. Interior hinged doors, sliding or folding doors, and exterior hinged doors: 5 pounds (22.2 N) maximum. Required fire doors: the minimum opening force allowable by the DSA authority, not to exceed 15 pounds (66.7N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
    b. The force required for activating any operable parts, such as lever hardware, or disengaging other devices shall be 5 pounds (22.2N) maximum to comply with CBC Section 11B-309.4.
    c. The 5 pound (22.2 N) maximum force shall be validated for the size of the door used. The Building Materials Listing of the California State Fire Marshal shall indicate that the door hardware meets the 5 pound (22.2 N) force and shall also list the largest door that can be used.

6. Door closing speed shall comply with CBC Section 11B-404.2.8. Closers shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum.
7. Floor stops shall not be located in the path of travel and 4” maximum from walls.
8. Thresholds shall comply with CBC Section 11B-404.2.5.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to ASSA ABLOY ACCENTRA. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about May of 2024, and products shipping after that time will be branded ASSA ABLOY ACCENTRA.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.

b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

a. Hager Companies (HA) - BB Series, 5-knuckle.
b. McKinney (MK) - TA/T4A Series, 5-knuckle.
c. dormakaba Best (ST) - F/FBB Series, 5-knuckle.

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

a. Schlage (SC).
b. Match Existing, Field Verify.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.4 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.5 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 5400LN Series.
b. dormakaba Best (BE) - 9K Series.
c. Schlage (SC) - ND Series.

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
9. Rim Exit Devices: Exit device rails shall release with less than 5 pounds of pressure per the California Building Code.
10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. Von Duprin (VD) - 35A/98 XP Series.

C. Security Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed rim panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be constructed of high grade, heat treated, corrosion resistant nickel steel alloy, and have a full 3/4" throw projection with slide action positive deadlocking.

1. Static Load Force Resistance: Minimum 3000 lbs. certified independent tested.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 7050 Series.
b. Corbin Russwin Hardware (RU) - ED4000S / ED5000S Series.

2.8 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:

    a. Corbin Russwin Hardware (RU) - DC6000 Series.
    b. Norton Rixson (NO) - 7500 Series.
    c. Sargent Manufacturing (SA) - 351 Series.

2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Ives (IV).
    b. Rockwood (RO).
    c. Trimco (TC).

2.10 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

    a. dormakaba (DO).
    b. Norton Rixson (RF).
    c. Rockwood (RO).
    d. Sargent Manufacturing (SA).

2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Zero (ZE).

2.12 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.13 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. SC - Schlage
3. RU - Corbin Russwin
4. RF - Rixson
5. NO - Norton
6. RO - Rockwood
7. TC - Trimco
8. PE - Pemko
9. BL - Blumcraft

Hardware Sets

Set: 45.13.73

Doors: K903

3 Hinge, Full Mortise, Hvy Wt	T4A3386	US32D	MK
1 Rim Exit Device, Nightlatch	ED5200S VTL957ET M110 M54 M52 5CH	626	RU
2 Cylinder	as required	.626	SC
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Floor Stop	1209HA	630	TC
1 Gasketing	319CR head and jamb		PE
1 Door Bottom	217AV		PE
1 Threshold	2005AT or per details		PE

Set: 45.13.74

Doors: K906

3 Hinge, Full Mortise, Hvy Wt	T4A3386	US32D	MK
1 Rim Exit Device, Nightlatch	ED5200S VTL957ET M110 M54 M52 5CH	626	RU
2 Cylinder	as required	.626	SC
1 Surface Closer	PR7500 DA	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Floor Stop	1209HA	630	TC
1 Gasketing	319CR head and jamb		PE
1 Door Bottom	217AV		PE
1 Threshold	2005AT or per details		PE

Set: 55.04.60

Doors: K129

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	ND96PD .RHO	.626	SC
1	Core	as required	.626	SC
1	Surface Closer	PR7500 DA	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
1	Door Stop	1209/1270CVSV	626	TC
3	Silencer	608-RKW		RO

Set: 55.04.62

Doors: K905

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	ND96PD .RHO	.626	SC
1	Core	as required	.626	SC
1	Surface Closer	CLP7500 DA	689	NO
1	Kick Plate	K1050 10" high CSK BEV	US32D	RO
3	Silencer	608-RKW		RO

Set: 55.04/MFB.15

Doors: K132

6	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom Lock	ND96PD .RHO	.626	SC
1	Core	as required	.626	SC
1	Surf Overhead Stop	10 Series	689	RF
1	Surface Closer	CLP7500 DA	689	NO
2	Kick Plate	K1050 10" high CSK BEV	US32D	RO
2	Door Stop	1209/1270CVSV	626	TC
1	Astragal	305CN		PE
2	Silencer	608-RKW		RO

Set: 55.05.56

Doors: K907

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Entrance/Office Lock	ND91PD .RHO	.626	SC
1	Core	as required	.626	SC
1	Conc Overhead Stop	6 Series	689	RF
3	Silencer	608-RKW		RO

Set: 55.38.50

Doors: K904

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Security Lock	ND95PD .RHO	.626	SC
2	Core	as required	.626	SC
1	Door Stop	1209/1270CVSV	626	TC
3	Silencer	608-RKW		RO

Set: 55.95.50

Doors: K131

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Passage Latch	ND10PD .RHO	.626	SC
1	Door Stop	1209/1270CVSV	626	TC
3	Silencer	608-RKW		RO

Set: 95.0

Doors: K901, K902

1	Core	as required	.626	SC
1	Balance of hardware	Provided by Door Manufacturer		BL

END OF SECTION 087100

SECTION 08 80 00 - GLAZING

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. Glass for windows, doors, and interior borrowed lites.
2. Glazing gaskets and accessories.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. CBC: 2022 California Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the following products; 12 inches square.

1. Laminated glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Product Certificates: For glass.

E. Product Test Reports: For tinted glass and insulating glass, for tests performed by a qualified testing agency.

F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.9 WARRANTY

A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Vitro Architectural Glass.
    b. Guardian Industries Corp.; SunGuard.
    c. Pilkington North America.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.
2. Obtain reflective-coated glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Safety Glazing: Conform to CCR Title 24, Part 2, California Building Code, Chapter 24. Safety Glass shall conform to CCR Title 24, Part 2, California Building Code, Section 2406 and shall be tested in accordance to CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category I or II as indicated in Table 2406.2(1). Glazing that is not installed in doors are permitted to be tested in accordance with ANSI Z97.1. Under ANSI Z97.1, glazing shall comply with the test criteria for Class A or B as indicated in Table 2406.2(2)

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. **For monolithic-glass lites, properties are based on units with lites 6 mm thick.**
2. **For laminated-glass lites, properties are based on products of construction indicated.**
3. **For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.**
4. **U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 7.3 computer program, expressed as Btu/sq. ft. x h x deg F.**
5. **Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 7.3 computer program.**
6. **Visible Reflectance: Center-of-glazing values, according to NFRC 300.**

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. **GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."**
2. **IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."**

B. Safety Glazing Labeling: Where safety glazing labeling is required per CCR Title 24, Part 2, California Building Code, Section 2406.3, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

E. Strength: Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged

glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.6 MONOLITHIC GLASS SCHEDULE

A. Glass Type GL-1: Clear, fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

3.7 INSULATING GLASS SCHEDULE

END OF SECTION 08 80 00

SECTION 08 90 00

LOUVERS AND VENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section specifies shop fabricated and manufactured metal louvers and vents that are not an integral part of the mechanical system or doors.

B. Related requirements specified elsewhere:
   1. Documents affecting work of this Section include, but are not limited to, Conditions of the Contract and Sections in Division 01 of these Specifications.
   2. Door louvers - Section 08 11 13, Hollow Metal Doors and Frames.
   3. Louvers and vents which are integral with the mechanical system - Division 23, Heating Ventilating, and Air Conditioning.

1.02 DESIGN REQUIREMENT

A. No exposed exterior screws on louvers within 6-feet of grade.

1.03 SUBMITTALS

A. Manufacturer's catalogue data for manufactured items including maximum recommended air velocity, design free area, materials and standard finishes.

B. Shop Drawings
   1. None required for first named manufacturer and product for each item.
   2. Other named manufacturers and products, including substitutions: Submit drawings for all shop fabricated items indicating gauge, configuration, assembly, material, finish and installation. Dimension all drawings; draw to scale.

C. Certification of free air area.

D. Proof of fabricator’s qualifications.

1.04 QUALITY ASSURANCE

A. Certify that louver conforms to free air area required by the mechanical systems.

B. Qualifications: Fabricator specializing in manufacturing products specified in this section with minimum five years documented experience. Work supervised in the shop by a SMACNA trained journeyman.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aluminum

1. Extruded shapes: ASTM B221, 6063-T5 alloy; factory finished.
2. Sheet and plate: ASTM B209.

2.02 MANUFACTURED UNITS

A. Manufacturers: Loren-Cook, Springfield, MO; Greenheck, Schofield, WI; Ruskin, Kansas City, MO
B. Wall Louvers

2.03 SHOP FABRICATED UNITS

A. Formed Stationary Louvers
1. Fabricate in accordance with SMACNA "Architectural Sheet Metal Manual, Plates 102 and 103, from galvanized steel.
2. Weld entire assembly and make watertight.
3. Where width exceeds 66-inches, provide interlock blade braces with aluminum angle supports equally spaced at a maximum of 54-inches.
4. Provide 1/8 x 1-inch stiffener bar where required by SMACNA standard.
5. Blades:
a. 45 degree baffle type set in louver frame. Each blade full width of louver.
b. Furnish with concealed vertical mullions where blade width exceeds 5 feet. Weld mullions to rear of louver blades so that mullions are not visually apparent when viewed from the exterior face of the louver.
6. Screens
a. Removable interior aluminum insect screen fit into 3/4-inch wide "U" frame, complying with ANSI/SMA 1004 and ANSI 089; 18 by 16; of 0.013-inch mesh for each operating sash; "gun metal" finish.
b. Reinforce and weld frame corners. Fit mesh taut into frame and secure.
7. Profiles, unless otherwise designated on the Drawings
a. Frames: "A-2"
b. Sills: "B-1"
c. Blades: "D-1"

2.04 ACCESSORIES

A. Fasteners: Stainless steel screws.

B. Flashing Felt: Imperforate asphalt saturated felt, ASTM D226.

C. Flashings: Same material as louver frame.

2.05 FINISHES

A. Manufactured wall louvers: Factory baked enamel finish, color as scheduled from standard colors.

B. Roof vents and shop fabricated stationary louvers: Prime paint finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before beginning the work specified in this section, carefully inspect the substrate to which the work specified in this section will be applied. Execution of the work specified in this section shall constitute a certification by the Contractor that the substrate is in proper condition to receive subsequent work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's written installation recommendations, plumb, level, and in alignment with adjoining construction..

B. Install flanges of wall louvers over 6-inch width of flashing felt all around.

C. Align louver assembly to ensure moisture shed from flashings and so that moisture is shed to the exterior.

D. Secure to louver back with stainless sheet metal screws spaced at 8-inches on center, on 4 sides.

END OF SECTION

SECTION 09 24 00 - PORTLAND CEMENT PLASTERING

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. Exterior portland cement plasterwork (stucco) on metal lath.

B. Related Sections:
1. Section 06 10 00 "Rough Carpentry" for wood framing and furring included in portland cement plaster assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of colored and textured finish coat indicated; 12 by 12 inches, and prepared on rigid backing if requested by Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.5 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653, G60, hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. CEMCO.
    b. Western Metal Lath.
    c. Dietrich Metal Framing; a Worthington Industries company.

2. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd..
3. 3/8-Inch Rib Lath: 3.4 lb/sq. yd.

B. Wire-Fabric Lath:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Structa Wire Corp.; Structalath Twin Trac (ICC #ESR 2017)
    b. Architect and District Approved Equal.

2. Welded-Wire Lath: ASTM C 933; self-furring, 1.14 lb/sq. yd.

C. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper.

1. Provide paper-backed lath at exterior locations.

2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. CEMCO.
    b. Clark Western Building Systems.
    c. Dietrich Metal Framing; a Worthington Industries company.
    d. Stockton Products
    e. Western Metal Lath

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653, G60 zinc coating.
3. Cornerite: Fabricated from metal lath with ASTM A 653, G60, hot-dip galvanized zinc coating.
4. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
    b. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.

5. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.

6. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8-inch-wide; with perforated flanges.
9. Soffit Vent: Fabricated from zinc-coated (galvanized) steel; formed to provide a vent with 1/8" vent holes; with expanded or solid flanges. Size as shown on drawings.

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: ASTM C 1116, alkaline-resistant glass or polypropylene fibers, 1/2-inch-long, free of contaminants, manufactured for use in portland cement plaster.

C. Bonding Compound: ASTM C 932.

D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 954, #10 self-drilling, self-tapping; with ¾ inch (min.) diameter pan head that is suitable for application; in lengths required to achieve penetration through joined materials and metal stud flange by no fewer than three exposed threads or 3/8 inch (whichever is greater) and shall engage not less than three strands of lath.

E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

1. Nails for attaching metal lath to wood stud framing shall have a 0.162" diameter head and shall be in lengths required to achieve penetration through joined materials and into wood stud framing by no less than 1 ¼ inches.

F. Wire: ASTM A 641, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, Type I.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate: ASTM C 897.

D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American, an Oldcastle Company; Marblesil Stucco Mix.
b. California Stucco Products Corp.; Conventional Portland Cement Stucco.
c. Florida Stucco; Florida Stucco.

d. LaHabra, a brand of ParexLaHabra, Inc.; Exterior Stucco Color Coat.
e. Omega Products International, Inc.; ColorTek Exterior Stucco.
f. QUIKCRETE; QUIKCRETE Finish Coat Stucco, No. 1201.
g. Shamrock Stucco LLC; Exterior Stucco.

2. Color: Match exterior paint colors.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1-part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1-part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

A. Metal Lath: Install according to ASTM C 1063 and 2019 CBC Section 2603.12.

1. Flat-Ceiling and Horizontal Framing: Install 3/8-inch rib lath.

2. On Solid Surfaces, Not Otherwise Furred: Install self-furring, expanded metal or welded-wire lath.

B. Attach lath to metal and wood framing with approved fasteners at 6 inches on center along framing supports.

3.4 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

1. Install cornerbead at exterior locations.

C. Control/Expansion Joints: Install control/expansion joints at locations indicated on Drawings and per the following minimum requirements:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

a. Vertical Surfaces: 144 sq. ft.
b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.

2. At distances between control joints of not greater than 18 feet o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

D. Aluminum Trim: Install at locations indicated on Drawings.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C 926, TER No. 1303-04, and 2019 CBC 2603.12.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
4. When attaching metal lath to wood stud framing over Foam Plastic Insulating Sheathing, the weight of the plaster assembly shall not exceed the limits set forth in 2019 CBC Table 2603.13.1. For installation of exterior cement plaster over 1 ½" thick foam insulation, the weight of the plaster assembly shall not exceed 18 psf.

B. Bonding Compound: Apply on concrete plaster bases.

C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 3/4-inch thickness.

1. **Portland cement mixes.**

D. **Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 3/4-inch thickness.**

1. **Portland cement mixes.**

E. **Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork, 3/8-inch-thick (minimum) on concrete masonry.**

1. **Portland cement mixes.**

F. **Plaster Finish Coats: Apply to provide float finish.**

3.6 PLASTER REPAIRS

A. **Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.**

3.7 PROTECTION

A. **Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.**

END OF SECTION 09 24 00

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. National Gypsum Company.
2. PABCO Gypsum.
3. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: As indicated.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corp.
   b. PABCO Gypsum.
   c. USG Corporation.

2. Core: As indicated on Drawings.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.

C. Aluminum Trim: ASTM B 221, Alloy 6063-T5.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.6 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

C. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Grabber Construction Products; Acoustical Sealant GSC.
   b. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.

c. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

E. Vapor Retarder: As specified in Section 07 21 00 "Thermal Insulation."

2.7 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
b. National Gypsum Company; Perfect Spray EM Texture.
c. USG Corporation; BEADEX FasTex Wall and Ceiling Spray Texture.

2. Texture: Provide mock-up for Architect's approval.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings.
2. Control Joints: Install control joints at locations indicated on Drawings according to ASTM C 840 and in specific locations approved by Architect for visual effect.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile Panels that are substrate for acoustical tile] [Where indicate on Drawings.

3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

H. Texture Finish Application: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

I. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

J. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

SECTION 09 51 00 – ACOUSTICAL CEILINGS

1. GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provision of the Master Site Lease.

1.2 DESCRIPTION OF WORK:

A. Extent of each type of acoustical ceiling is shown and scheduled on drawings.

B. Types of acoustical ceilings specified in this section include the following:

1. Acoustical panel ceilings, exposed suspension.

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: Firm with not less than 3 years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer. Installer shall be familiar with DSA I.R. 25-2.

B. Fire Performance Characteristics: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84.

Flame Spread: 25 or less

Smoke Developed: 50 or less

2. Fire Resistance Ratings: As indicated by reference to design designation in UL “Fire Resistance Directory” of “FM Approval Guide,” for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any) and partition system (if any).

1.4 SUBMITTALS:

A. Product Data: Manufacturer's product specifications and installation instructions for each acoustical ceiling material required and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.

1. Include manufacturer's recommendations for cleaning acoustical unit, including precautions against materials and methods which may be detrimental to finishes and acoustical performances.

B. Samples: Set of 3 - 4" x 4" square samples for each acoustical unit required, showing full range of exposed color and texture to be expected in completed work.

C. Submittals: In accordance with Section 01 33 00.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver acoustical ceiling units to project site in original unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS:

A. Space enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

2. PRODUCTS

2.1 ACOUSTICAL CEILING UNITS, GENERAL:

A. Colors, Textures, and Patterns: Provide products to match appearance characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of quality designated.

3.1 PREPARATION:

A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

1. Furnish concrete inserts, steel deck hanger clips and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.2 INSTALLATION:

A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and industry standards applicable to work.

B. Arrange acoustical units and orient directionally patterned units (if any) in manner shown by reflected ceiling plans.

C. Install acoustical tile by cementing to substrate, using amount of adhesive and procedure recommended by tile manufacturer. Maintain tight butt joints, aligned in bother directions, and coordinated with ceiling fixtures. Scribe and cut tile to fit accurately at ceiling edges and penetrations.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing molding.

2. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely. Butt splice only.

3.3 ADJUST AND CLEAN:

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4 EXTRA STOCK: Deliver stock of maintenance material to Owner, furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.

A. Acoustical Ceiling Units: (tiles) Furnish quantity of full size units equal to 2%of amount installed.

END OF SECTION

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

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. Resilient base.

B. Related Sections:

1. Section 03 30 00 “Cast-in-Place Concrete” for concrete substrate and finished concrete floors.
2. Section 09 29 00 “Gypsum Board” for wall materials to receive resilient base.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. California Green Building Standards Code (GBC) Submittals:

1. Product Data: For adhesives, documentation indicating that products:

a. Comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits as shown in Tables 5.504.4.1 (2022 California Green Building Standards Code).
b. Comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene) except for aerosol products as specified in GBC 5.504.4.1.2.

2. Product Data: For smaller unit sizes of adhesives (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces):

a. Comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products. Use same designations indicated on Drawings.

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver

extra materials to owner where directed. Obtain signed receipt from owner that indicate where materials were delivered, the date of delivery, who accepted delivery and the amount and nature of materials delivered. Include copy of signed receipt in maintenance manuals.

1. **Furnish not less than 20 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.**

1.4 QUALITY ASSURANCE

A. **Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.**

1. **Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.**

1.5 DELIVERY, STORAGE, AND HANDLING

A. **Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.**

1.6 PROJECT CONDITIONS

A. **Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 90 deg F, in spaces to receive resilient products during the following time periods:**

1. **48 hours before installation.**
2. **During installation.**
3. **48 hours after installation.**

B. **Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.**

C. **Install resilient products after other finishing operations, including painting, have been completed.**

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. **Resilient Base:**

1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

a. **Burke Mercer Flooring Products; Division of Burke Industries, Inc.**
b. **Endura Rubber Flooring; Division of Burke Industries, Inc.**
c. **Johnsonite.**
d. **Mondo Rubber International, Inc.**
e. **Roppe Corporation, USA.**

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous) or Group II (layered).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: preformed. A mockup for a typical installation shall be done by the contractor and shall be reviewed and approved by the Architect and Owner before proceeding with either installation method.

G. Inside Corners: Preformed.

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

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

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products as reviewed by Architect during the submittal process.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, in toe spaces and open ends of casework and cabinets, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned. Maintain minimum measurement of 18 inches between joints.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Scribe and fit to door frames and other interruptions.

F. Do not stretch resilient base during installation.

G. At exposed ends used preformed units.

H. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products as recommended by the Manufacturer's installation instruction until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 91 00 – PAINTING AND FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Painting schedules, including painting of exposed surfaces, interior and exterior, except as otherwise specified or indicated.

1.2 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications: Shop Primed Surfaces.

B. Section 06 20 23 – Interior Finish Carpentry.

C. Section 07 62 00 – Sheet Metal Flashing and Trim.

D. Section 08 11 13 – Hollow Metal Doors and Frames.

E. Section 08 31 13 – Access Doors and Frames.

F. Section 09 24 00 – Portland Cement Plastering.

G. Section 09 29 00 – Gypsum Board.

H. Divisions 22 – 23 – Mechanical Sections as applicable to the Project.

I. Divisions 26 – 28 – Electrical Sections as applicable to the Project.

1.3 REFERENCES

A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual

C. Referenced Standards:

1. ASTM D523 – Standard Test Method for Specular Gloss.
2. The Master Painters Institute, MPI Gloss and Sheen Levels.

1.4 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with sufficient documented experience.

B. Applicator: Company specializing in commercial painting and finishing with sufficient documented experience.

C. Gloss Levels: Per Master Painters Institute (MPI) gloss standards “MPI Gloss and Sheen Levels,” measured in accordance with ASTM D523.

GLOSS LEVEL	DESCRIPTION	GLOSS AT 60 DEGREES ASTM D523	SHEEN AT 85 DEGREES ASTM D523
G1	A traditional matte finish – flat.	5 units, maximum	and 10 units, maximum
G2	A high side sheet flat – “a velvet-like finish.”	10 units, maximum	And 10 – 35 units
G4	A “satin-like” finish	10-25 units	and 35 units maximum
G5	A traditional semi-gloss.	35 - 70 units	-
G6	A traditional gloss.	70 - 85 units	-
G7	A high gloss.	More than 85 units	-

1.5 REGULATORY REQUIREMENTS

A. Conform to California Building Code for flame spread and smoke density requirements for finishes.

B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB), 2019 California Green Building Standards Code, and the San Joaquin Valley Air Pollution Control District (SJVAPCD).

1.6 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Provide product data on all finishing products.

C. Submit four brush-out samples 8 inches by 10 inches in size illustrating color and gloss level selected for each surface finishing product scheduled.

D. Field Sample: Furnish sample of actual paint colors selected on portion of building item to receive paint as directed by Architect, prior to beginning interior and exterior painting.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in manufacturer's original unopened, labeled containers; inspect to verify acceptance.

B. Store and protect products from abuse and contamination.

C. Container labeling is to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well-ventilated area, unless required otherwise by manufacturer's instructions.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior work and interior work, unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.9 EXTRA STOCK

A. Provide a new and unopened five-gallon container of each type, color and sheen to Owner.

B. Label each container with color, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.1 PAINT SYSTEMS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2 SUSTAINABLE DESIGN REQUIREMENTS

A. VOC Content: Provide materials that comply with VOC limits set by Rule 4601 of the San Joaquin Valley Air Pollution Control District and 2019 California Green Building Standards Code Table 5.504.4.3; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content not more than 50 g/L.
2. Primers, Sealers, and Undercoaters: VOC content not more than 100 g/L.
3. Nonflat Paints and Coatings: VOC content not more than 100 g/L.
4. Nonflat-high gloss Paints and Coatings: VOC content not more than 150 g/L.
5. Stains: VOC content not more than 250 g/L.
6. Anti-Corrosive and Anti-Rust Paints and Primers applied directly to Ferrous Metals: VOC content not more than 250 g/L.
7. Zinc-Rich Primer applied to Galvanized and Ferrous Metals: VOC content not more than 340 g/L.
8. Varnish: VOC content not more than 450 g/L.

B. Chemical Components of **Field-Applied Interior Paints and Coatings**: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1, 2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.
    s. Methyl ethyl ketone.
    t. Methyl isobutyl ketone.
    u. Methylene chloride.
    v. Naphthalene.
    w. Toluene (methylbenzene).
    x. 1,1,1-trichloroethane.
    y. Vinyl chloride.

2.3 ACCEPTABLE MANUFACTURERS – PAINT

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.4 ACCEPTABLE MANUFACTURERS – PRIMER SEALERS

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.5 ACCEPTABLE MANUFACTURERS – STAIN AND CLEAR FINISHES

A. Refer to Table at the end of this Section.

B. Substitutions: Under provisions of Section 01 25 13.

2.6 MATERIALS

A. All paint materials shall be provided from a single manufacturer unless noted otherwise in this Section.

B. Coatings: Ready mixed. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating.

C. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

D. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

E. All Materials specified by brand name or manufacturer shall be delivered unopened at the job in their original containers.

2.7 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

PART 3 EXECUTION

3.1 GENERAL

A. Storage: All materials used by the painting contractor shall be stored and mixed in a place designated by the Owner or the Architect. The storage place must be kept neat and clean at all times. All cloths, waste or other material that might constitute a fire hazard shall be placed in a suitable metal container or shall be removed from the site or destroyed at the end of each day's work.

3.2 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application to the Architect, Architect's representative or inspector in writing. The Architect will cause such defect to be remedied.

C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster; Gypsum Wallboard: 12 percent.
2. Concrete Masonry Units: 10 percent.
3. Interior Located Wood: 15 percent.
4. Exterior Located Wood: 7 percent.

D. Beginning of application constitutes acceptance of the surfaces.

3.3 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or painting.

B. Correct minor defects and clean surfaces that affect work of this Section.

C. Seal marks that may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Gypsum Board Surfaces: Latex fill minor defects. Spot-prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer, unless otherwise recommended by finish coating system manufacturer.

G. Shop-Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces as recommended by primer manufacturer. Prime shop-primed steel items with steel primers specified in this Section.

H. Concrete, Stucco and Masonry: All dust and loose mortar shall be removed by sweeping or by brushing with a stiff fiber or wire brush.

1. Concrete and masonry surfaces that show signs of efflorescent shall be treated with a zinc sulfate wash (3lbs. per gallon of water), or by scrubbing affected areas with a solution of muriatic acid. Remove loose crystals and rinse with clear water. Allow to dry thoroughly before painting.

a. All surfaces defects and all cracks more than 1/16 inch wide shall be filled with patching plaster or spackle according to package directions and textured to match adjacent areas.
b. Form oils or separating agents that might impair the adhesion or the appearance of the specified finish shall be removed before any materials are applied.

2. Plaster work that has cured for less than two months and all other plaster areas that show the presence of excessive amounts of free alkali when tested with phenolphthalein or some other suitable means shall be treated with a zinc sulfate wash (3 lbs. per gallon of water) to neutralize the alkali and obtain the optimum of surface carbonation.

a. All surface Cracks greater than 1/32 inch wide, holes and other surface defects shall be repaired as recommended by the finish paint manufacturer’s written instructions.

I. Interior Wood Items Scheduled to Receive Finish: Hand sandpaper and wipe off dust and grit prior to priming. Seal knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

1. At woodwork with transparent finish, nail holes, cracks or defects shall be filled with wood filler tinted to match color of stain.

3.4 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this Section.

C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.5 WORKMANSHIP

A. All work shall be performed by experienced mechanics in a skillful manner. All materials shall be evenly applied so as to be free from sags, crawls or other defects. Coats shall be of the proper consistency and well brushed out as to show the minimum brush marks, except varnish and enamel which shall be uniformly applied. Brushes shall be clean and in good condition. All areas with a transparent coat will be repainted at contractor’s expense.

B. All painting shall be by brush, except plaster and gypsum board which may be by spraying with back rolling. Underside of soffits, covered walks, acoustical panels and screens may be completed by spraying with back rolling.

C. No work shall be completed under conditions that are unsuitable for the production of good results. No painting shall be completed while plaster is curing, or while wood sawing, sanding or cleaning is in process. Coats shall be thoroughly dry before the succeeding coat is applied. Finishes shall be uniform as to sheen, shine, color and texture, except when glazing is required.

D. No exterior painting shall be done in rainy, damp, or frosty weather. No Interior painting or finishing shall be permitted until the building has been thoroughly dried out by artificial heat. A minimum temperature of 50 degrees Fahrenheit shall be maintained in areas where the application or drying of paint is occurring.

E. This contractor shall take into account that not less than the following percentages of total surfaces shall be painted in deep (dark) tones of color selected: (This includes colors requiring ultra-deep bases)

1. Walls: 25%
2. Ceilings: 25%
3. Doors and Door Frames: 100%
4. Sheet Metal: 50%
5. Exposed Steel: 100%

3.6 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

1. Paint mil thicknesses shall not be less than the minimums recommended by the paint manufacturers.
2. No Paint, varnish or stain shall be reduced or applied in any way except as herein specifically called for, or recommended by the manufacturer.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand lightly between coats to achieve required finish.

F. Allow applied coat to dry before next coat is applied.

G. The number of coats called for in the Painting Schedules included in this specification are the minimum number required. Additional coats may be required to achieve the desired finish.

H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Prime back surfaces of interior and exterior woodwork with primer paint, type as recommended by manufacturer.

J. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.7 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. See Divisions 21 – 23 and 25 – 28 for other items requiring painting.

B. Paint interior surfaces of air ducts and convector heating cabinets that are visible through grilles and louvers with one) coat of flat black paint, to limit of sight line. Paint dampers exposed behind grilles to match face panels. Paint all new interior and exterior exposed ductwork and ductwork supports. Paint all new conduit, pipes and conduit/pipe supports in exposed interior and exterior locations.

C. Reinstall electrical plates, hardware, light fixture trim, and fittings removed for surface preparation or painting.

D. Do not paint factory-finished mechanical and electrical equipment.

3.8 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.

B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove from site daily.

3.9 PAINTING SCHEDULE – EXTERIOR SURFACES:

A. Ferrous Metal
1st coat – Acrylic Low Sheen Primer
2nd and 3rd coats – 100 percent Acrylic Semi-Gloss

B. Ferrous Metal (Industrial)
1st coat – Epoxy Primer
2nd and 3rd coats – Aliphatic Urethane Gloss Enamel
For use at exterior metal architectural features/exposed structure

C. Galvanized Metal (Handrail and Guardrail Assemblies only)
1st coat – Etch Prep
2nd coat – Epoxy Satin Primer
3rd and 4th coats – High Dispersion Pure Acrylic Polymer

D. Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)
1st coat – Etch Prep
2nd coat – Acrylic Low Sheen Primer
3rd and 4th coats – 100 percent Acrylic Semi-Gloss

E. Exposed Concrete and Cement Plaster System with Cementitious Finish Coat
1st coat – Acrylic Flat Primer
2nd and 3rd coats – Elastomeric Flat

F. Cement Plaster System with Acrylic Finish Coat
1st coat – Acrylic Flat Primer
2nd and 3rd coats – Elastomeric Flat

G. Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Flat

H. Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Semi-Gloss

I. Pressure Treated Wood
1st coat – Acrylic Flat Primer
2nd and 3rd coats – 100 percent Acrylic Satin

J. Masonry (CMU)
1st coat – Acrylic Block Filler Primer
2nd and 3rd coats – Elastomeric Flat

3.10 PAINTING SCHEDULE – INTERIOR SURFACES:

A. Gypsum Board
1st coat – PVA Primer Sealer
Texture by Section 09 29 00 Contractor
2nd coat – PVA Primer Sealer – Tint towards final color.
3rd and 4th coats – 100 percent Acrylic Semi-Gloss

B. Interior Cement Plaster
1st coat – PVA Primer Sealer
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel

C. Gypsum Board (Whiteboard Finish)
1st coat – PVA Primer Sealer
Texture by Section 09 29 00 Contractor (Level 5)
2nd coat – Acrylic Flat Primer
3rd coat – 2-Part Solvent Based Dry-Erase Coating

D. Wood (Opaque Finish)
1st coat – Acrylic Flat Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

E. Interior Ferrous Metal
1st coat – Acrylic Low Sheen Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel
Typical paint system at all hollow metal doors, pressed metal frames, and exposed steel structure.

F. Concrete
1st coat – Acrylic Flat Primer – Tint towards final color
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

G. Masonry (CMU)
1st coat – Acrylic Block Filler Primer
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss

H. Wood (Transparent Finish)
1st coat – Oil-based Interior Wood Stain
2nd coat – Oil-based Interior Sanding Sealer
3rd and 4th coats – Oil-based Interior Wood Varnish – Semi-Gloss

I. Galvanized Metal, Zinc Alloy Metal and Aluminum
1st coat – Etch Prep
2nd coat – Acrylic Low Sheen Primer – Tint towards final color.
2nd coat and 3rd coats – 100 percent Acrylic Semi-Gloss Enamel

PAINTING SCHEDULE

APPLICATION	TYPE	MPI Gloss Level	MANUFACTURER	PRODUCT NUMBER
PRIMERS				
Exterior Ferrous Metal	Acrylic	G2	Sherwin Williams	5725
Exterior Ferrous Metal (Industrial)	Epoxy	G6	Rust-oleum	9103
Exterior Galvanized Metal and Aluminum (Except Handrail and Guardrail Assemblies)	Acrylic	G2	Sherwin Williams	5725
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	Epoxy	G4	Tnemec	L69
Exterior Wood and Pressure Treated Wood	Acrylic	G1	Sherwin Williams	255
Exterior Cement Plaster and Concrete; and Interior Concrete	Acrylic	G1	Sherwin Williams	247
Exterior Cement Plaster System with Acrylic Finish Coat	Acrylic	G1	Sherwin Williams	250
Exterior and Interior Masonry (Block Filler)	Acrylic	G1	Sherwin Williams	521
Interior Gypsum Board& Cement Plaster	PVA	G1	Sherwin Williams	971
Interior Wood	Acrylic	G1	Sherwin Williams	973
Interior Ferrous Metal	Acrylic	G2	Sherwin Williams	5725
Interior Aluminum, Ferrous & Galvanized Metal	Acrylic	G2	Sherwin Williams	5725
Interior Gypsum Board (Dry-Erase)	Acrylic	G1	Kilz	Premium Primer
FINISHES				
Exterior Ferrous & Galvanized Metal, Aluminum, Wood and Pressure Treated Wood (Except Handrail and Guardrail Assemblies)	100 percent Acrylic	G5	Sherwin Williams	1250
Exterior Ferrous Metal (Industrial)	Aliphatic Urethane Enamel	G6	Rust-oleum	3300
Exterior Galvanized Metal (Handrail and Guardrail Assemblies Only)	High Dispersion Pure Acrylic	G5	Tnemec	1029
Exterior Cement Plaster, Concrete, and CMU	Elastomeric	G1	Sherwin Williams	1128
Exterior Wood and Masonry	100 percent Acrylic	G1	Sherwin Williams	1240A
Exterior Pressure Treated Wood	100 percent Acrylic	G4	Sherwin Williams	1245A
Interior Gypsum Board, Wood, Masonry (CMU) and Concrete	100 percent Acrylic	G5	Sherwin Williams	1650
Interior Gypsum Board (Dry-Erase Finish)	2-Part Solvent		FUZE	WHITE
Interior Ferrous & Galvanized Metal and Aluminum	100 percent Acrylic Enamel	G5	Sherwin Williams	1685
Interior Plaster (existing and new)	100 percent Acrylic Enamel	G5	Sherwin Williams	1685

MISCELLANEOUS				
Interior Wood Stain	Oil-based	G1	Old Masters	11101
Interior Sanding Sealer	Oil-based	G1	Old Masters	45004
Interior Wood Varnish	Oil-based Polyurethane Semi-Gloss Finish	G5	Old Masters	495
Exterior Heavy-Duty Cleaner	Water Based	-	Jasco	Prep & Prime
Exterior & Interior Galvanized Metal Etch Prep.	Water Based	-	Jasco	Prep & Prime

END OF SECTION

SECTION 10 10 00 – MISCELLANEOUS SPECIALTIES

1. GENERAL:

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK: (provide and install complete)

A. Section Includes:

1. Extreme Short Throw Digital Projector
2. Projector Mount and Accessories (Wall Mount)
4. Battery Operated Radio Control Clock
5. Portable Assistive Listening System

B. Related Sections:

1. Section 10 14 00 “Signage and Graphics” for Assistive Listening System Sign.

1.3 QUALITY ASSURANCE:

A. Manufacturer’s Data: Provide complete manufacturer’s data, including installation instructions and details to contractor’s job Superintendent, to facilitate coordination of work.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer’s technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.

B. Shop Drawings: Submit for each type of product. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, and accessories, and installation details.

C. Certification: Submit manufacturer’s certification that all materials furnished for project comply with requirements specified herein.

2. PRODUCTS:

2.1 EXTREME SHORT THROW DIGITAL PROJECTOR:

A. Basis-of-Design Product: Subject to compliance with requirements, provide Vivitek; D757WT or comparable product by one of the following:

1. Architect and District approved equal.

2.2 PROJECTOR MOUNT AND ACCESSORIES (WALL MOUNT):

A. Basis-of-Design Product: Subject to compliance with requirements, provide Vivitek; WM-3 Wall-Mount Bracket or comparable product by one of the following:

1. Architect and District approved equal.

2.4 BATTERY-OPERATED RADIO-CONTROLLED CLOCKS:

A. Basis-of-Design Product: Subject to compliance with requirements, provide American Time; Part #E56BAND301BP, Radio Controlled Clocks – 12 inch Round Surface, Full Numbered Dial, Black Case, and an on-board radio receiver to receive time signal transmitted by the National Institute of Standards and Technology (NIST) from Fort Collins, Colorado or comparable product by one of the following:

1. Atomic Time
2. Howard Miller

2.5 PORTABLE ASSISTIVE LISTENING SYSTEM:

A. Furnish a portable RF (radio frequency) wireless assistive listening system for use by the hearing-impaired. The assistive listening system (ALS) shall be capable of transmitting up to six (6) channels of audio simultaneously on the 72 MHz band. The ALS system shall offer a choice between 57 channels for flexibility and ease of setup. The ALS system shall have 80dB SNR or greater, end-to-end. Receivers shall be frequency agile and frequency set with a "seek" button. The receiver will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset and listen to audio normally. The portable receivers and transmitters shall incorporate automatic battery charging circuitry for recharging of Ni-MH batteries.

B. Basis of Design Manufacturer: Subject to compliance with requirements, provide portable assistive listening system packages manufactured by Listen Technologies Corporations or comparable products by one of the following

1. Williams Sound
2. Architect and District Approved Equal.

C. Portable Assistive Listening System (Ag Shop Classroom):

1. Listen Technologies Corporation: ListenPortable 72MHz RF System with the following options and accessories:
   a. LT-700-072 Portable RF Display Transmitter (Qty: 1 ea.)
   b. LA-277 Conference Microphone (Qty: 1 ea.)
   c. LR-400-072 Portable Display RF Receiver (Qty: 2 ea.)
   d. LA-164 Ear Speaker (Qty: 2 ea.)
   e. LA-166 T-coil Neckloop (for hearing aid compatibility) (Qty: 2 ea.)
   f. LA-362 NiMH rechargeable batteries (pkg. of 2) (Qty: 3 ea.)
   g. LA-323 4-unit Portable RF Products Charging/Carrying Case w/ Removable Lid (Qty: 1 ea.)

3. EXECUTION

3.1 GENERAL

A. Field Conditions: Inspect field condition for suitability of proper installation. Inform contractor of conditions requiring attention. Make field measurements as required.

3.2 INSTALLATION

A. Follow manufacturer’s printed installation instructions and as shown on plans.

B. Provide battery-operated radio-controlled clocks at each space designated on the Electrical Drawings.

3.3 DEMONSTRATION AND TRAINING

A. Before the date of beneficial occupancy/substantial completion, demonstrate and provide training to SUSD personnel and staff per Section 01 79 00 “Demonstration and Training.”

END OF SECTION 10 10 00

SECTION 10 10 10 – TOPCAT ACCESS AUDIO SYSTEM

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 Classroom Audio System for spoken and projected sound reinforcement within the classroom.

B. Related Requirements:

1. Section 10 10 00 “Miscellaneous Specialties” for Assistive Listening System and Ultra Short Throw Projectors.
2. Section 10 14 00 “Signs and Graphics” for Assistive Listening System Signs

1.3 REGULATORY REQUIREMENTS

A. Conform to 2022 California Building Code for requirements applicable to work specified herein.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
   a. Certificate: when requested, submit certificate, indicating qualification.
2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

B. Acceptable Manufacturers

1. Basis of Design: Lightspeed Technologies, 11509 SW Herman Road, Tualatin, OR 97062, PH 800-732-8999, FAX 503-684-3197.

C. Manufacturer Testing: Manufacturer to provide quality assurance certification for each system and all of its components. A report for each system will be available upon request. Report will include serial numbers and pertinent testing data for all of the system functions.

D. Successful third-party installation (when needed) will be supplied with necessary training to allow for product installation certification by Manufacturer and will be installed according to Lightspeed recommendations.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with “Conditions of the Contract”.

B. Manufacturer’s data on all products including but not limited to:

1. Catalog cut sheets
2. Installation instructions
3. Typical wiring diagrams
4. Drawings showing speaker locations
5. Daily Use Guide
6. Manufacturer’s warranty documents
7. Manufacturer’s parts lists
8. Product serial numbers

1.6 WARRANTY

A. Warranty: Refer to “Conditions of the Contract” for warranty and repair provisions.

B. Repair: Manufacturer shall offer repair service on all Classroom Audio components. Owner shall pre-pay shipping for all items returned to manufacturer for repair. The Manufacturer shall repair or replace system components as specified under warranty. Manufacturer shall ship repaired components within five (5) working days of receipt. Items returned to Owner are shipped via the same method in which they were received.
C. Manufacturer's Warranty: All the major system components (transmitters, receiver-amplifier and speakers) must be warranted for five years against defects occurring while used in normal classroom instruction. The warranty shall be equivalent to a Lightspeed Technologies' Five-Year Warranty.

1. Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

1.7 OVERALL SYSTEM DESCRIPTION

A. The system must have specifications and features that are equivalent to the Lightspeed Topcat Access™ In-Ceiling Classroom Audio System including the following:

1. All-in-one, in-ceiling audio system with integrated amplifier, speakers and wireless audio receiver/transmitter
2. Two-way hybrid speaker system with exciter technology sound panel and low frequency cone driver
3. Cross over technology to deliver high speech intelligibility and full range sound with even distribution throughout the classroom
4. Up to 2 microphones for whole room instruction, team-teaching or student sharing
5. Pendant-style Flexmike™ classroom microphone with audio input utilizing Access Technology (1.9 GHz) for transmission. IR not acceptable
6. Optional PageFirst emergency page priority
7. In-Ceiling mounted
8. Suitable for use in air-handling spaces (plenum-rated)
9. Wireless Media Connector utilizing Access Technology (1.9 GHz) to integrate with and wirelessly transmit all classroom multimedia to be played through the Topcat

a. Includes 4 audio inputs with volume control
b. 2 audio outputs for Assisted Listening System Device (ALD) and/or recording with volume control
c. Tone control to remotely adjust bass/treble of Topcat

B. The amplifier must contain a Page mute function (PageFirst™) that passively detects the audio signal of a page coming through the PA system without compromising system performance or voiding warranties. As an audio signal is sent to the PA speaker, the PageFirst™ detects that signal and immediately mutes the Topcat audio amplifier.
C. The system must produce high speech intelligibility and full-range multimedia quality sound with excellent distribution throughout a classroom.
D. The system must be capable to be installed in a classroom with no wires installed in or on the walls. The system must be fully operational without speaker wires or sensor cables.
E. The system must be compatible and expandable to operate with 2-way small group speaker Pods allowing interoperability between both small group and whole group instruction.
F. The system shall carry a "No Audio Dropout Guarantee" between the wireless microphone and the sound system. The guarantee applies to operation in any room up to its expected range of 200 feet (assuming no walls). The guarantee does not extend into other rooms separated by walls as this can limit transmission range significantly. Should any dropout within the classroom in audio transmission occur, the manufacturer would correct it at no additional charge.
G. The system shall carry a standard warranty equivalent to the Lightspeed 5-year Warranty.

1.8 OWNER INSTRUCTION

A. Owner's Instruction: user training will be performed by the manufacturer's local representative. The training will include the research and benefits of classroom amplification, system operation,

simple troubleshooting guidelines, and incorporating the classroom amplification into teaching styles. The manufacturer will also provide additional training in trouble-shooting techniques and product return procedures to one specified person per campus. This service shall be rendered to the Owner at no additional cost.

B. A Daily Use Guide is included with system to provide information on how to use the system. In addition, instruction materials and detailed Owner's manual shall be available on manufacturer's website to cover complete operational and basic maintenance procedures.

PART 2. PRODUCTS

2.1 IN-CEILING CLASSROOM AUDIO SYSTEM SPECIFICATIONS

A. Overall System:

1. Power output: 20 Watts RMS
2. Acoustic Frequency response: 60 Hz to 18 kHz -10dB
3. AC Mains Power Input: 100-240V ~ 50/60Hz 1.5A
4. DC Power Input: 24V/2.5A
5. Signal-to-noise: 60 dB
6. Total Harmonic Distortion: <1%, 10 W
7. Wireless Communication: Access Technology (1.9 GHz + RF4CE)
8. Automatic power on when Flexmike is powered on and linked
9. Dimensions (W x D x H): 24" x 12" x 3.7" (Removable side spacers to fit international ceiling grids; 595mm x 295mm x 94mm)
10. Weight: 13.5 lbs. (6.1 kg)
11. Controls:
    a. (1) Microphone volume control
    b. (1) Tone control
    c. (1) Audio input volume control
    d. (1) PageFirst sensitivity adjustment
12. Connections:
    a. (1) Direct AC mains power input
    b. (1) Optional DC Power Input
    c. (1) Audio input (Longer cable runs may require a ground loop isolator in order to prevent audio hum caused by a ground loop.)
    d. (1) Optional Page mute (PageFirst™) input (Euro-block)
13. Device Registration: push button for transmitter(s), remote(s), speaker Pods, Media Connector, Activate Station
14. Wireless audio range: up to 200 feet
15. Integrated 2-Way Hybrid Speaker System:
    a. Description: exciter technology sound panel plus low frequency cone driver
    b. Integrated cross-over technology
    c. Panel Size: 13.75" x 6.75"
    d. Cone Driver Size: 5.25"
    e. Overall Frequency Response: 60 Hz to 18 kHz -10dB
    f. Impedance: 8 Ω
    g. Power Handling: 25 W

B. The in-ceiling classroom audio system shall use bi-directional wireless Access Technology to communicate with up to two wireless microphones.

C. The in-ceiling classroom audio system shall use bi-directional wireless Access Technology to integrate with other audio sources in the classroom.

D. The in-ceiling classroom audio system shall use bi-directional wireless Access Technology to send a mixed audio output to a media connector or Activate Station located at a convenient/student accessible location in the classroom.

E. The in-ceiling classroom audio system shall use bi-directional wireless Access Technology to communicate with up to 12 optional tabletop speaker Pods available to facilitate small group instruction.
F. The all-in-one system must contain a Page mute function (PageFirst™) that passively detects the audio signal of a page coming through the PA system without compromising system performance or voiding warranties. As an audio signal is sent to the PA speaker, the PageFirst passive sensor clip detects that signal and immediately mutes the Topcat.

2.2 FLEXMIKE PENDANT-STYLE MICROPHONE / TRANSMITTER

A. Description: the pendant-style Flexmike transmitter shall contain microphone volume control on the unit allowing users to adjust volume level from anywhere in the classroom. The Flexmike shall be capable of being worn around a teacher's neck as a hands-free microphone via the lavaliere cord or to be used as a handheld student pass-around microphone. The Flexmike must be rechargeable via cradle charger, computer, or Activate Bluetooth Charging Station and must have alkaline charge protection.
B. Lanyard: adjustable length with magnetic clasp
C. Wireless communication: bi-directional Access Technology (1.9 GHz)
D. Audio distortion: <1%
E. Integrated microphone type: uni-directional electret
F. Audio input: 3.5mm
G. Earbud output: 3.5mm (for monitoring optional Activate Pods)
H. Push button volume control: +/- 6dB (total range = 12 dB)
I. Power: on/off/mute button
J. Battery Power: 2.4V NiMH battery pack
K. Battery run time: 8 hours (fully charged)
L. Charging: Integrated battery charger. The 5V power can be supplied via a cradle charger (charges two Flexmike transmitters)
M. Alkaline Charge Protection: Yes
N. USB Audio: interface with computer USB audio while charging
O. Registration: push button for registration with Topcat
P. Dimensions (L x W x H): 2.9" x 1.1" x 1.0" (74 x 28 x 25mm)
Q. Weight: 1.8 oz. (51g)

2.3 WIRELESS MEDIA CONNECTOR

A. Description: Wireless audio transmitter/receiver to integrate with classroom audio sources and send/receive the wireless to the Topcat system in the ceiling.
B. Wireless Communication: Access Technology (1.9 GHz)
C. Audio Inputs: (4) 3.5mm stereo jacks connect to classroom audio sources.
D. Audio Outputs: (2) 3.5mm jack with volume control
E. (1) Microphone volume control
F. (1) Audio input volume control
G. (1) Audio output volume control
H. (1) Power button with LED
I. (1) Tone control
J. (1) Registration button with Registration LED and linked LED
K. Audio frequency response: 80 Hz to 7 kHz ±3 dB
L. Audio distortion: <1%
M. DC Power Input: USB 5V/0.2A (type micro-B)
N. Mounting: table-top or wall
O. Dimensions (W x D x H): 7.6"x 4.1"x 1.1" (193 x 104 x 28mm)

2.4 WALL MOUNTING BRACKET (WHERE SHOWN)

A. Description: Wall mounting bracket for Topcat classroom audio system to allow easy installation on a hard ceiling or a wall. Includes a breakout to accommodate conduit and allows space for j-box and power supply.
B. Dimensions (L x H x D): 28.5" x 2" x 4.5"

C. Weight: 7 lbs., with Topcat 21.5 lbs.

2.5 REGULATORY AND CERTIFICATIONS

A. The classroom audio system and its components shall be manufactured using lead-free processes and free of other materials harmful to the environment (RoHS and WEEE compliant).
B. The classroom audio system and its components shall be listed to UL/CUL standards and requirements for electrical safety by Underwriters Laboratories Inc.
C. The classroom audio system must be suitable for use in air handling spaces and carry appropriate certifications (UL 2043).
D. The classroom audio system and its components shall be CE Certified and conform with the essential requirements of the following European Union Directives: 2014/30 EU Electromagnetic Compatibility (EMC), 2014/35/EU Low Voltage Directive (LVD) and RED 2014/53/EU.
E. The classroom audio system and its components shall comply with Part 15 of the FCC rules as a Class B digital device (FCC Certified).

PART 3. EXECUTION

3.1 SYSTEM PERFORMANCE

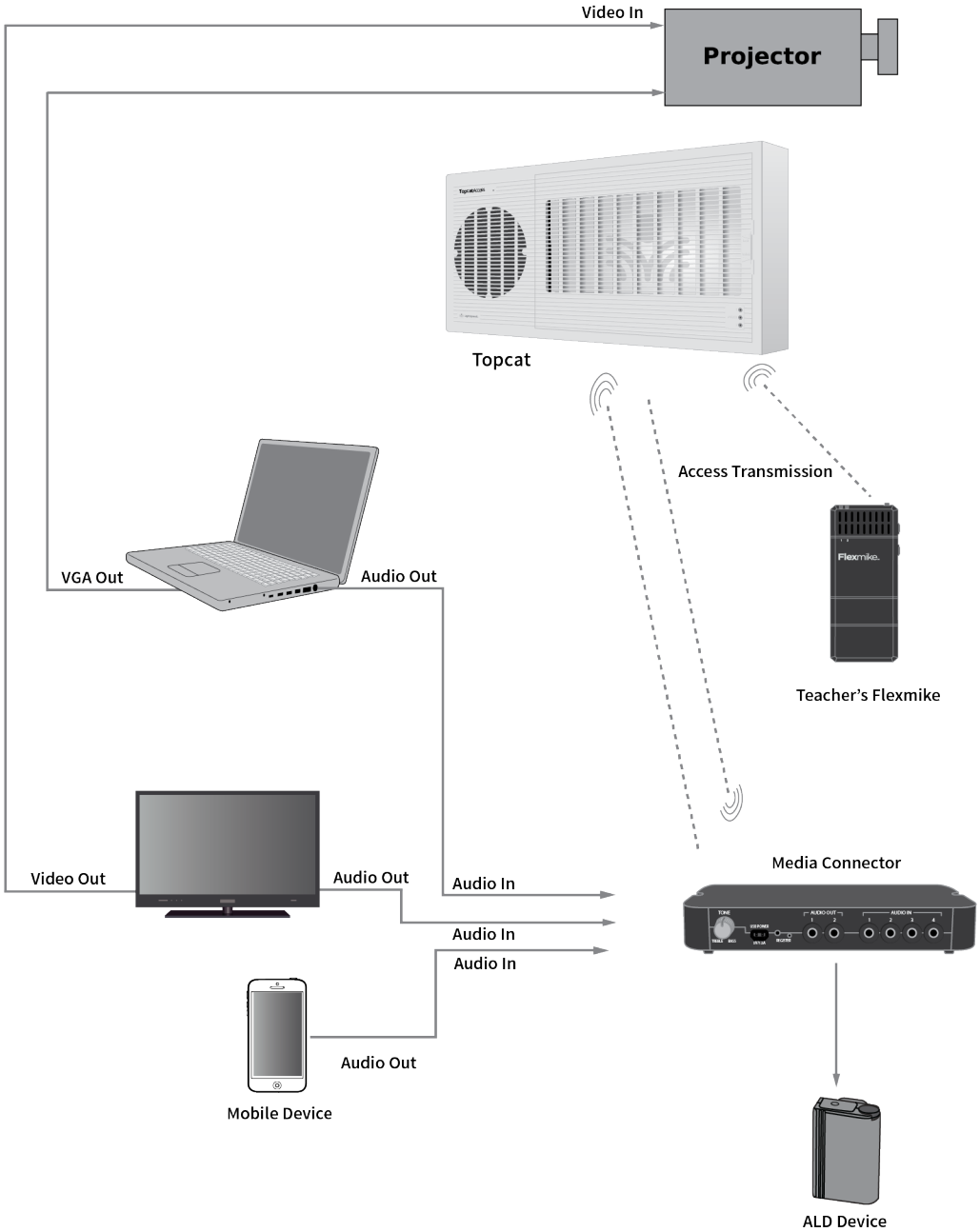
A. Install in accordance with Manufacturer's installation instructions.
B. Final adjustment: Upon completion, the system shall be clean, adjusted and left in perfect operating condition. Transmitters shall be plugged in and charging and Daily Use Guide should be left in a conspicuous place. The full user manual shall be available for download from the manufacturer's website.
C. Provisions: There shall be no audible components of hum, noise, or distortion.

3.2 INSTALLATION

A. Provide and install Sound Reinforcement System in the locations shown on drawings as required.
B. All equipment and enclosures described in this specification shall be permanently attached to the structure and held firmly in place. Supports shall be adequate to support their loads per manufacturers specifications.
C. The process of testing the Audio Sound System may necessitate moving and adjusting certain component parts (ex. loud speakers). Contractor shall provide at no additional cost to the owner.
D. Take precautions as necessary to prevent and guard against electromagnetic and electrostatic noise interference. Long cable runs, unshielded and / or poorly shielded cable, multiple ground paths and improper grounding may all contribute to the production of a low frequency hum. In most cases a ground loop isolator (not provided) placed in line will attenuate or possibly eliminate the hum.
E. Wireless Media Connector shall be located per Owner's request. Contractor to ensure all Media Connectors or Activate Charging Stations have power available, are properly registered, and all volume controls are set properly via a field test in every classroom.

3.3 TOPCAT AUDIO INTEGRATION USING MEDIA CONNECTOR

The wireless Media Connector must have four audio inputs to allow other audio sources to be wirelessly transmitted and played through the Topcat system. Computers, laptops, DVD/VCR's, LCD displays, etc. may be connected into the Media Connector using appropriate patch cords. The Media Connector must also receive audio back from the Topcat to output the mixed audio signal of both microphone channels and multimedia for recording purposes and interface with assistive listening devices. See the systems integration chart below.



SECTION 10 11 00

VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Markerboards.

1.2 ACTION SUBMITTALS

A. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of panel joints.
2. Include sections of typical trim members.

B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

C. Warranties: Sample of special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For visual display surfaces to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.

B. Preinstallation Conference: Conduct conference at Project site.

1.6 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Surfaces lose original writing and erasing qualities.
   b. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Claridge Products and Equipment, Inc.
   b. PolyVision Corporation; a Steelcase company.
   c. ADP Lemco, Inc..

B. Hardboard: ANSI A135.4, tempered.

C. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde. Fiberboard: ASTM C 208.

D. Extruded Aluminum: ASTM B 221, Alloy 6063.

E. Laminating Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 MARKERBOARD ASSEMBLIES

A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and porcelain-enamel face sheet with high-gloss finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. PolyVision Corporation; a Steelcase company.
   b. Claridge Products and Equipment, Inc.
   c. ADP Lemco, Inc.

2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.3 MARKERBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; standard size and shape.

1. Field-Applied Trim: Manufacturer's standard, snap-on trim with no visible screws or exposed joints.
2. Factory-Applied Trim: Manufacturer's standard.

B. Chalktray: Manufacturer's standard, continuous.

1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

C. Map Rail: Provide the following accessories:

1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide.
2. End Stops: Located at each end of map rail.
3. Map Hooks: Two map hooks for every 48 inches of map rail or fraction thereof.
4. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches of map rail or fraction thereof.
5. Flag Holder: One for each room.
6. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.

2.4 FABRICATION

A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

B. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.

1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.5 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

B.

2.6 VISUAL DISPLAY SURFACE SCHEDULE

A. Visual Display Board: Factory assembled.

1. Markerboard: Porcelain-enamel markerboard assembly.

a. Color: White.

2. Corners: Square.
3. Width: As indicated on Drawings.
4. Height: As indicated on Drawings.
5. Mounting: Wall.
6. Mounting Height: As indicated on Drawings.
7. Factory-Applied Aluminum Trim: Manufacturer's standard with clear anodic finish.

a. Color: As selected by Architect from full range of industry colors and color densities.

8. Accessories:

a. Chalktray: Solid type.
b. Map rail with display rail, end stops, map hooks and clips, and flag holder.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

C. Field-Assembled Visual Display Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
2. Provide manufacturer's standard vertical-joint system between abutting sections of markerboards.

D. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.

1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.

a. Attach chalktrays to boards with fasteners at not more than 12 inches o.c.

E. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION 10 11 00

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. The work included under this section consists of furnishing all products, materials, finishes, supplies, equipment, tools and transportation, and performing all labor and services necessary for, required in connection with, or properly incidental to furnishing and installing signage as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.\

B. Work Summary:
   1. Create final production artwork and layouts for each sign face.
   2. Furnish materials and labor associated with fabricating and finishing all signs.
   3. Provide packaging and transportation of all signs to the project site.
   4. Furnish material and labor required for installation of signage.
   5. All code required signage shall be field inspected per CBC 11B-703.1.1.2

C. Alternates
   1. Provide separate pricing for alternate designs shown on sheet W3.4. These alternate designs substitute for signs with the same sign type designation shown on sheets W3.1-W3.3. Quantities and locations are the same.

1.2 SUBMITTALS

A. Color Samples: Submit three sets of 6"x6" samples of each color for approval. See design drawings for colors and materials.

B. Product Data Sheets. Supply product data sheets for all products used in the manufacture and installation of signage.

C. Contractor shall be responsible for the structural design of freestanding signs, internal illumination, and methods for fastening and installation.

D. Applicable Standards and Publications: Unless otherwise specified or shown, signage shall conform to the following standards and publications:

E. ANSI A-117.1 and the Americans with Disabilities Act (ADA).

F. ATBCB Design Guidelines for Signage in relation to the Americans with Disabilities Act.

G. California Building Code (CBC), 2022, Sections 11B-216 and 11B-701-703.

H. California Grade 2 Braille shall be used whenever Braille symbols are specifically required. Refer to CBC Section 11B-703.

I. ANSI A-117.1 and the Americans with Disabilities Act (ADA).

J. ATBCB Design Guidelines for Signage in relation to the Americans with Disabilities Act.

K. California Building Code (CBC), 2022, Sections 11B-216 and 11B-701-703.

L. California Grade 2 Braille shall be used whenever Braille symbols are specifically required. Refer to CBC Section 11B-703.

M. Contractor shall be responsible for the quality of materials and workmanship of any firm acting as the Contractor's subcontractor.

N. Welding, where required, shall be in accordance with procedures specified in American Welding Society Standards using procedures, materials, and equipment of the type required for the work.

O. Inspection: Tactile signes shall be field inspected for compliance after installation (11B-703.1.1.2)

1.3 GUARANTEE

A. At a minimum, the Contractor shall warrant that all work installed under this Contract is free of defect and will remain in good working order for a period of one year for all surface improvements and five years for all underground work. If warranties specified elsewhere in these documents are for a longer period of time than that specified in this section, the longer warranties shall apply.

B. Manufacturer's Standard Product Warranties:

1. Plastic Elements: Manufacturer's warranty against yellowing, cracking, crazing, or other visible and performance defects for a period of 5 years from the date of installation.
2. Paint Coating: Acrylic polyurethane coating manufacturer's 5-year warranty against defects in materials.

PART 2 - CODE REQUIRED SIGNAGE

2.1 TYPES OF SIGNS

A. Room Identification: Interior and exterior signs identifying permanent rooms and spaces shall comply with CBC Sections 11B-703.1, 11B-703.2, 11B-703.3 and 11B-703.5. Where pictograms are provided as designations of permanent rooms and spaces, the pictograms shall comply with CBC Section 11B-703.6 and shall have text descriptors complying with CBC Sections 11B-703.2 and 11B-703.5.

B. Egress Signage: Signs for means of egress shall comply with CBC Section 11B-216.4.

C. Directional & Informational: Signs that provide direction to or information about interior and exterior spaces and facilities of the site shall comply with CBC Section 11B-703.5.

D. Toilet Room Signage: Signage for toilet rooms shall comply with CBC 11B-216.8.

E. Assistive Listening Systems: Signage for assistive listening systems shall comply with CBC 11B-216.10

2.2 RAISED CHARACTERS: Raised characters shall comply with CBC Section 11B-703.2 and shall be duplicated in Braille complying with CBC Section 11B-703.3. Raised characters shall be installed in accordance with CBC Section 11B-703.4.

2.3 BRAILLE. Braille shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4.

2.4 INSTALLATION HEIGH AND LOCATION. Signs with tactile characters shall comply with CBC Section 11B-703.4.

2.5 VISUAL CHARACTERS. Visual characters shall comply with CBC Section 11B-703.5.

2.6 PICTOGRAMS. Pictograms shall comply with CBC Section 11B-703.6.

2.7 SYMBOLS OF ACCESSIBILITY. Symbols of accessibility shall comply with CBC Section 11B-703.7.

2.8 BACKGROUNDS: All sign backgrounds to have a non-glare finish.

PART 3 - PRODUCTS

3.1 MATERIALS

A. Acrylic Sheet. Cast methyl methacrylate monomer plastic conforming to ASTM D788, Sign Grade; “Plexiglas SQ” by Altuglas or equal, unless otherwise recommended by fabricator. Sizes and thicknesses as shown.

B. Silicone adhesive to be Dow Corning or approved equal, clear unless otherwise specified.

C. Adhesive tapes to be 3M or approved equal.

D. Paint products to be low VOC Matthews Acrylic Polyurethane or approved equal in colors specified. All finishes to be non-glare. Provide primer as recommended by coating manufacturer for each type of substrate.

E. Screen-printing enamel to be Nazdar or approved equal.

F. Engraving substrate to be Rowmark or approved equal. www.rowmark.com

G. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

H. Vinyl opaque film with pressure-sensitive adhesive backing, suitable for exterior applications, to be 3M or approved equal.

I. Sealant: As required to prevent light and water leakage. No exposed sealant shall be allowed except as indicated on the reviewed shop drawings.

PART 4 - EXECUTION

4.1 GENERAL

A. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary flanges, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.

B. Shop fabricate so far as practicable. Joints shall be fastened flush to conceal reinforcement or welded where thickness or section permits.

C. Contact surfaces of connected members must be assembled so joints will be tight and practically unnoticeable, with minimal use of filling compound.

D. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises

E. unbroken, profiles accurate and ornament true to pattern. Plane surfaces to be smooth flat and without oil-canning, free of rack and twist. Restore texture to filed or cut areas.

F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.

G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.

H. Form joints exposed to weather to exclude water.

I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints shall be tightly mitered to give appearance of solid material.

J. All painted surfaces shall be properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface shall be smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.

K. Movable parts, including hardware, are be cleaned and adjusted to operate as designed without binding of deformation of members. Doors and covers shall be centered in openings or frames. All contact surfaces fit tight and even without forcing or warping components.

L. All fasteners to be non-corrosive.

M. Security head screw to be used for all fasteners. Contractor to coordinate type of security screws used with campus facilities department.

4.2 CUTTING & FINISHING

A. All materials shall be cut with proper equipment using sharp blades. Shapes shall have square corners, straight edges and shall be sized as shown in the design drawings. Blade/cutter marks and scratches will not be accepted.

B. Materials shall be prepared and primed according to product manufacturer's instructions before painting.

C. Finishes shall be applied according to product manufacturer's instructions, then properly cured and protected after application.

4.3 APPLICATION OF GRAPHICS

A. All graphics shall be cut, etched and/or printed to comply with the specified typeface and graphic shapes. Graphics and type shall be clean and crisp without deformation of characters, ticks, gaps or irregularities.

B. Finished surfaces shall be protected from damage during application of graphics.

4.4 PACKAGING

A. Completed signs shall be packed for shipment to the project site to protect from damage.

B. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

PART 5 - INSTALLATION

5.1 GENERAL

A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and surrounding wall and/or building finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.

B. All exterior signs to be staked by contractor for owner's approval prior to sign installation or excavation.

C. Contractor will be responsible for verifying that, at each sign location, there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.

D. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices, which may involve other trades.

E. Mount signs in proper alignment, level and plumb. When exact position, angle, height or location is in doubt, contact Designer for clarification.

F. Remove or correct signs or installation work Owner determines as unsafe or as an unsafe condition.

G. Mount exterior signs with tamper-proof screws as recommended by manufacturer or as shown in the drawings.

H. Mount interior sign with adhesives as recommended by manufacturer or as shown in the drawings.

5.2 CLEANING & ADJUSTING

A. Return items that cannot be refinished in the field to the shop. Make required alterations and refinish entire unit or provide new units.

B. Verify gaskets and flanges interface properly to provide a lightproof installation at monument sign.

C. After installation, clean soiled sign surfaces according to manufacturer's instructions. Protect from damage until acceptance by University.

D. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.

5.3 PUNCHLIST & PROJECT CLOSEOUT

A. Sign contractor shall review all installed work with the Client or Client's representative and make all required punchlist corrections. Once complete, the sign contractor shall back-check all punchlist items and receive Client's final approval of installation.

5.4 RECORD DOCUMENTS

A. As-Built Drawings

B. The Contractor shall submit to the University’s Representative, 10 calendar days after Final Completion, fully updated As-built Drawings and Shop Drawings for review.

C. The As-Built Drawings and Shop Drawings shall be in PDF format. Email is acceptable.

END OF SECTION

SECTION 10 44 16

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

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

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Failure of hydrostatic test according to NFPA 10.
   b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
   b. Larsen's Manufacturing Company.
   c. Potter Roemer LLC.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated 10lbs nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
   b. Larsen's Manufacturing Company.
   c. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

   a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 10 51 13

METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Heavy-duty metal lockers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For units with factory-applied color finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Where metal lockers are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities", ICC/ANSI A117.1 and the CBC.

B. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver combination control charts to Owner by registered mail or overnight package service.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

C. Steel Tube: ASTM A 500, cold rolled.

D. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

E. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 HEAVY-DUTY METAL LOCKERS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Art Metal Products; Champ Corridor Lockers.
2. DeBourgh Mfg. Co.; Sentry Corridor/Personnel Lockers.
3. List Industries Inc.; Marquis Protector.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Art Metal Products, Champ Corridor Lockers

C. Locker Arrangement: Triple tier.

D. Material: Cold-rolled steel sheet.

E. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with 0.048-inch nominal-thickness backs and 0.060-inch nominal-thickness tops, bottoms, sides, and shelves.

F. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

G. Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
2. Door Style: Louvered vents at top and bottom.

H. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
2. Continuous Hinges: Manufacturer's standard, steel, full height.

I. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.

a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

2. Single-Point Latching: Nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.

a. Latch Hook: Equip each door with one latch hook, fabricated from 0.120-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

J. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

K. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: Manually locking deadbolt.

L. Equipment: Equip each metal locker with identification plate.

M. Accessories:

1. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.

a. Height: 4 inches.

2. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

a. Closures: Hipped-end type.

3. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
4. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
5. Boxed End Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

N. Finish: Baked enamel.

1. Color(s): As selected by Architect from manufacturer's full range.

2.3 FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

D. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.

E. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

F. Continuous Base: Formed into channel or zee profile for stiffness and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.

G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

I. Boxed End Panels: Fabricated with 1-inch- wide edge dimension and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

J. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

K. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.4 STEEL SHEET FINISHES

A. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers.

B. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach door locks on doors using security-type fasteners.
2. Identification Plates: Identify metal lockers with identification indicated on Drawings.

    a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

3. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
4. Attach sloping-top units to metal lockers, with closures at exposed ends.
5. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
6. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

END OF SECTION 10 51 13

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated projection screens.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:

1. For projection screens and controls:

a. Location of screen centerline relative to ends of screen case.
b. Location of wiring connections.
c. Location of seams in viewing surfaces.
d. Anchorage details.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED PROJECTION SCREENS (Classrooms)

A. General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

1. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen connected to edge of screen by tabs to pull screen flat horizontally.

B. Surface-Mounted, Metal-Encased, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Da-Lite Screen Company; Model B, with CSR 69” x 92” x 120” diagonal, with wall bracket extension No. 6 White.

PART 3 - EXECUTION

3.1 PROJECTION SCREEN INSTALLATION

A. Install projection screens at locations indicated to comply with screen manufacturer's written instructions.

B. Install projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.

2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.

END OF SECTION 11 52 13

SECTION 123616 - METAL COUNTERTOPS

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. Stainless-steel countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For metal fabrications.

1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.

B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

1.5 FIELD CONDITIONS

A. Field Measurements: Where products are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where products are indicated to fit to other construction, establish dimensions for areas where products are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

A. Countertops: Fabricate from 0.062-inch thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.

1. Joints: Fabricate countertops without field-made joints.
2. Weld shop-made joints.
3. Sound deaden the undersurface with heavy-build mastic coating.
4. Extend the top down to provide a 1-inch-thick edge with a 1/2-inch return flange.
5. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.

2.2 MATERIALS

A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.

B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and the following:

1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
2. Joint Sealant: Single component, nonsag, neutral curing, silicone; Class 25.
3. Color: Stainless to match countertop.

2.3 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.

B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.

D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

E. Seal junctures of countertops, splashes, and walls with sealant for countertops.

3.3 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Architect.

C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123616

SECTION 21 11 00 - FIRE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This is a bidder design system. Contact Authority Having Jurisdiction (AHJ) prior to bid to verify fire system requirements. Provide design compliant with codes as interpreted by AHJ.

B. Provide the following:

1. Wet-pipe sprinkler system.

2. Private fire service main, including connection to existing utility, and piping to the inlet connection inside the building. Provide required valves, backflow preventer, vaults, and appurtenances.

3. Heat cable on insulation for risers and mains in unheated areas. Areas include, but are not limited to, Administration Building and Multi-Use Building.

4. Heater Cable Controller. Connected to building fire alarm control panel.

C. Provide tamper, flow, and pressure switches. Coordinate location and type of tamper, flow, and pressure switches with the fire alarm system.

D. Provide all costs for electrical connections and wiring as required for a complete and operable system. Includes, but is not limited to air compressors, sump pumps, fire pumps, jockey pumps, pump controllers, and the like. Coordinate with Division 16.

E. Refer to Architectural, Structural, Mechanical, Plumbing, Electrical, and Civil Drawings for additional information relating to the fire sprinkler system.

1.2 DEFINITIONS

A. Following is a list of abbreviations generally used in Division 21:

1.	AHJ	Authority Having Jurisdiction
2.	AWWA	American Water Works Association
3.	CBC	California Building Code
4.	CFC	California Fire Code
5.	NFPA	National Fire Protection Association
6.	UL	Underwriters Laboratories Inc.

B. Code: Where this Specification refers to "Code," it indicates any or all of the above listed Codes as applicable to that reference.

C. AHJ: Indicates all reviewing authorities, including the local fire marshal, the Owner's insurance underwriter, Owner's representative, and any other reviewing entity whose approval is required to obtain systems acceptance.

1.3 QUALITY ASSURANCE

A. Qualifications: Company specializing in sprinkler systems of similar type and scope with 3 years experience.

B. Construction Drawings and hydraulic calculations to be signed by a mechanical or fire protection engineer licensed in the state of California. NICET and contractor seals and signatures do not meet this requirement. Construction drawings shall be complete and show information required by NFPA 13.

C. Regulatory Requirements: Provide system per the requirements of the following, except as specifically modified herein. Apply edition as enforced by AHJ unless otherwise stated. Comply with state amendments.

1. UBC and California Building Standards Code, Title 24, all parts, as adopted by AHJ.

2. UFC and California Fire Code, as adopted by AHJ.

3. NFPA 101, Latest Edition, *Life Safety Code.*

4. NFPA 13, Latest Edition, *Standard for the Installation of Sprinkler Systems*.

5. NFPA 25, Latest Edition, *Standard for Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

6. UL Fire Protection Equipment Directory.

7. UL Online Certifications Directory.

8. FM Global Approval Guide.

9. NFPA 24, Latest Edition, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

10. NFPA 291, Latest Edition, *Recommended Practice for Fire Flow Testing and Marking of Hydrants.*

11. NFPA 5000, Latest Edition, *NFPA Building Construction and Safety Code.*

D. Sway brace calculations shall meet minimum requirements of CBC Chapter 16, Par. 1632; and NFPA 13, Par. 9.3.5.6. Brace calculations in UBC Seismic Zone 4 shall be signed by a structural engineer licensed in the state of California. When submitting sway brace calculations, include Building Code Chapter 16 calculations determining force factor (Fp) used in those sway brace calculations.

1.4 SUBMITTALS

A. Submit the following for review. Include in operations and maintenance manual.

1. Shop drawings, hydraulic calculations, sway brace calculations, and component manufacturer's data sheets (as one complete standalone package) to AHJ, Owner's insurance underwriter, and Engineer. Provide proof of approval by AHJ of installed sprinkler system to Engineer on completion of work. Coordinate sprinkler system design with all other building systems. Plans shall show information required by NFPA 13, Par. 14.1, including room names and occupancy classifications.

2. Project Record Documents indicating record conditions per Division 1, Closeout Requirements.

3. Test Reports: Underground and aboveground piping hydrostatic test, water supply flow test; Code-required acceptance tests; and manufacturer's operation and maintenance data. Include written maintenance data on components of system, servicing requirements, and Record Drawings.

4. Operations and Maintenance Manual: Provide three sets of O&M manuals that include Record Drawings, hydraulic calculations, manufacturer's data sheets and operation and maintenance instructions, servicing requirements, test reports and certificates, Contractor’s Material and Test Certificates for Aboveground Piping/Underground Piping and NFPA 25.

1.5 EXTRA STOCK

A. Provide extra sprinklers per code; provide suitable wrenches for each sprinkler type, and metal storage cabinet in location designated.

1.6 SYSTEM DESCRIPTION

A. Provide coverage for all buildings. Contractor to field verify field conditions prior to submittal of bid. Contractor to make any necessary adjustments to bid in order to provide protection features in accordance with applicable codes and interpretations by AHJ. Provide design and installation based on the more stringent requirements if AHJ requirements differ from Code.

B. Design Parameters:

1. Increase remote design area for sloped roofs and concealed areas per NFPA 13-2002.

2. Building Area: Classrooms, Offices, Gym, Restrooms, Stairs, Corridors, and Conference Rooms.

a. Occupancy Classification: Light.

b. Density: 0.10 GPM per sq.ft. over a 1500 sq.ft. hydraulically most remote design area per NFPA 13.

c. Area per Sprinkler: 225 sq.ft. maximum.

d. Inside Hose Allowance: 0 GPM.

e. Outside Hose Allowance: 100 GPM.

3. Building Area: Storage, Electrical, Mechanical, Janitor.

a. Occupancy Classification: Ordinary Group 1.

b. Density: 0.15 GPM per sq.ft. over a 1500 sq.ft. hydraulically most remote design area per NFPA 13.

c. Area per Sprinkler: 130 sq.ft. maximum.

d. Inside Hose Allowance: 0 GPM.

e. Outside Hose Allowance: 250 GPM.

4. Building Area: Stage.

a. Occupancy Classification: Ordinary Group 2.

b. Density: .020 GPM per sq.ft. over a 1500 sq.ft. hydraulically most remote design area per NFPA 13.

c. Area per Sprinkler: 130 sq.ft. maximum.

d. Inside Hose Allowance: 0 GPM.

e. Outside Hose Allowance: 250 GPM.

C. Sprinkler system design to include a 10 percent pressure cushion between system demand point and available water supplies.

D. Extend hydraulic calculations from hydraulically most remote design back to location of flow test.

E. Develop cost-effective designs that may include the use of extended coverage sprinklers and design area reductions as allowed by NFPA 13.

1.7 FLOW TEST

A. Provide materials and labor for a new water supply test on the closest nearby fire hydrants per NFPA 13, Par. A.15.2.1 and NFPA 291.

1.8 GUARANTY

A. Guaranty all systems against defective equipment, materials and workmanship for a period of 1 year after Owner's acceptance.

PART 2 - PRODUCTS

2.1 GENERAL

A. Material and equipment listed in current UL Fire Protection Equipment Directory, UL Online Certifications Directory for Fire Protection, or FM Global Approval Guide.

B. Provide products new and of current manufacture.

2.2 PIPE AND FITTINGS

A. General: Provide per AHJ requirements, and as a minimum per below.

B. Materials: Domestic Manufacture. .

1. Buried Piping: Ductile iron Class 52, AWWA C151 or PVC, SDR-18, AWWA C900.

2. Aboveground Inside Building Piping:

a. Pipe Size 2-Inch Diameter and Smaller: ASTM A53, ASTM A135, or ASTM A795; minimum CRR of 1.00 per UL listing or FM Global approval. Allied BLT/XL is not permitted.

b. Pipe Size 2-1/2-Inch Diameter and Larger: ASTM A53, ASTM A135, or ASTM A795; minimum CRR of 1.00 per UL Testing or FM Global approved, wall thickness greater than Schedule 5 (Schedule 5 not approved).

c. Copper Pipe: ASTM B75, ASTM B88, ASTM B251. Threaded, brazed, solder or mechanical fittings only.

d. Mechanical Couplings: FM Global approved; Victaulic, Gruvlok, or approved.

e. All dry pipe system piping shall be galvanized inside and out. When ambient temperature exceeds 130F, galvanizing shall not be used. Where piping is exposed, fittings shall be galvanized.

f. Exposed pipe 8’-0” or less above finished floor shall be a minimum of Schedule 40.

2.3 SPECIALTIES

A. Fire Department Connection: Free-standing type; ductile iron; brass finish; thread size to suit fire department hardware; two-way threaded dust cap and chain of same material and finish, marked "Sprinkler Fire Department Connection." Provide method of draining piping subject to freezing.

B. Waterflow Detector: Vane-type with SPDT switches and adjustable time delay (0 to 75 seconds). Potter VSR-F, or approved.

C. Tamper Switches: Provide to mount on applicable valve (OS&Y gate, butterfly, or PIV), with SPDT switches to match requirements of fire alarm system. Potter, or approved.

D. Backflow Prevention Device:

1. Two check valves in series with in-line strainer and OS&Y gate valves at each end. Provide detector if required by local utility. Entire assembly must be UL listed or FM Global approved for fire protection service. Approved by local and state authorities, including California State Department of Health.

2. For Antifreeze Systems: Reduced pressure principle backflow prevention device. OS&Y gate valves on inlet and outlet with indentation for monitoring switch and strainer on inlet. Include two independent operating, spring-loaded check valves with a pressure differential relief valve located between the two checks. Include relief valve air gap drain funnel. Provide detector if required by local utility. Entire assembly must be UL listed or FM Global approved for fire protection service and approved by local authorities and California State Department of Health. Coordinate with Specification Section 15400, Plumbing, for drainage of relief valve. Model 880 by FEBCO, or approved.

E. Inspector's Test Connection: AGF Test-an-Drain, or approved.

F. Alarm Bells Interior: Locate in a normally occupied location. Coordinate with Architect and Division 16.

G. Alarm Bells - Exterior: Exceed 90 dBA at 10 feet. Locate at 8 feet above finished grade. Coordinate with Architect and Division 16. Potter PB 8-inch, or approved.

H. Heater Cable: Nelson LT-3 self-regulating heater cable or approved. Coordinate with Division 16.

I. Heater Cable Controller: Chromalox DL Model RTBC or approved. Coordinate with Division 16.

J. Expansion Chamber: Young Engineering, or approved.

K. Automatic Ball Drip Valve: Viking Model B-1, or approved.

L. High/Low Pressure Alarm Switch: Coordinate electrical requirements with fire alarm system. Potter PS40A, or approved.

M. Air Compressor: Manufactured for fire sprinkler systems. Emglo, Gast, General, or approved.

N. Sectional Control Test/Drain Unit: ASTM A53 pipe, with inspector's test valve, sectional drain valve, sectional isolation valve with tamper switch, restriction union with corrosion resistant orifice equivalent to sprinkler orifice, sight flow connection, and waterflow detector. Tyco F350, or approved.

O. Pressure Switch: Coordinate electrical requirements with fire alarm system. Potter PS10, or approved.

2.4 SPRINKLERS

A. Finished Areas: Glass-bulb, recessed, quick-response pendent with chrome plated finish, and chrome escutcheon.

B. Nonfinished Areas: Glass-bulb, quick-response. Brass finish.

C. Dry: Recessed, glass bulb, quick-response, chrome finish with chrome escutcheon.

D. Provide guards for sprinklers located under ducts or other obstructions or for sprinklers located less than 8’-0” above finished floor or where subject to mechanical injury.

2.5 VALVES, GENERAL

A. OS&Y Gate:

1. 2-1/2 Inches and Larger: Nibco F-607-0, or approved.

2. 2 Inches and Smaller: Nibco T-104, or approved.

B. NRS Gate: Nonrising stem with post indicator. Nibco M/F-609 with NIP1A or equivalent for yard use and Nibco NIP2 or equivalent for wall use.

C. Swing Check: Iron body, rubber and bronze faced checks. Nibco F-908-W, or approved.

D. Wafer Check: Iron body, rubber seat, spring actuated. Nibco W-900-W, or approved.

E. Butterfly Valves: Ductile iron body, Nibco WD3510-8 with factory-installed tamper switches or approved. Use lug body next to pumps, LD-3510-6 or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate the work of this Section with other trades and building systems. Provide adequate space for installation.

B. General:

1. Provide post indicator on buried control valves.

2. Provide listed backflow assembly at sprinkler system water source connection. Coordinate with local utility; conform to their installation requirements.

3. Fire Department Connection: Locate with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.

4. Install pipe runs to minimize obstruction to other work.

5. Install piping in concealed spaces above finished ceilings. Exposed piping shall be approved by Architect and Engineer.

6. Center sprinklers in the middle or quarter points of suspended ceiling tile.

7. Apply strippable tape or paper cover to ensure sprinklers do not receive field paint finish. Remove upon completion of painting.

8. Provide seismic restraints per NFPA 13, and applicable building codes.

9. Coordinate support of sprinkler pipe 4 inches and larger with structural engineer.

10. Provide clearances around piping per NFPA 13, Par. 9.3.4.

11. Provide flexible couplings at building expansion joints per NFPA 13, Par. 9.3.2.

12. Sprinkler system control valves to be post indicator valves to be located a minimum of 40 feet from the building.

13. Route water supply flow test connections to a location which can accept the flow under wide-open flow and pressure for a sufficient time to assure a proper test, and which will not cause damage, including to landscaping.

14. Coordinate location and electrical requirements of air compressor with Division 16.

15. Provide access panels for all test valves, test drains and low point drains concealed by structure or finish.

16. Maintain fire rating of all structural assemblies.

17. Provide Schedule 40 zinc-coated pipe sleeves for pipes passing through masonry walls, floors and ceilings. Extend sleeves completely through construction, firmly pack with oakum and caulk both ends with insulating cement or rated fire-stopping compound.

18. Hydraulic calculations shall include all friction losses between the hydraulically most remote design area and the hydrant flow test pressure hydrant.

19. Space pipe hangers no more than 4 feet on center for all exposed sprinkler pipe located 8'-0" or less above finished floor. Limit branch line overhangs to 4 inches or less.

20. For antifreeze systems provide reduced pressure backflow preventer with drain to sanitary sewer and UL listed or FM approved expansion chamber.

21. Route piping to avoid sheet metal ducts as shown on drawings.

22. Coordinate installation with other trades. Route piping as required to avoid building structure, equipment, plumbing piping, HVAC piping, ductwork, lighting fixtures, electrical conduits and bus ducts and similar work. Final location of lighting will have priority over final sprinkler locations. Provide drains to trapped sections of system which result from such routing. Other trades take precedence for installation space.

23. Locate all sprinkler drains within 7 feet of floor. All sprinkler piping shall be capable of being fully drained.

24. At completion of installation, provide permanent signing of substantial construction and permanent inscription, as required by NFPA 13. Tags on antifreeze systems shall identify volume of system and percentage mixture of water and propylene glycol. Hydraulic placards shall be affixed to the sprinkler riser(s) with one placard for each remote area, per NFPA 13, Par. 16.5.

3.2 SYSTEM TESTS

A. Test entire system per code and AHJ. Provide, arrange, and pay for all testing required by code or AHJ in order to obtain complete and final acceptance. Witness tests by AHJ and Engineer. Notify AHJ and Engineer 2 weeks prior to test.

3.3 FIELD SERVICES

A. Instruct the Owner in the operation of the sprinkler system, including main valve position (open or closed) recognition, system drainage, system testing, and the relation to the fire alarm system.

END OF SECTION

SECTION 22 30 00 - PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Piping system work includes but not limited to:

1. Conductor piping from roof drains to storm building drain.

2. Storm building drain piping from conductor piping and area drains terminating at connection to storm sewers 5 feet outside foundation wall.

3. Plumbing Fixtures: See Schedule on Drawings for types.

4. Specialty piping systems.

5. Natural Gas System: Including new service connection and piping/meter assembly by serving utility company and costs/fees involving rough-in and connection to meter connections to gas equipment.

6. Condensate drain and water piping system for plumbing equipment.

7. Flashing and counterflashing of roof and wall penetrations required by installation of work of this Section.

8. Furnishing and installing of sleeves, inserts and anchorage required for the installation, which are embedded in work of other trades. Sleeve, wrap and seal piping in concrete.

B. Fixtures:

1. Rough and final connection to equipment and fixtures, relocated or provided under other sections by Owner and under other divisions of the work.

2. Standards and supports for equipment requiring them.

3. Instructions and maintenance manuals for equipment furnished by this Section.

1.2 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of plumbing system products, of types, materials, and sizes required.

B. Regulatory Requirements:

1. Codes: Comply with UPC pertaining to plumbing materials, construction and installation of products. Comply with local and state regulations.

2. ANSI Compliance: Comply with applicable American National Institute standards pertaining to products and installation.

3. PDI Compliance: Comply with applicable Plumbing and Drainage Institute standards pertaining to products and installation.

4. Federal Standards: Comply with applicable Federal Specification WW-P-541 Series sections pertaining to plumbing fixtures.

5. NAHB Label: Provide fiberglass bathtub units and shower stalls which have been tested and labeled by NAHB Research Foundation.

6. ADA Compliance: Construct and install barrier-free plumbing fixtures in accordance with "The Americans with Disabilities" Act.

7. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by UL and which comply with NEMA standards.

8. CEC Compliance: Comply with CEC as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

1.3 SUBMITTALS

A. Product data in accordance with Division 1, Section "Shop Drawings, Product Data and Samples." Manufacturer's specifications, installation and startup instructions, capacity and ratings, with selection indicated. Provide pump performance curves with selection points indicated. Provide specialties and accessories required for a complete and operable installation.

B. Shop Drawings: Provide assembly type shop drawings indicating dimensions, weights, required clearances, and methods of assembly of components and anchorages.

C. Wiring Diagrams: Ladder type wiring diagrams for components, indicating required field electrical connections.

D. Maintenance Data: Submit maintenance data and parts list for each item. Include "troubleshooting" maintenance guides. Include this data in operation and maintenance manual.

E. As built Drawings:

1. Supplementing the requirements of the General Conditions and Supplementary General Conditions, As-Built Drawings shall show invert elevations of sanitary sewers, rain water leaders and storm sewers of critical locations, locations of shut-off valves and stub-outs for future, and all changes made during the course of the work. Furnish reproducible drawings when work is complete.

2. The grade or quality of materials desired is indicated by the trade names or catalog numbers stated herein

3. Dimensions, sizes, and capacities shown are a minimum and shall not be changed without permission of the Architect.

PART 2 - PRODUCTS

2.1 DRAINAGE PIPING

A. Underground Piping Outside Building Line: 10 Inches and Smaller: "No-Hub" cast iron soil pipe and fittings with heavy-duty stainless steel couplings and neoprene gaskets.

B. Aboveground Piping: 10 Inches and Smaller: "No-Hub" cast iron soil pipe and fittings with standard-duty stainless steel couplings and neoprene gaskets.

2.2 GAS REGULATOR VENT PIPING

A. Schedule 40 ASTM A53 black steel pipe with black malleable iron fittings.

2.3 CONDENSATE DRAIN PIPING

A. Type "M" copper tubing and wrought copper or cast bronze sweat fittings. 95/5 soldered joints. On sizes 1-1/4 inches and larger, provide "DWV" pattern drainage fittings.

2.4 GAS PIPING

A. Above Grade:

1. 2-1/2 Inches and Smaller: Schedule 40, A53 black steel pipe and threaded malleable iron fittings.

2. 3 Inches and Larger: Schedule 40, A53 black steel pipe. Welded.

3. Piping 1 Inch and Smaller: Corrugated stainless steel tubing with polyethylene jacketing with brass mechanical type fittings.

2.5 CLEANOUTS

A. General: Locate cleanouts as shown on Drawings and as required by local code. Cleanouts same size as pipe except that greater than 4 inches will not be required. Plastic components not allowed, except unless specifically noted.

B. Manufacturers: J. R. Smith, Zurn, Wade, Watts, or approved. J. R. Smith model numbers used as a basis of selection.

2.6 VALVES

A. General:

1. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer’s option.

2. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe sizes.

3. Refer to Section 230500, Basic Materials and Methods, for detailed valve specifications.

B. Service:

1. Drain Service; All Pipe Sizes: Drain valves.

2. Pressure Regulating Valves: Natural Gas/L.P.G.: Diaphragm and spring actuated type, with ventless or vented relief feature. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location. Maxitrol, Equimeter, or approved.

2.7 PREMANUFACTURED COUNTERFLASHINGS

A. Factory-fabricated counterflashing constructed from Schedule 40 galvanized steel or galvanized malleable iron pipe coupling with tapered threads and 3 lb. lead sheet lead formed and soldered to coupling to produce counterflashing minimum of 4-inch overlap over roof flashings. Provide for pipe sizes as required. Manufacturers: A&B Sheetmetal, 503-254-5581.

2.8 ROOF DRAINS/OVERFLOW ROOF DRAINS

A. Cast iron body, flashing ring, drain receiver, cast iron dome and underdeck clamp. Comply with ANSI A112.21.2. J. R. Smith, Watts, Wade, Zurn, Mifab, or approved. See Schedule on Drawings for type. (Plastic components not allowed.)

2.9 DOWNSPOUT NOZZLE

A. Sidewall termination unit. Nickel bronze. J. R. Smith, Zurn, Mifab, or approved.

PART 3 - EXECUTION

3.2 COMPLY WITH PARAGRAPH ON PLUMBING FIXTURES INSTALLATION, THIS SECTION, FOR INSTALLATION PROCEDURES.C. REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE ON DRAWINGS. FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.

B. Manufacturers: Hilti, Proset, or approved.

3.3 PROTECTION

A. Keep pipe openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or plumbing damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of the work.

B. Protect bright finished shafts, bearing housings and similar items, until in service; no rust will be permitted.

C. Cover equipment and materials stored on the job site or otherwise suitably protect at the direction of, and to the satisfaction of Architect. If coverings become torn, replace until the equipment is connected and operating.

3.4 PIPING SYSTEMS INSTALLATION

A. Piping:

1. General: Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other

superfluous materials as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Coordinate installation of piping below with structural components and other system installations.

2. Install piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent). Where this slope is impractical, slope at 1/4 inch per foot for pipes below 4-inch size, and 1/8 inch per foot (1 percent) for piping 4 inches and larger, with the approval of the local code authority.

3. Condensate Drain Piping at HVAC Units: Trap condensate drain for HVAC units.

4. Seismic Restraint: Brace plumbing piping and plumbing equipment against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Plumbing Systems" as published by SMACNA.

5. Rough-in Piping: Provide temporary caps or plugs at piping shown on Drawings to be roughed-in for future connections by others.

6. Storm Drain Piping: Slope at uniform grade of 1/4 inch per foot unless noted otherwise. Make changes in size with reducing and wye fittings. Run exposed piping parallel or perpendicular to building structure.

B. Cleanouts: Install in aboveground piping and building drain piping as indicated, as required by code; at each change in direction of piping greater than 135 degrees; at minimum intervals of 100 feet; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping. Select type to match adjacent building finish. Coordinate locations and types of cleanouts with Architect prior to installation.

C. Equipment Connections:

1. Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by code.

2. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3. Equipment Connections: Connect hot and cold water piping system to equipment as indicated, and comply with equipment manufacturer's instructions. Provide shutoff valve and union for each connection; provide drain valve on drain connection.

D. Valves:

1. Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.

2. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.

3. .

E. Pressure Regulating Valves: Provide inlet and outlet ball valves, and globe valve bypass. Provide pressure gauge on valve outlet.

F. Gas Piping:

1. General: Provide shutoff valves, pressure regulators and unions at connections to gas-fired equipment. Provide dirt legs at low points.

2. Piping Through Roof: Coordinate exact location with roof structure and roof mounted equipment. Provide 2-1/2 lb. lead flashing with manufactured counterflashing at roof penetration.

3. Paint piping exposed to weather with one coat of Rustoleum.

G. Gas Regulator Vent Piping: Paint piping exposed to weather with one coat of Rustoleum.

H. Excavation and Backfill:

1. General: Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work damaged by Contractor's operations.

2. Water: Keep excavations free of standing water. Reexcavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.

3. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of a testing laboratory.

4. Trench Excavation: Excavate trenches to necessary depth and width, removing rocks, unstable soil (muck, peat, and the like), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material at no expense to Owner. Adequate width of trench for proper installation of piping or conduit.

5. Support Foundations:

a. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to a depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other sections of Specifications or drawings.

b. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.

c. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form a base for replacement of required thickness of bedding material.

	Class A		Class B	
Material Passing:	Min.	Max.	Min.	Max.

3/4-Inch Square Opening	27	47	0	1

d. Bedding Material: Full bed site piping on sand, pea gravel or 3/4-inch minus crushed rock. Place a minimum 4-inch deep layer of sand or crushed rock on leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide a firm foundation.

6. Backfilling:

a. Following installation and successful completion of required tests, backfill piping in lifts.

1) In "Pipe Zone," place backfill material and compact in lifts not to exceed 6 inches in depth to a height of 12 inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.

2) Place and compact backfill above "Pipe Zone" in layers not to exceed 12 inches in depth.

b. Backfill Material:

1) Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.

2) Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

7. Compaction of Trench Backfill:

a. Where compaction of trench backfill material is required, use one of following methods or combination thereof:

1) Mechanical tamper,
2) Vibratory compacter, or
3) Other approved methods appropriate to conditions encountered.

b. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.

I. Testing:

1. General:

a. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed

local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.

b. Notify Architect and local Plumbing Inspector two days before tests.

c. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to a water pressure of a minimum of 5 PSI head. System to hold water without a water level drop greater than 1/2 pipe diameter of largest nominal pipe size within a 24-hour period. Test system in sections if minimum head cannot be maintained in each section. The 5 PSI head to be the minimum pressure at the highest joint.

d. Send test results to Architect for review and approval.

2. Testing of Pressurized Systems:

a. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.

b. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.

3. Gas Piping:

a. Cap openings and test with compressed air or nitrogen. Systems to maintain test pressure for a period of 24 hours with no leaks or pressure loss.

b. Test Pressure: 100 PSIG. Use only nontoxic soap and water or commercially approved leak detector liquids for leak detection. Testing mediums and apparatus required to be oil free.

c. Energize and test equipment connected to piping for proper operation. Test "final" gas piping and fittings installed on equipment beyond the rough in piping for leakage using an electronic ionization gas detector. Submit a certificate indicating the completion of the prescribed testing procedure and that such equipment and piping is free from leakage. Test pressures not to exceed recommendations or instructions by manufacturers of equipment and devices.

4. Repair:

a. Repair piping system sections which fail the required piping test by disassembly and reinstallation, using new materials to the extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

b. Drain or purge test water, air, or nitrogen from piping system after testing and repair work have been completed.

3.5 ROOF DRAINS/OVERFLOW DRAINS

A. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.

B. Coordinate metal flashing work with work of roofing, waterproofing, and adjoining substrate work.

C. Coordinate with roofing as necessary to interface roof drains with roofing work.

D. Coordinate with storm water piping as necessary to interface drains with drainage piping systems.

E. Install drains at low points of surface areas to be drained.

F. Install drains flashing collar or flange so that no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

G. Position drains so that they are accessible and easy to maintain.

H. Set overflow drains at proper elevation relative to main roof drains.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Wash Fountains

E. Sinks.

F. Service sinks.

G. Drinking fountains.

H. Hose Bibbs and Wall Hydrants

I. Emergency Shower/Eye Wash

J. Fixtures:

1. Plumbing fixtures and trim, including rims for sinks and lavatories in casework or counters, chair carriers (as required), drinking fountains, drains, cleanouts, floor sinks, and related fixtures shown on the Drawings.
2. Rough and final connection to equipment and fixtures, relocated or provided under other sections by Owner and under other divisions of the work.
3. Standards and supports for equipment requiring them.
4. Instructions and maintenance manuals for equipment furnished by this Section.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 07 90 05 - Joint Sealers: Seal fixtures to walls and floors.

C. Section 22 30 00 - Plumbing

1.3 REFERENCE STANDARDS

A. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 2022.

B. ASME A112.18.1 - Plumbing Supply Fittings; 2022.

C. NSF 61 - Drinking Water System Components - Health Effects; 2022.

D. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.4 SUBMITTALS

A. See Section Division 01 - for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Manufacturers: Firms regularly engaged in manufacture of plumbing system products, of types, materials, and sizes required.

C. Regulatory Requirements:

1. Codes: Comply with UPC pertaining to plumbing materials, construction and installation of products. Comply with local and state regulations.
2. ANSI Compliance: Comply with applicable American National Institute standards pertaining to products and installation.
3. PDI Compliance: Comply with applicable Plumbing and Drainage Institute standards pertaining to products and installation.
4. Federal Standards: Comply with applicable Federal Specification WW-P-541 Series sections pertaining to plumbing fixtures.
5. NAHB Label: Provide fiberglass bathtub units and shower stalls which have been tested and labeled by NAHB Research Foundation.
6. ADA Compliance: Construct and install barrier-free plumbing fixtures in accordance with "The Americans with Disabilities" Act.
7. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by UL and which comply with NEMA standards.
8. CEC Compliance: Comply with CEC as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

1.6 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. 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 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 GENERAL REQUIREMENTS:

A. Refer to Architectural drawings for exact locations, fixture mounting heights and ADA accessibility requirements.

B. Insulate domestic hot water, tempered water and waste piping below handicapped plumbing fixtures with molded single piece removable insulation covers, foam, fire resistant, Truebro, or equal. Install insulation covers in accordance with ADA requirements.

C. Provide 85% IPS red brass pipe for each connection to faucets, stops, hose bibs, and other fixtures/trim. Securely anchor brass pipe to structure. Install stop valves on water supply lines for each fixture, except hose bibbs.

D. Provide compression shutoff control stop valves with IPS inlets and threaded brass nipples at pipe connection on water supplies to each fixture. Provide stops with lock shield loose key and key handle for each stop. For combination fixtures, provide with compression stop and IPS inlet on each water supply fitting.

E. Provide cast brass escutcheons, except escutcheons exposed to view shall have chrome plated finish.

F. Provide chromium-plated finish on fittings and accessories exposed to view.

G. Fixture fittings and trim: Conform to ASME A112.18.1M and ASME A112.19.5, as applicable.

H. Centerset faucets: Top-mounted with inlets on not greater than 4-inch centers, unless specified otherwise below.

I. Separate faucets and combination supply fittings: Provide inlets on 8-inch centers.

J. Zinc-alloy or plastic handles are not permitted for faucets and valves.

K. Provide special roughing-in for wheelchair fixtures.

L. Provide water hammer arrestors at end of pipe runs to two or more fixtures, properly sized with sufficient displacement volume to dissipate calculated energy in the piping systems. Water hammer arrestors shall be stainless steel shell with stainless steel bellows contained within the casing, Zurn Model Z-1700, or equal. See Section 22 10 06. Locate in accessible location or provide access panel with location approved by Architect.

M. Fixture dimensions specified are nominal.

2.3 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated on the plumbing fixture connection schedule on the Drawings. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is installer's option; but, fixtures of same type must be furnished by a single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.
   1. Fixtures: Complete with fittings, supports, fastening devices, faucets, valves, traps, stops and appurtenances required.
   2. Exposed IPS Piping and Tubing: Brass, chrome plated.
   3. Escutcheons: Brass, chrome plated.
   4. Fixture Locations: As shown on Drawings.
   5. Stops: Stops installed in each supply pipe at each fixture accessibly located with wall escutcheons.
   6. Public Lavatories: Provide with flow control device to prevent flow over 0.5 GPM.
   7. Interior Faucets Except Public Lavatories: Provide with flow control device to prevent flow over 0.5 GPM.

2.4 FIXTURE TRIM

A. Traps: Provide traps on fixtures except fixtures with integral traps. Exposed traps chromium plated cast brass or 17-gauge chromium plated brass tubing. American Standard, Kohler, Chicago, BrassCraft, Eastman, Speedway, McGuire, or approved.

B. Supplies and Stops: First quality, chrome plated with brass stems. Stops: Loose key type. American Standard, Kohler, Chicago, BrassCraft, Eastman, Legend, Speedway, McGuire, or approved.

2.5 FLUSH VALVE WATER CLOSETS (WC-1)

A. Bowl:
   1. Manufacturers:
      a. American Standard Inc; Model Afwall FloWise. 2856.128: www.americanstandard.com.
      b. Kohler Company: www.kohlerco.com.
      c. Approved equal.
   2. ASME A112.19.2M; wall hung, siphon jet vitreous china closet bowl, with elongated rim, 1-1/2-inch top spud, china bolt caps.
   3. Mount at ADA accessible height.

B. Flush Valve Manufacturers:
   1. Sloan Valve Company; Model Royal 111-1.28: www.sloanvalve.com.

C. Exposed Flush Valve:
   1. ASME A112.18.1M; exposed chrome plated, diaphragm type with ADA compliant oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 1.28 gallon flush.
   2. ADA accessible.

D. Seat:

1. Manufacturers:
   a. Bemis Manufacturing Company: www.bemismfg.com.
   b. Church Seat Company: www.churchseats.com.
   c. Olsonite; Model 10CC-SS: www.olsonite.com.
   d. Beneke.
   e. Approved equal.
2. Solid white plastic, open front, extended back, self-sustaining hinge, stainless steel, without cover.

E. Water Closet Carrier:
1. Manufacturers:
   a. J.R. Smith 100 or 200 Series.
2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.6 FLUSH VALVE WATER CLOSETS (WC-2)

A. Bowl:
1. Manufacturers:
   a. American Standard Inc; Model Afwall FloWise. 2856.128: www.americanstandard.com.
   b. Kohler Company: www.kohlerco.com.
   c. Approved equal.
2. ASME A112.19.2M; wall hung, siphon jet vitreous china closet bowl, with elongated rim, 1-1/2-inch top spud, china bolt caps.

B. Flush Valve Manufacturers:
1. Sloan Valve Company; Model Royal 111-1.28: www.sloanvalve.com.

C. Exposed Flush Valve:
1. ASME A112.18.1M; exposed chrome plated, diaphragm type with ADA compliant oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 1.28 gallon flush.
2. ADA accessible.

D. Seat:
1. Manufacturers:
   a. Bemis Manufacturing Company: www.bemismfg.com.
   b. Church Seat Company: www.churchseats.com.
   c. Olsonite; Model 10CC-SS: www.olsonite.com.
   d. Beneke.
   e. Approved equal.
2. Solid white plastic, open front, extended back, self-sustaining hinge, stainless steel bolts, without cover.

E. Water Closet Carrier:
1. Manufacturers:
   a. J.R. Smith 100 or 200 Series.
2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.6 FLUSH VALVE WATER CLOSETS (WC-3)

A. Bowl:
1. Manufacturers:
   a. American Standard Inc; Model Baby DeVoro FloWise. 2282.001: www.americanstandard.com.
   b. Kohler Company: www.kohlerco.com.
   c. Approved equal.

2. ASME A112.19.2M; floor mounted, siphon jet vitreous china closet bowl, with elongated rim, 1-1/2-inch top spud, china bolt caps.

B. Flush Valve Manufacturers:
1. Sloan Valve Company; Model Royal 111-1.28: www.sloanvalve.com.

C. Exposed Flush Valve:
1. ASME A112.18.1M; exposed chrome plated, diaphragm type with ADA compliant oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 1.28 gallon flush.
2. ADA accessible.

D. Seat:
1. Manufacturers:
a. Bemis Manufacturing Company; BB955CT 000: www.bemismfg.com.
b. Church Seat Company; 1580CC: www.churchseats.com.
c. Olsonite; Model 126CC: www.olsonite.com.
d. Approved equal.
2. Solid white plastic, open front, extended back, self-sustaining hinge, stainless steel bolts, without cover.

2.7 WALL HUNG URINALS (UR-1)

A. Wall Hung Urinal Manufacturers:
1. American Standard; Model Washbrook Flowise No. 6590.530.
2. Eljer.
3. Kohler Company: www.kohler.com.
4. Approved equal.

B. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Flush Volume: 0.125 gpf, maximum.
2. Flush Valve: Exposed (top spud).
3. Flush Operation: Manual, oscillating handle.
4. Trap: Integral.

C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.

D. Urinal:
1. ASME A112.19.2; vitreous china, wall hung washout urinal with shields, integral trap, removable stainless steel strainer, top spud, steel supporting hanger.
2. Mount at heights shown on architectural drawings.

E. Manufacturers:
1. Sloan Valve Company; Model Royal 186-0.125: www.sloanvalve.com.

F. Exposed Flush Valve
1. ASME A112.18.1M; exposed chrome plated, diaphragm type with ADA compliant oscillating handle, with maximum 5 lbs. force to operate, escutcheon, integral screwdriver stop, vacuum breaker; maximum 0.125 gallon flush volume.

G. Carriers:
1. Manufacturers:
a. J.R. Smith 637 Series.
2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.8 LAVATORIES (L-1)

A. Lavatory Manufacturers:
1. American Standard Inc; Model Lucerne No. 0355.012 "D" shaped bowl: www.americanstandard.com.

2. Eljer.
3. Kohler Company: www.kohler.com.
4. Approved equal.

B. Vitreous China Wall Hung Basin:
1. ASME A112.19.2; vitreous china wall hung lavatory 20 x 18 inch minimum, with 4-inch-high back, rectangular basin with splash lip, front overflow, and soap depression.
a. Drilling Centers: 4 inches.

C. Supply Faucet:
1.
Trim: Chicago Model 802-VE39VP317ABCP combination sink fitting, mixing faucet, 4" centers, No. 317 - 4-inch blade handles, 0.35 GPM flow restrictor, ASME A112.18.1M; chrome plated brass supply with standard spout.
2. ADA accessible.

D. Accessories:
1. Chrome plated 17 gage brass P-trap and arm with escutcheon.
2. Offset waste with perforated open strainer.
3. Screwdriver stops.
4. Rigid supplies.
5. Carrier:
a. Manufacturers:
1) J.R. Smith.
b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

2.9 LAVATORIES (L-2)

A. Lavatory Manufacturers:
1. American Standard Inc; Model Lucerne No. 0355.012 "D" shaped bowl: www.americanstandard.com.
2. Eljer.
3. Kohler Company: www.kohler.com.
4. Approved equal.

B. Vitreous China Wall Hung Basin:
1. ASME A112.19.2; vitreous china wall hung lavatory 20 x 18 inch minimum, with 4-inch-high back, rectangular basin with splash lip, front overflow, and soap depression.
a. Drilling Centers: 4 inches.

C. Supply Faucet:
1. Trim: Chicago Model 802-VE39VP317ABCP combination sink fitting, mixing faucet, 4" centers, No. 317 - 4-inch blade handles, 0.35 GPM flow restrictor, ASME A112.18.1M; chrome plated brass supply with standard spout.
2. ADA accessible.

D. Accessories:
1. Chrome plated 17 gage brass P-trap and arm with escutcheon.
2. Offset waste with perforated open strainer.
3. Screwdriver stops.
4. Rigid supplies.
5. Carrier:
a. Manufacturers:
1) J.R. Smith.
b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

2.10 SINKS (S-1)

A. Manufacturers:

1. Elkay

B. Single Compartment Bowl:
   1. ASME A112.19.3M; 25 x 17 x 6-1/2 inch (635 x 430 x 165 mm) outside dimensions, 18-gauge, Type 302 stainless steel, self rimming and undercoated, with ledge drilled for trim. Elkay DRKAD251765. Disabled accessible.
      a. Drain: 3" (76 mm) chromed brass perforated grid strainer and 1-1/2" O.D. tailpiece, vandal resistant, Elkay LK-18.

C. Trim: Elkay Model LK-VR-2085-13-LC, single handle deck mount, 1-hole installation, 13" high rigid gooseneck spout, vandal resistant aerator, wing handle, ASME A112.18.1M; chrome plated brass supply, anti-rotation pins. Provide with flow control device to restrict flow to no more than 0.5 GPM

D. Bubbler: Elkay LK-VR-1141-A no lead Flexi-Guard bubbler with anti-rotation feature.

E. Accessories: Chrome plated 17-gauge (1.3 mm) brass P-trap and arm with escutcheon, screwdriver stops, rigid supplies.

2.11 SINKS (S-2)

A. Manufacturers:
   1. Elkay

B. Single Compartment Bowl:
   1. ASME A112.19.3M; 22 x 19 x 6 inch outside dimensions, 18 gauge (0.9 mm) thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim. Elkay LRAD 2219. Disabled accessible.
      a. Drain: 3" (76 mm) chromed brass perforated grid strainer and 1-1/2" O.D. tailpiece, Elkay LK18.

C. Trim: Elkay Model 350-E35VP317XKABCP, single handle deck mount, 1-hole installation, gooseneck spout, 1.5 gpm aerator, 4" wrist blade handle, ASME A112.18.1M; chrome plated brass. ADA compliant.

D. Accessories: Chrome plated 17-gauge (1.3 mm) brass and arm with escutcheon, loose key handle stops, rigid supplies.

2.12 SINKS (S-3)

A. Manufacturers:
   1. Elkay

B. Single Compartment Bowl:
   1. ASME A112.19.3M; 25 x 17 x 6-1/2 inch (635 x 430 x 165 mm) outside dimensions, 18-gauge, Type 302 stainless steel, self rimming and undercoated, with ledge drilled for trim. Elkay DRKAD251765. Disabled accessible.
      a. Drain: 3" (76 mm) chromed brass perforated grid strainer and 1-1/2" O.D. tailpiece, vandal resistant, Elkay LK-18.

C. Trim: Elkay Model LK-VR-2085-13-LC, single handle deck mount, 1-hole installation, 13" high rigid gooseneck spout, vandal resistant aerator, wing handle, ASME A112.18.1M; chrome plated brass supply, anti-rotation pins. Provide with flow control device to restrict flow to no more than 0.5 GPM.

D. Eye Wash: Guardian G1849 deck mounted 90-degree swing-down emergency eyewash, provide G3600LF Thermostatic mixing valve.

E. Accessories: Chrome plated 17-gauge (1.3 mm) brass P-trap and arm with escutcheon, screwdriver stops, rigid supplies.

2.13 DRINKING FOUNTAINS (DF-1)

A. Drinking Fountain Manufacturers:
   1. Haws Drinking Faucet Company; Model 1119.
   2. Elkay Manufacturing Company: www.elkay.com.

3. Halsey Taylor: www.halseytaylor.com.
4. Sunroc.
5. Oasis.
6. Approved equal.

B. Fountain:
1. "Hi-Lo" 18 gage, Type 304, No. 4 satin finish stainless steel, two dual height one pieces fountains with rounded bowls. Polished chrome plated brass, shielded, anti-squirt, vandal resistant bubbler heads. Push button activation. In-line strainer, waste strainers and traps. Vandal resistant bottom plates and matching stainless steel back panel. ADA accessible.
2. Mounting: Provide with Haws Model 6700.4 mounting plate with all thread studs, nuts and washers.
3. Support Carrier: Provide with Haws Model 6800 in-the-wall studs.

2.14 DRINKING FOUNTAINS with BOTTLE FILLER (DF-2)

A. Drinking Fountain Manufacturers:
1. Murdock Manufacturing; Model M-OBR4-GRD. www.murdockmfg.com
2. Approved equal.

B. Fountain:
1. "Hi-Lo" 18 gauge, Type 304, No. 4 satin finish stainless steel, two dual height one pieces fountains with round bowls and recessed filler. Unit shall be a recessed outdoor bottle filler. Housing shall have a slim and trim look that blends into the built environment. Unit shall have a strong vandal-resistant design for years of trouble-free service. Bottle filler shall be activated by a 9-volt sensor or a pushbutton as standard. Fixture shall have a self-closing pushbutton that requires less than 5 pounds of force to activate the internally mounted valve. ADA accessible.
2. Mounting: Manufacturer provided mounting plate with all mounting screws, thread studs, nuts, and washers.
3. Electrical: 115v Plug-in Transformer

2.15 WASH FOUNTAINS (WF-1)

A. Manufacturers:
1. Bradley Corporation; Terreon Tri-Fount Wash Fountain; MF2933-STD-AST4-NSD-TL: www.bradleycorp.com.
2. Approved equal

B. Bowl:
1. Constructed of Terreon, a densified solid surface material composed of resin with aluminum trihydrate and other fillers.

C. Sprayhead: Molded vandal resistant sprayhead integral to bowl. All streamformers, and push buttons are secured to the unit from inside the sprayhead module. All valving, water supplies and waste connections are concealed inside the pedestal.

D. Valves and Fittings: Checks, stops, drain spud, flexible stainless steel supply hose and locknut.

E. Activation Controls: Air push button. Each push button pneumatically actuates a non-hold-open, air metering, single temperature valve with field adjustable timing from 0-45 seconds. Factory preset at 10 seconds. Each push button activates one valve which, in turn, activates one station. Push button requires less than five pounds of pressure to activate.

F. Unit is for cold water (no hot water).

F. Barrier-free ADA compliant.

2.16 WASH FOUNTAINS (WF-2)

A. Manufacturers:
1. Bradley Corporation; Terreon Quadra-Fount Wash Fountain; MF2944-STD-AST4-NSD-TL: www.bradleycorp.com.

2. Approved equal

B. Bowl:
   1. Constructed of Terreon, a densified solid surface material composed of resin with aluminum trihydrate and other fillers.

C. Sprayhead: Molded vandal resistant sprayhead integral to bowl. All streamformers, and push buttons are secured to the unit from inside the sprayhead module. All valving, water supplies and waste connections are concealed inside the pedestal.

D. Valves and Fittings: Checks, stops, drain spud, flexible stainless steel supply hose and locknut.

E. Activation Controls: Air push button. Each push button pneumatically actuates a non-hold-open, air metering, single temperature valve with field adjustable timing from 0-45 seconds. Factory preset at 10 seconds. Each push button activates one valve which, in turn, activates one station. Push button requires less than five pounds of pressure to activate.

F. Unit is for cold water (no hot water).

F. Barrier-free ADA compliant.

2.17 SERVICE SINKS (SS-1)

A. Service Sink Manufacturers:
   1. Florestone
   2. Fiat TSB-3000.
   3. Williams.

B. Bowl: 24 x 24 x 12 inch (600 x 600 x 300 mm) high one-piece precast terrazzo. Shoulders shall not be less than 2" wide with 1/2" pitch towards inside with stainless steel cap. Stainless steel cast integral drain body and stainless-steel strainer.

C. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout with pail hook, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges. Chicago 897.

D. Accessories:
   1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
   2. Hose clamp hanger.
   3. Mop hanger. Fiat 889-CC.

2.18 Hose Bibb (HB-1)

A. Hose Bibb Manufacturers:
   1. Acorn; Model 8121CR-LF.
   2. Approved equal.

B. Hose Bibb:
   1. Lead-Free, cartridge operated hose valve with lock shield bonnet, bent nose with flange, vacuum breaker, and removable loose key handle.
   2. Vacuum Breaker: Atmospheric type conforming to the requirements of ASSE Standard 1011.
   3. Finish: Rough chrome plated.

2.19 Hose Bibb (Roof) (HB-2)

A. Hose Bibb Manufacturers:
   1. Acorn; Model 8126CR-LF.
   2. Approved equal.

B. Hose Bibb:
   1. Lead-Free, cartridge operated hose valve with lock shield bonnet, bent nose, vacuum breaker, and removable loose key handle.
   2. Vacuum Breaker: Atmospheric type conforming to the requirements of ASSE Standard 1011.
   3. Finish: Rough chrome plated.

2.20 Wall Hydrant (H-1)

A. Wall Hydrant Manufacturers:
   1. Acorn; Model 8151-SSLF.
   2. Approved equal.

B. Wall Hydrant
   1. Recessed hose box with wall flange. Box shall be fabricated from 18-gauge, type 304 stainless steel with satin finish exterior. Flange shall be 16-gauge stainless steel with satin finish exterior. Lead-Free, cartridge operated hose valve with vandal-resistant lockshield, removable loose key wheel handle, and screw driver operated Stop. Door shall be 16-gauge stainless steel with satin finish and shall have a removable hinge and cylinder lock.
   2. Vacuum Breaker: Atmospheric type conforming to the requirements of ASSE Standard 1011.
   3. Stop: Screwdriver Stop in supply permits servicing the control valve without shutting down the water supply.
   4. Cylinder Lock: Coordinate Keying of Cylinder Lock with District's Locksmith Department.
   5. Finish: Type 304 Stainless Steel – Satin Finish.

2.21 Emergency Shower/Eye Wash (EW-1)

A. Emergency Shower Manufacturers:
   1. Bradley; Model S19314BFPB.
   2. Acorn
   3. Guardian
   4. Haws
   5. Speakman
   6. Approved equal.

B. Emergency Shower/Eye Wash
   1. Barrier-Free Combination Drench Shower/Eye/Face Wash. Space Saver Unit. Shower valve shall operate quickly by a pull rod with a triangular handle. Shower shall provide a superior washdown with an even spray pattern. Halo eye/face wash shall operate with an ergonomic, highly visible push handle and shall provide effective wash down coverage and spray pattern. Provide an integral strainer to reduce debris in the water and to prevent clogging. Unit shall include antimicrobial protection.
   2. ANSI Z358.1-2009
   3. 1 ¼" piping assembly: Galvanized Steel with Manufacturer's standard Safety Yellow Coating.
   4. 1" stay-open shower ball valve and ½" stay-open eye/face wash valve of chrome-plated brass with a type 304 stainless steel pull rod and handle.
   5. Shower head: 3.1" diameter. Highly visible yellow impact-resistant plastic. Minimum water flow of 20 GPM at 30 PSI.
   6. Eye/Face Wash: High performance rinsing platform that provides rapid relief to an individual's eyes and face that have been injured by chemicals or particulate. The eye/face wash shall provide 4.8 GPM of water at a safe velocity while maintaining effectiveness. The eye/face wash shall be protected by flip open dust covers that open when the product is activated. It shall contain an antimicrobial agent to protect the eye/face wash. Unit shall provide a safe, steady water flow under varying water supply conditions from 30 PSI to 90 PSI through the use of an integral flow control in the sprayhead assembly. The bowl shall be constructed of yellow impact-resistant plastic. The dust cover shall be constructed of transparent yellow impact-resistant plastic. Activation shall be by means of a Type 304 Stainless-Steel push handle.
   7. Backflow Prevention: Watts Series LFN9C dual-check backflow preventer with a chrome-plated lead-free brass body and atmospheric vent for continuous pressure applications. The check valve shall come with a 3/8" dual NPT female inlet and outlet connections. It shall be able to sustain a maximum pressure of 125 PSI. The check valve shall be certified to CSA B64.8.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PROTECTION

A. Protect fixtures and equipment from damage. Replace damaged items with new.

B. Keep pipe openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or plumbing damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of the work.

C. Protect bright finished shafts, bearing housings and similar items, until in service; no rust will be permitted.

D. Cover equipment and materials stored on the job site or otherwise suitably protect at the direction of, and to the satisfaction of Architect. If coverings become torn, replace until the equipment is connected and operating.

3.3 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.4 INSTALLATION - GENERAL

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.5 FIXTURES INSTALLATION

A. General:

1. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes.
2. Verification of Conditions: Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.
3. Set and connect to soil, waste, vent and water piping in neat, finished and uniform manner. Connections to be equal height, plumb and set at right angles to floor, or both unless otherwise required or specified.
4. Seal fixtures mounted on floors and walls at abutting joints with approved sealant compounds as directed by Architect.
5. For ADA accessible toilets, provide with handle at wide portion of stall.
6. Lavatories: Set mixing valves to limit outlet temperature to 110F.

B. Fixture Locations: As shown on Drawings. Center water closets and urinals between privacy partitions unless noted otherwise.

C. Stops: Stops installed in each supply pipe at each fixture accessibly located with stops of loose key type. Concealed stops to be screwdriver or loose key type with wall escutcheons.

D. Fixture Supports:
   1. Support wall hung water closets, urinals and lavatories on heavy duty, full size, concealed, commercial grade chair carriers mounted to floor structure. Refer to plumbing fixture connection schedule on drawings.
   2. Support other fixtures mounted on stud partitions on heavy concealed wall brackets bolted to a 1/4-inch thick by 5-inch high steel plate anchored firmly to studs with bolts (or welded to metal studs). Plate to extend one stud each way beyond fixture mounting point width.

E. Flush Valves: Provide "drop-ear" ells or couplings in wall at water supply outlets to flush valves; anchor firmly to structure. At ADA accessible fixtures, face handle to wide portion of stall.

F. After fixtures are set in place and secured to walls, caulk around between fixtures and wall with white silicone caulking compound. Dow Corning 780, General Electric Construction Sealant, or approved.

G. Set countertop lavatories and stainless-steel sink rims in waterproof sealant made for application.

H. Adjust self-closing faucets to provide minimum of 10 seconds of waterflow, and maximum of 15 seconds.

I. After fixture installation is complete, cover and protect rims, fronts and exposed parts until completion of construction phase. Contractor to be responsible for damage to fixtures and assumes related fixture repair or replacement costs.

J. Adjusting and Cleaning: Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.

K. Extra Stock: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner.

L. Field Quality Control:
   1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
   2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

M. Adjusting and Cleaning: Piping: Clean piping exterior surfaces. Comply with Section 22 07 19, Insulation, as applicable. Flush out water filled or drainage piping systems with clean water.

N. Hose Bibb Piping: Provide each hose bibb with an individual accessible shutoff valve (ball type). Locate where shown on Drawings. Provide full access.

3.6 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

END OF SECTION

SECTION 23 05 00 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Materials, installation and testing of pipe, tubing and fittings, and valves.

2. Refer to Specification Sections for each system medium (i.e., plumbing, hydronics, gas, and the like) for pipe application.

3. Motors and starters.

4. Rooftop equipment supports.

5. Mechanical identification materials.

6. Seismic/vibration isolation.

1.2 QUALITY ASSURANCE

A. Manufacturer's Inspection: Inspect flanges, fittings and field applied welds in accordance with manufacturer's standard written quality control procedure in accordance with the following techniques:

1. Visual Method: Comply with MSS SP-55 except as otherwise indicated.

2. Radiographic (X-Ray) Method: Employ wherever recommended or required for pressurized piping systems.

B. Welding Qualification: Qualify welding procedures, welders and operators in accordance with ANSI B31.9 for shop and project site welding of piping work.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, installation instructions, and dimensioned drawings for:

1. Each type of valve.

2. Access panels.

B. Piping Materials List: Provide typewritten list which schedules the piping materials to be used for each system as a function of applicable nominal pipe size ranges. Arrange schedule in outline form for each specific piping system, e.g., "Chilled Water System," "Soil, Waste, and Vent Piping System," and the like. Include ASTM, ANSI or other numbers and other data as necessary to demonstrate compliance with requirements.

C. Test Procedure: Submit a typewritten checklist type of testing procedure indicating testing medium (i.e., water, air, nitrogen, and the like), pipe service, pipe and fitting type and classification, test pressure, pass/fail criteria and any other pertinent data.

D. Maintenance Data: Submit maintenance data and parts list for each type valve. Include this data, product data, and certifications in maintenance manual.

PART 2 - PRODUCTS

2.1 PRODUCT STANDARDS

A. References to product Specifications for materials are listed according to accepted base standards. Materials to meet latest approved versions of these standards.

B. See Section 23 00 00, Basic Mechanical Requirements, and Section 22 30 00, Plumbing, where piping materials are approved for use.

2.2 ACCESS PANELS

A. Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size). Wall access panels to be minimum 14x14 (or required and approved size).

B. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

2.3 PIPING - GENERAL

A. Provide pipe, tube and fittings of the type, fitting requirements, grade, class, size and weight indicated or required for each service. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

2.4 STEEL PIPE

A. ASTM A53, Hot Dipped, Zinc Coated Black Welded or Seamless, Grade B: Schedule as specified.

B. ASTM A135, Electric Resistance Welded, Grade B: Black, unless otherwise indicated, schedule as specified.

2.5 COPPER TUBE

A. Temper: Annealed (hard drawn).

B. Water Service: ASTM B88, Type as indicated for each service.

C. Drain, Waste, and Vent (DWV): ASTM B306.

2.6 CAST IRON PIPE

A. ASTM A74, hub-and-spigot, service weight.

B. ASTM A888/CISPI 301 hubless, including coupling assembly.

2.7 POLYETHYLENE PIPING

A. Polyethylene piping conforming to ASTM D2513. Pipe below grade shall have an insulated copper tracer wire installed adjacent to underground nonmetallic gas piping. Tracer wire insulation: yellow. Tracer wire shall meet requirements of CPC 1211.19.

2.8 FITTINGS FOR STEEL PIPE

A. General: Flanges, fittings, unions and other products, mark in accordance with MSS SP-25.

B. Welding Fittings: Wrought carbon steel fittings, ASTM A234, ANSI B16.9, B16.28. Butt-welding type unless otherwise indicated to be socket welding type.

C. Branch Connections: From mains or headers 2-1/2 inches or larger, welded tees or forged welding outlets.

D. Welding Outlets: "Weldolets" or "Threadolets" equivalent to Bonney Forge. Use forged welding outlets wherever branch line is at least 1 nominal pipe size smaller than local main or header.

E. Threaded Fittings: ANSI B2.1, ASTM A47, 150 PSI rating, except where otherwise specified, prevailing codes or requirements or Specifications dictate use of 300 PSI rating. Fabricate from standard malleable iron with dimensions conforming to ANSI B16.3.

1. Fitting requirements for galvanized steel piping systems to be the same as for black steel pipe except each to have galvanized coating.

2. Fittings for waste, vent and drainage piping to be drainage pattern type.

F. Flanges: Carbon steel conforming to ASTM A105, ANSI B16.5, and factory forged in the USA. Flanges which have been machined, remade, painted, or are nondomestic origin are not acceptable. Provide raised or full face ends wherever indicated or required.

G. Unions: ANSI B16.39, ASTM A47, and be fabricated from malleable iron with bronze-to-iron ground joints rated at 150 percent design operating pressure. Threads: ANSI B2.1.

H. Fasteners: Semi-finished carbon steel bolts and hex nuts conforming to ASTM A307. Threads and Dimensions: ANSI B1.1 and B18.2.

I. Threaded Pipe Plugs: ANSI B16.14.

J. Thread Lubricant: RectorSeal No. 5 or Slic-tite Teflon Paste.

2.9 FITTINGS FOR COPPER TUBE

A. Wrought copper/bronze solder joint fittings complying with ANSI B16.22.

B. DWV Service:

1. Cast Copper Solder Joint Drainage Fittings: ANSI B16.23.

2. Wrought Copper Solder Joint Drainage Fittings: ANSI B16.29.

2.10 FITTINGS FOR CAST IRON PIPE

A. Hubless Cast Iron Drainage Pipe Fittings: CISPI 301 as manufactured by ABI, Charlotte or Tyler with stainless steel clamp assemblies.

1. Manufacturers for heavy-duty or below grade applications meeting FM-1680: Husky SD4000 or Clamp-All high torque couplings.

B. Cast Iron Hub-and-Spigot Drainage Pipe Fittings: Match drainage pipe units, ASTM A74. Fitting joints: Positive seal compression type gaskets, ASTM C564.

2.11 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

A. Insulating (Dielectric) Unions: Standard units recommended by manufacturer for use in the service indicated, which isolate ferrous from nonferrous piping, and prevent galvanic corrosion action. Minimum rated "flashover" voltage: 600 volts. Watts 3000 Series. Provide insulated flanges for flanged piping system connection to dissimilar metals.

B. Welding Materials: Comply with Section 2-C of ASME Boiler Code, as applicable.

C. Tin-Antimony Soldering Materials: ASTM B13.

D. Gaskets for Flanged Joints: ANSI B16.12; full faced for cast iron flanges; raised face for steel flanges, unless otherwise indicated or recommended by manufacturer. Gaskets: Minimum 1/8-inch thick fabricated from nonasbestos bases.

E. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e.g., "Phos-O" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping. Installations conform to accepted published procedures, i.e., UPC Installation Standard 3-75 and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited.

2.12 UNIONS

A. Steel Pipe Union: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe.

B. Copper Pipe Union: 200 PSI working pressure. Bronze body, solder or grooved ends. Pipes 2 inches and under use ground joint, pipes 2-1/2 inches and larger use flanged face or grooved ends.

C. Insulating Unions: 250 PSI working pressure. Pipe ends and material to match piping. Electric current below 1 percent of galvanic current. Gasket material as recommended by manufacturer. Epco or approved.

2.13 ESCUTCHEONS

A. Brass material, chrome plated finish. Size sufficient to cover pipe openings through wall, floor or ceiling. Set screw or spring to secure to pipe. Coordinate opening sizes.

2.14 VALVES - GENERAL

A. General:

1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.

2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6 inches and smaller, and 4 inches and smaller for plug valves. Provide gear operators for quarter-turn valves 8 inches and larger. Provide chain-operated sheaves and chains for overhead valves.

3. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.

B. Service:

1. Domestic Hot and Cold Water Shutoff and Isolation Valves:

a. Pipe Sizes 2-1/2 Inches and Smaller: Ball valve.
b. Pipe Sizes 3 Inches and Larger: Gate valve or butterfly valve.

2. Drain Service; All Pipe Sizes: Drain valves.
3. Bypass Around Pressure-Reducing Valves: Globe valves.
4. Check Valves: Swing check.

C. Manufacturers: Crane, Fairbanks, Anvil, Jenkins, Kennedy, Walworth, Red/White (commercial grade), Mueller, Legend, Conbraco, Nibco, DeZurik, Hays, Powell, Stockham, Hammond, Watts, Milwaukee, or approved. Note: See individual sections for specialty valves (balancing valves, pressure regulators, relief valves, earthquake valves, gas valves).

2.15 GATE VALVES

A. 2 Inches and Smaller: Class 125, bronze, screw-in bonnet, solid wedge. Rising Stem: Nibco 111. Nonrising Stem: Nibco 113.

B. 2-1/2 Inches and Larger: Flanged ends, Class 125, iron body, bolted bonnet, solid wedge, bronze mounted. OS&Y: Nibco 617-0. Nonrising Stem: Nibco F-619.

2.16 GLOBE VALVES

A. 2 Inches and Smaller: Class 125, bronze body, screw-in bonnet, integral seat, renewable disc, straight body, Nibco 211. Angle body, Nibco 311.

B. 2-1/2 Inches and Larger: Class 125, iron body, bolted bonnet, flanged ends, renewable seat and disc, bronze mounted. Straight Body: Nibco F-718-B. Angle Body: Nibco F-818-B.

2.17 DRAIN VALVES

A. Class 125, bronze body, screw-in bonnet, rising stem, composition disc, 3/4-inch hose outlet. Threaded: Nibco 73. Solder: Nibco 72.

2.18 BALL VALVES

A. 2-1/2 Inches and Smaller: 150 PSI, bronze body, full port, bronze trim, three-piece construction, TFE seats and seals. Threaded: Nibco T-595-Y. Soldered: Nibco S-595-Y.

2.19 SWING CHECK VALVES

A. 2 Inches and Smaller: Class 125, bronze body, horizontal swing, regrinding type, Y-pattern, renewable disc. Nibco 413.

B. 2-1/2 Inches and Larger: Class 125, iron body, bolted bonnet, horizontal swing, renewable seat and disc, flanged ends. Nibco F918.

2.20 NATURAL GAS PRESSURE REGULATORS

A. Natural Gas: Diaphragm and spring actuated type, with ventless or vented relief feature. Construction, pressure range and venting features suitable for intended service. Regulator to meet code and serving utility requirements. Pipe vented type to atmosphere in approved location. Manufacturers: Maxitrol, Equimeter, or approved.

2.21 PRESSURE AND TEMPERATURE RELIEF VALVES

A. Bronze body, ASME/CSA rated. Sized to meet BTUH and code requirements. Manual lever operator, ANSI listed. Stainless steel or thermal bond coated thermostat tube. Watts, Cash-Acme, or approved.

2.22 NATURAL GAS VALVES

A. 2 Inches and Smaller: Ball valves. UL listed, two-piece construction, threaded, bronze body, conventional port, 250 PSI WOG working pressure. Watts B-6000UL.

B. 2-1/2 Inches and Larger: 100 to 125 PSI rated bronze or iron body/bronze trimmed plug cock type, square head or tee/lever handle operation. CSA approved.

2.23 PIPING HANGERS AND SUPPORTS

A. General:

1. Horizontal Piping Hangers and Supports-Horizontal and Vertical Piping, and Hanger Rod Attachments: Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for uninsulated copper piping systems.

2. Building Attachments: Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

3. Saddles and Shields: Factory fabricated saddles or shields under piping hangers and supports for insulated piping. Size saddles and shields for exact fit to mate

with pipe insulation. 1/2 round, 18 gauge, minimum 12 inches in length (4-inch pipe and larger to be three times longer than pipe diameter).

4. Roller Hangers: Adjustable roller hanger. Black steel yoke, cast iron roller.

5. Concrete Inserts: Malleable iron body, black finish. Lateral adjustment.

6. Continuous Concrete Insert: Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.

B. Pipe Hangers Size 2 Inches and Smaller: Adjustable swivel ring hanger, UL listed. Michigan 100 or 101.

C. Pipe Hangers Size 2-1/2 Inches and Larger: Adjustable clevis type, UL listed. Michigan 400.

D. Riser Clamps: Steel, UL listed. Michigan 510 or 511. Copper coated; Michigan 368.

E. Plumbers Tape: Not permitted as pipe hangers or pipe straps.

F. Michigan numbers are indicated for type and quality. Comparable products manufactured by Globe, Elcen, B-Line, Kindorf, Kinline, Unistrut, Anvil, Super Strut, Tolco, PHD, Power-Strut, or approved.

2.24 ROOF EQUIPMENT SUPPORTS

A. General:

1. Coordinate the location and type of each roof equipment support with the roofing system supplier. Coordinate systems to maintain roof warranty.

2. Minimum 18 gauge galvanized steel with fully mitered and welded corners, internal bulkhead reinforcing, integral base plates, pressure-treated wood nailer, and 18 gauge galvanized steel counterflashing. Provide insulated curbs where surrounding roof is insulated.

3. Compensate for slope in roof so top of support is level.

4. Construct curb to withstand seismic forces.

B. Manufacturers:

1. Equipment Supports: Pate ES, Custom Curb, Vibrex, or Thycurb.
2. Equipment Curbs: Pate PC, Custom Curb, Vibrex, or Thycurb.
3. Pipe Curb Assemblies: Pate PCC, Custom Curb, Vibrex, or Thycurb.

2.25 FREESTANDING ROOF PIPE SUPPORTS

A. Support piping on roof with polyethylene high-density U.V. resistant quick "pipe" block with foam pad, manufactured by Erico Pipe Piers or Nelson-Olsen Inc., distributed by Bongard Corporation. Recommended installation is for all quick "pipe" blocks to be freestanding. Piping 3 inch and larger mounted on roller hangers. Wood block supports are not acceptable.

2.26 WALL AND FLOOR SLEEVES

A. Minimum 20 gauge galvanized steel in concrete, 18 gauge in other construction. 1/2-inch clearance around pipe or insulation. Provide UL approved fire-rated assemblies/caulking as required. 3M or approved.

2.27 ANCHORS

A. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer.

B. Manufacturers: Anchor-It, Hilti Hit System, Epcon System, or Power Fast System.

2.28 ELECTRIC MOTORS

A. Motors: Energy efficient, suitable for nonoverloading operation, and capable of continuous operation at full nameplate rating. Motors 1 HP and larger must meet Energy Policy act of 1992. Motors to be high efficient type similar to Century/Gould E-plus.

B. Take NEMA standards as minimum requirements for motor design and performance. Motors suitable for load, duty, voltage, frequency, hazard and for service and location intended. Motors, unless specified otherwise, to be general purpose open dripproof type, ball bearing equipped, 40C temperature rise; and rated for continuous duty under full load. Motors to have name plate giving manufacturer's name, shop number, HP, RPM and current characteristics.

C. Motors smaller than 1/2 horsepower, 1 phase; and motors 1/2 horsepower and larger, 3 phase and voltage as indicated on Drawings, unless otherwise noted. One phase motors to have internal thermal overload protection with automatic reset.

D. Provide two-speed motors where indicated on schedule or in sequence.

E. Provide inverter rated motors per NEMA MG1-31 where variable frequency drives are applied or soft start starters.

2.29 STARTERS

A. Single Phase Motors:

1. Manual across-the-line starting switch having toggle-operated switch pilot running light and built-in thermal overload device with heating element rated not more than 115 percent motor full load current indicated on name plate of motor to be protected. Surface mount starters. Provide NEMA-1 enclosure.

2. Overload relays to be melting alloy type with a replaceable control circuit module. Thermal units to be interchangeable. Starter to be nonoperative if thermal unit is removed.

3. Single phase motors with automatic controls. Provide motor rated relay with coils rated for control voltage.

B. Starters up to size 8 to be suitable for the addition of a minimum of three external auxiliary contacts (normally open or normally closed). Contactor, coils, and relays to perform the control functions of the associated equipment and control sequence.

C. Three phase motors up to and including 15 HP:

1. Provide enclosed type magnetic across-the-line starter with thermal overload and under voltage protection.

2. Operator: "Start-Stop" pushbutton, except where automatic control is indicated on Drawings or specified. Then provide "Hand-Off-Auto" selector switch.

3. Starters for 3 phase motors to have overload protection in each of the three legs, with external manual reset.

4. Unless indicated on Drawings or in Specifications, furnish motor starters with a neon pilot light. Neon lights are required for exhaust fan switches.

5. Equip starters with integral transformer and coil for control circuit. Coordinate coil voltage with control voltage.

D. Motor starters for equipment not installed in Division 16, Section "Motor Control Center" to be furnished and installed by Division 15.

2.30 DISCONNECTS

A. Provided by Division 16 unless otherwise specified.

2.31 PIPING AND EQUIPMENT IDENTIFICATION

A. Each piping system furnished and installed under this work shall be identified and the direction of flow indicated by means of color stenciled legends and flow arrows, all as specified herein. The markings shall be applied after all painting, priming, and cleaning of the piping and insulation is completed.

B. In lieu of the colored stenciling, prefabricated labels on paper or on pressure sensitive self-adhesive cloth tapes may be used, as manufactured by General Painting Company, Westline Products, W.H. Brandy Company, or equal. The labels shall have black lettering and flow arrows on colored backgrounds, and the background colors shall conform to the color schedule shown in this Article. Yellow letters may be used on brown background only for better visibility. If the paper labels are used, they shall be attached to the piping with Arabol Adhesive No. E-3448, or equal. After the adhesive has dried, the paper label shall be given a protective coating of Arabol No. E708F, or equal.

C. The size of the lettering and the label shall be such that the lettering can be easily read from the floor and the colors are easily discernible.

D. Provide white lamacoid plate for each and every piece of equipment installed in this work. Lettering on plate shall be black, with size of lettering to suit equipment. Lettering shall be minimum of 3/8-inch in height. Plates shall be riveted or bolted to equipment.

2.32 VALVE TAGS

A. Brass Valve Tags: Polished brass valve tags with stamp-engraved piping system abbreviation in 1/4-inch high letters and sequenced valve numbers 1/2 inch high, and with hole for fastener. 1-1/2-inch diameter tags, except as otherwise indicated.

B. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

C. Access Panel Markers: Manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include center hole to allow attachment.

2.33 VALVE SCHEDULE FRAMES

A. General: For each page of a valve schedule, provide glazed display frame with removable mounting as appropriate for wall construction upon which frame is to be mounted. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

2.34 METAL PARTS INSTALLED OUT-OF-DOORS

A. Cold dip galvanized, cadmium plated or neoprene coated after fabrication.

2.35 SEISMIC RESTRAINTS FOR PIPING AND DUCTWORK

A. Use the document "Seismic Restraints Manual Guidelines for Mechanical Systems." Secure piping, ductwork, and the like to withstand a force in any direction.

B. Sway bracing is not required for pipes that are installed on very short hangers (12 inches or less).

C. Secure HVAC and plumbing piping bracing at every fourth hanger transversely and every eighth hanger longitudinally.

D. As approved by code authority, use a bracing system manufactured by Superstrut, Mason, or Pipe Shields Inc., or approved.

E. Design restraints to meet CBC Chapter 16 standards. Provide structural engineering calculations sealed by a professional engineer registered in state of California.

2.36 EQUIPMENT

A. Provide a means to prohibit excessive motion of mechanical equipment during an earthquake.

B. Provide mechanical equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

C. Design restraints to meet CBC Chapter 16 standards. Provide structural engineering calculations sealed by a professional engineer registered in state of California.

D. Rooftop Seismic Straps: Provide 8-inch wide by 8-inch long, 16 gauge straps fastened from rooftop mounted equipment to curb at minimum of one or more locations per side as determined by calculations performed. Curb seismically attached to structure. Provide engineered calculations where required.

2.37 NEOPRENE PAD (NP)

A. One layer of 5/16-inch thick ribbed or waffled neoprene, 40 to 50 durometer. Size pads for loading between 40 and 50 PSI.

B. NP Isolators: Amber/Booth type NR.

C. Manufacturers: Supply vibration isolation mounts by a single manufacturer. Acceptable suppliers are as follows: Amber/Booth Co. - A.B., Korfund Dynamics - K.D., Mason Industries, Inc. - M.I., Peabody Noise Control Inc. - P.N.C., Vibration Mountings & Controls, Inc. - V.M.&C., IAC, Koppers, Vibrex.

2.38 FLEXIBLE DUCT CONNECTIONS (FDC)

A. Neoprene loaded vinyl material or neoprene loaded canvas with vapor barrier. Flame spread rating of 25 or less, and a smoke spread rating of 50 or less, per ASTM E84. Not affected by temperatures as low as minus 10F, or as high as 200F.

B. Flexible Connections: Ventglas manufactured by Ventfabrics, Amatex, or approved.

2.39 FLEXIBLE PIPE CONNECTIONS (FPC)

A. Straight, double sphere shape fabricated of multiple plies of nylon cord, fabric and neoprene, vulcanized so as to become inseparable and homogenous. Able to accept compressive, elongative, transverse and angular movements.

B. Select and fit to suit the system temperature, pressure and fluid type. Do not use rods or cables to control extension of the connector.

C. Pipe Sizes 2 Inches or Smaller: Threaded female union couplings on each end. Larger sizes: Metallic flange couplings.

D. FPC: Mason MFTNC.

E. Manufacturers: Supply vibration isolation mounts by a single manufacturer. Acceptable suppliers are as follows: Amber/Booth Co. - A.B., Korfund Dynamics - K.D., Mason Industries, Inc. - M.I., Peabody Noise Control Inc. - P.N.C., Vibration Mountings & Controls, Inc. - V.M.&C., Metraflex, Vibrex.

F. Fuel Oil and Gas Pipe: Flexonics 301 bronze, minimum 12-inch live length.

G. Refrigerant Pipe: Flexonics 301 bronze, minimum 18-inch live length.

H. Connections to match piping system.

2.40 GROMMETS

A. Combine a neoprene washer and sleeve.

B. Isogrommets manufactured by MBPS, Inc.

C. Series W by Barry Controls, or approved.

D. Neoprene Durometer: Between 40 and 50. Grommets: Specially formed to prevent fastening bolts from directly contacting the isolator base plate.

2.41 RESILIENT NONHARDENING SEALANT

A. Sealants for Acoustical Purposes: DAP acoustical sealant.

B. Manufacturers: Pecra, Tremco, USG, or approved.

2.42 FOAM RUBBER

A. Foam Rubber Sheets: Armstrong Armaflex, or approved.

2.43 SEISMIC PIPE LOOPS

A. General: Seismic connectors for straight pipe runs to be designed with sufficient live length on each flexible leg to provide the minimum movement in directions as required by movement allowed at joint. Verify with structural total movement required in planes and list with submittal.

B. Materials: Type 321 stainless steel hose and braid, with carbon steel elbows and ends. Flanged connectors will be used in steel piping 2-1/2 inches or larger, and threaded connectors for piping smaller than 2-1/2 inches. Carbon steel FNPT drain port will be utilized on connectors. For copper piping systems, manufacture connectors with bronze hose and braid and copper elbows and sweat ends. Guide seismic connectors per manufacturer's guidelines.

C. Pressure Rating: 150 PSI.

D. Manufacturers: Unisource, Metraflex, or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Electrical Equipment Clearances: Do not route piping through electrical rooms, transformer vaults, elevator equipment rooms, and other electrical or electronic equipment spaces and enclosures. Within equipment rooms, provide minimum 3-foot lateral clearance from sides of electric switchgear panels. Do not route piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with electrical and coordinate exact pipe routing to provide proper clearance with such items.

B. Pressure Piping Routing:

1. Route piping, except as otherwise indicated, vertically and horizontally (sloped to drain). Avoid diagonal runs wherever possible. Orient horizontal routes parallel with walls and beam lines.

2. Install piping as shown or described by diagrams, details and notations on Drawings or, if not indicated, install piping to provide the shortest route which does not obstruct usable space or block access for servicing the building and its equipment.

3. Support piping adjacent to walls, overhead construction, columns and other structural and permanent enclosure elements of the building. Limit clearance to 1/2 inch wherever furring is indicated for concealment of piping. Allow for insulation thickness, if any. Locate insulated piping to provide minimum 1-inch clearance outside insulation.

4. Wherever possible in finished and occupied spaces, conceal piping from view by locating within column or beam enclosures, hollow wall construction, or above suspended ceilings. Do not encase horizontal routes in solid partitions, except where approved.

C. Preparation:

1. Cast Iron Soil Pipe: Conform with state plumbing code and standards, CISPI recommendations and applicable adopted code amendments.

2. Hubless Cast Iron Joints: Comply with CISPI HSN utilizing calibrated torque wrenches for tightening bands to manufacturer's recommended settings.

3. Unions:

   a. Insulating (Dielectric) Unions: Comply with manufacturer's instructions for installing unions wherever piping of dissimilar metals are adjoined. Install unions in manner which will prevent galvanic action and inhibit corrosion.

   b. Standard Unions: Install where indicated on Drawings and on each side of pieces of equipment to permit easy removal of equipment.

4. Copper Tubing:

   a. Remove burrs from and clean outer surface of tube ends and inner surface of fittings.

   b. Copper-Soldered: Make soldered joints for copper tubing and fittings with code approved solder alloys meeting ASTM and ANSI standards and listings. Solder-paste-flux combination fillers are not approved. Installations to conform to accepted published procedures; i.e., UPC IS 375, IS 21-80 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Apply flux as recommended by manufacturer. Solder domestic hot and cold water and condensate pipe within building above grade with 95 percent tin and 5 percent antimony, Allstate Silver Bearing Solder 430 or other approved solder alloys which do not contain lead or cadmium.

   c. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e.g., "Phos-0" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping. Installations to conform to accepted published procedures, i.e., UPC IS 3-75 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Braze other copper pressure piping underground including water service. Remove bonnets and nonmetallic seats on valves and cool body with damp cloth while soldering or brazing. Remove excess flux from completed joints in accordance with manufacturer's instructions and code standards.

   d. Pressurized Service:

      1) Unless otherwise indicated, wrought copper/bronze solder joint fittings complying with ANSI B16.22-1995.

2) Copper Tube Unions: Standard products as recommended by manufacturer for use in the service. Rated at 150 percent design operating pressure.

3) Mechanically Formed Tee Connections:

a) Form mechanically extracted collars in a continuous operation consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. Fully adjustable collaring device to ensure proper tolerance and complete uniformity of the joint.

b) Notch the branch to conform with the inner curve of the run tube and dimpled to ensure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube.

c) Braze joints in accordance with the Copper Development Association Copper Tube Handbook using B-cup series filler metal. Note: Soft soldered joints will not be permitted.

3.2 PIPE AND PIPE FITTINGS

A. Pipe Sleeves:

1. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.

2. Floor Sleeves (Except DWV Piping at Slab on Grade): Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with nonshrinking grout or approved caulking compound. Provide "Link-Seal" sleeve sealing system for slab on grade. Caulk/seal piping and ductwork passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements.

3. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping and ducts passing through fire-rated building assemblies with UL approved fire-rated assemblies. Provide fire-rated assemblies per local AHJ requirements.

4. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Penetrations must be indicated on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.

B. Conform with applicable codes and industry standards.

C. Install uninsulated piping so that unrestrained direct contact with the structure or other system installations is avoided. Where contact with or passage through building or structural features cannot be avoided; firmly anchor piping to, or isolated from, the structure to prevent noise transmission and occurrence of physical damage. Install piping to be insulated with adequate clearance around piping to allow for placement of full thickness insulating material.

D. Corrosion Control:

1. Underground Steel Piping Corrosion Protection: Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat." Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3 inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.

2. Install hot water heating vessels with a stainless steel fitting at tank and a dielectric fitting on both supply and discharge sides of hot water tanks.

E. Installation/Coordination:

1. Expansion and Flexibility: Install work with due regard for expansion, contraction, and building settlement to prevent damage to the piping, ductwork, equipment and the building and its contents. Provide piping offsets, loops, expansion joints, anchors or other means to control pipe movement, to minimize pipe forces and effects of building settlement.

2. Install piping to prevent stresses and strains to piping and hangers and supports due to expansion or contraction and building settlement. Provide proper loops, guides, offsets, anchor points, or expansion joints. Verify with anticipated settlement or shrinkage of building. Verify construction phasing of project, type of building construction products and type for coordinating installation of piping systems. Include provisions for servicing and removal of equipment without dismantling piping.

3.3 ESCUTCHEONS

A. Install on exposed pipes passing through walls or floors, and on fixture stops and waste connections to wall, except not required in stockrooms.

3.4 PIPING AND EQUIPMENT REMOVAL

A. Piping and equipment removed as salvage by Owner to remain property of the Owner.

B. Remove as shown on drawings. Piping and ductwork to be reused where shown. Dispose and remove excess piping, ductwork and equipment (and not identified by Owner as salvage).

3.5 ACCESSIBILITY

A. Installation of valves, gauges and equipment conveniently and accessibly located with reference to finished building for repairs, removal and service.

3.6 PAINTING

A. Ferrous Metal: After completion of mechanical work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, and the like, with one coat of black asphalt varnish or black enamel suitable for hot surfaces.

B. Machinery:

1. In a mechanical room, on the roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.

2. See individual equipment specifications for other painting.

C. Structural Steel: Repair damage to structural steel finishes or the finishes of other materials damaged by cutting, welding or patching to match original.

D. Piping: Clean, primer coat, and paint exposed piping on the roof or at other exterior locations with two coats of paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

3.7 ACCESS PANELS

A. Install ceiling or wall access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or as specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

B. Where access panels are for service of fire, fire/smoke, or smoke dampers, stencil the words "Fire Damper," "Fire/Smoke Damper," or "Smoke Damper" in 1/2-inch high capital letters on the outside of the panels.

3.8 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.

B. Manufacturers: Hilti, Proset, or approved.

3.9 FIELD QUALITY CONTROL

A. Upon completion of installation of equipment and plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

3.10 VALVE INSTALLATION

A. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.

C. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

D. Mechanical Actuators: Install with chain operators where indicated. Extend chains to 5 feet above floor and hook to clips to clear aisle passage.

E. Stem Selection: Outside screw and yoke stems, except provide inside screw, nonrising stem where space prevents full opening of OS&Y valves.

F. Seats: Renewable seats, except where otherwise indicated.

G. Installation of Check Valves: Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.

3.11 VALVE ADJUSTING AND CLEANING

A. Inspect valves for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.

3.12 VALVE IDENTIFICATION

A. General: Provide valve tag on every valve, cock and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibbs, shutoff valves at plumbing fixtures, and similar rough-in connections of end-use fixtures. List each tagged valve in valve schedule for each piping system.

B. Install mounted valve schedule in each mechanical room.

3.13 MECHANICAL EQUIPMENT IDENTIFICATION

A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices: terminal units, coils, fans, water heaters, blowers, unitary HVAC equipment, similar equipment.

3.14 ROOFTOP SEISMIC STRAPS

A. Provide 8-inch wide by 8-inch long, 16 gauge straps fastened from rooftop-mounted equipment to curb at minimum of one or more locations per side as determined by seismic design requirements.

3.15 PIPING SYSTEM IDENTIFICATION

A. Identification shall be applied to all piping, except piping located in furred spaces without access to permit entrance of personnel, and piping buried in the ground or concrete.

B. The legend and flow arrow shall be applied at all valve locations, at all points where piping enters or leaves a wall, partition, cluster of piping, or similar obstruction, and at approximately 20-foot intervals on pipe runs.

C. Practical variations or changes in locations and spacing may be made with the specific approval of the Architect to meet specific conditions.

D. Wherever two or more pipes run parallel, the printed legend and other markings shall be applied in the same relative location so that all piping is easily identified.

E. The marking shall be located so as to be readily conspicuous at all times from any reasonable point of vantage.

F. The legends and flow arrows shall be in the colors as indicated in the pipe-marking schedule.

G. The paint shall be prepared enamel brushed on or sprayed from pressurized cans.

H. Where the pipe marking colors are not easily visible over the background, such as brown on soil pipe, orange on copper pipe, or similar combinations, a neat white or aluminum-colored background shall be painted on the pipe before the markings are applied.

I. The sizes, in inches, of the stenciled lettering and flow arrows shall be as follows:

Outside Diameter, In	**Size of**	**Minimum Length**
Inches of Pipe or Covering	Stencil Letter of	Flow Arrow
5/8” to 2” include.	½ ”	2-1/2”
2-1/2” to 4” include.	1”	4”
4-1/2” to 7” include.	2”	5”
8” and larger	3”	6”

Pipe Marking Schedule:

Legend	**Color**
Refrigerant Suction	Yellow
Refrigerant Liquid	Yellow
Refrigerant Hot Gas	Yellow
Gas	Yellow

3.16 ADJUSTING AND CLEANING

A. Adjusting: Relocate any mechanical identification device which has become visually blocked.

B. Cleaning: Clean face of identification devices, and glass frames of valve charts.

3.17 CAULKING

A. Provide Geocel Corporation, (800) 348-7615, Construction 2000 Caulking Sealant. Standard color to match as close as possible to surrounding surface. Application standards, ASTM C920, Type S, Grade NS, Class 25, ICBO approved, Report No. 3680. Apply per manufacturer's recommendations.

3.18 STARTERS

A. Install in sight of equipment controlled, easily accessible, protected from possible piping leaks and no more than 6 feet above the floor.

END OF SECTION

SECTION 23 05 10 - MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References.
B. Description of Work.
C. Drawings and Specifications.
D. Industry Standards and Codes.
E. Site Examination.
F. Permits, Fees and Utility Connections.
G. Coordination of Work.
H. Progress of Work.
I. Submittals
J. Operation and Maintenance Manuals.
K. Project Record Documents.
L. Warranty.
M. Quality and Care
N. Access Doors.
O. Starting Equipment and Systems.

1.2 RELATED SECTIONS

A. The Drawings and General Provisions of the Contract, including the General Conditions, Special Conditions and Division 1 General Requirements apply to this section.
B. The Contract Agreement, Bidding Documents and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the mechanical systems.
C. The requirements of this Section apply to all Work of Divisions 22 and 23.
D. Section 01 33 00 - Submittals.
E. Section 01 77 00 – Contract Closeout and Final Cleaning
F. Section 01 78 23 – Operation and Maintenance Data.
G. Section 01 78 39 – Record Documents.
H. Section 01 79 00 – Demonstration and Training.
I. Section 23 08 00 – T-24 Commissioning Requirements

1.3 DEFINITIONS

A. Following is a list of abbreviations generally used in Division 23:
   1. ADA Americans with Disabilities Act
   2. AHJ Authority Having Jurisdiction
   3. ANSI American National Standards Institute
   4. ARI Air-Conditioning & Refrigeration Institute
   5. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
   6. ASME American Society of Mechanical Engineers
   7. ASTM American Society for Testing and Materials
   8. ASSE American Society of Sanitary Engineering
   9. AWWA American Water Works Association
   10. CBC California Building Code

11. CEC California Electrical Code
12. CMC California Mechanical Code
13. CPC California Plumbing Code
14. CGA Canadian Gas Association
15. CISPI Cast Iron Soil Pipe Institute
16. CSA Canadian Standards Association
17. ETL Electric Testing Laboratories
18. FM FM Global
19. HI Hydraulic Institute Standards
20. HVAC Heating, Ventilating and Air Conditioning
21. MSS Manufacturers Standardization Society
22. NEC National Electric Code
23. NEMA National Electrical Manufacturers Association
24. NFPA National Fire Protection Association
25. NFGC National Fuel Gas Code
26. NRCA National Roofing Contractors Association
27. NSF National Sanitation Foundation.
28. OSHA Occupational Safety and Health Administration
29. SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.
30. TEMA Tubular Exchanger Manufacturers Association
31. TIMA Thermal Insulation Manufacturers Association
32. UL Underwriters Laboratories Inc.
33. UPC Uniform Plumbing Code

B. Provide: To furnish and install, complete and ready for the intended use.

C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.

D. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site as required to complete items of work furnished by others.

1.4 REFERENCES

A. ANSI - American National Standards Institute.

B. ASTM - American Society for Testing Materials.

C. CEC - California Electric Code.

D. NEMA - National Electric Manufacturers' Association.

E. NFPA - National Fire Protection Association.

F. OSHA - Occupational Safety and Health Act.

G. UL - Underwriters' Laboratories.

H. See detailed References that are listed in individual sections.

1.5 DESCRIPTION OF WORK

A. The work included in this division of the specifications consists of furnishing labor, tools, equipment, supplies and materials, unless otherwise specified, and in performing operations necessary for the installation of the complete Mechanical System as required by these specifications or shown on the Drawings, subject to the terms and conditions of the Contract Agreement.

B. The work shall also include the completion of details of mechanical work not mentioned or shown which are necessary for the successful operation of mechanical systems described on the drawings or required by these specifications. Furnish and install any incidental work not shown or specified which is required to provide a complete and operational system.

1.6 DRAWINGS AND SPECIFICATIONS

A. A. Where Contract Documents are at variance with applicable codes governing work, code and local jurisdiction requirements take precedence, and include cost necessary for code compliance or local jurisdiction compliance in bid price. Machinery and equipment to comply with Occupational Safety and Health Act of 1970, as currently revised, as interpreted for equipment manufacturer requirements.

B. Drawings are schematic and diagrammatic. Drawings indicate the general arrangement of equipment, piping, ductwork and other mechanical work. Drawings are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., ducts and piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than basis of design, including but not limited to architectural, structural, electrical, HVAC, fire sprinkler, and plumbing. Use judgement and care to install mechanical work to fit the job conditions within the building construction and finishes, and to function properly.

C. The Contractor shall investigate the building conditions affecting the Work and shall arrange his work accordingly providing offsets, fittings, valves and accessories to fit the actual job conditions. The Contractor shall be responsible to field measure and confirm new and existing mechanical systems locations with respect to other architectural, structural, and electrical work, existing and new. Do not scale distances off of the mechanical drawings. Use actual building dimensions.

D. The drawings and specifications are complimentary each to the other. What is required by one shall be as binding as if called for by both.

E. Examine all drawings and specifications prior to bidding the Work. Report any discrepancies to the Engineer.

1.7 INDUSTRY STANDARDS AND CODES

A. The Mechanical Contractor shall comply with the latest provisions of all codes, regulations, laws and ordinances applicable to the work involved. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such codes, regulations laws and ordinances.

B. All materials, products, devices, fixtures forms or types of construction included in this project shall meet or exceed the published requirements of the publications listed below. These publications form a part of this specification.
   1. California Building Code, 2022.
   2. California Mechanical Code, 2022.
   3. California Plumbing Code, 2022.
   4. California Electrical Code, 2022.
   5. National Fire Protection Association.
   6. California Fire Code, 2022.
   7. California State Fire Marshal.
   8. Occupational Safety and Health Administration, including CAL-OSHA.
   9. State of California Energy Conservation Standards.
   10. State of California Code of Regulations, Title 24.
   11. Other applicable state laws.

C. Nothing in the Drawings or Specifications shall be construed to permit work that does not conform these codes. When Contract Documents differ from governing codes, furnish and install to the higher standard required at no extra charge. The Contract Documents are not intended to repeat the code requirements except where necessary for clarity.

D. No material or product installed as a part of the Work shall contain asbestos in any form.

1.8 SITE EXAMINATION

A. Contractor shall examine the site, verify dimensions and locations with Drawings, check utility connection locations, and familiarize himself with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or his lack of knowledge of any site condition which may affect his work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Engineer immediately.

1.9 PERMITS, FEES AND UTILITY SERVICES

A. Contractor shall pay for and obtain all permits and service required in the installation of this work.

B. Contractor shall arrange for all required inspections and will secure approvals from authorities having jurisdiction.

1.10 COORDINATION OF WORK

A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work and that such establishment is the exclusive responsibility of the contractor.

B. The Contractor shall give careful consideration to the work of the General, Electrical and other contractors on the job and shall organize his work so that it will not interfere with the work of other trades. He shall consult the drawings and specifications for work of other trades for correcting information, and the pertinent drawings for details and dimensions. Install this work in harmony with other crafts and at proper time to avoid delay of work.

C. Arrange mechanical work in a neat, well-organized manner with the piping, ductwork and similar services running parallel and/or perpendicular to primary lines of the building construction. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance.

D. Verify the location of all equipment, air distribution devices, etc. and if interference develops, the Owner/Engineer's decision will be final and no additional compensation will be allowed for the moving of misplaced air devices or equipment.

E. Execute any work or apparatus shown on the drawings and not mentioned in the specifications, or vise versa, the same as specifically mention by both. Omission from drawings or specifications of any minor details of construction, installation, materials, or essential specialties does not relieve this contractor from furnishing same in place complete.

F. Furnish and install any incidental work not shown or specified which can reasonably be inferred as part of the work and necessary to provide a complete and workable system.

G. Furnish materials and work at proper time to avoid delay of the work.

1.11 PROGRESS OF WORK

A. This Contractor shall organize his work so that the progress of the mechanical work will conform to the progress of the other trades, and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill timed work performed under this section shall be borne by this Contractor.

1.12 EXISTING SOILS CONDITIONS

A. Understand existing soils conditions before submitting bid on work. No additional allowance will be granted due to lack of information for existing conditions of subsurface soils.

B. Submission of a bid will be considered acknowledgment of review/understanding of project geotechnical soils report.

1.13 STRUCTURAL DESIGN REQUIREMENTS AND SEISMIC RESTRAINTS

A. Mechanical systems and equipment shall be anchored and seismically braced in accordance with all applicable codes and industry standards.

B. Contractor shall design seismic bracing for all mechanical equipment and systems to comply with the 2019 California Building Code (CBC) and the latest edition of the Mason Industries "Seismic Restraint Guidelines".
   1. Contractor shall submit details and calculations prepared and signed by a licensed professional structural engineer registered in the state in which the Work is performed demonstrating compliance with the above and all applicable codes.
   2. Drawings, details and calculations shall be submitted to the Engineer for review. Compliance documents shall be approved by the Engineer prior to installation.

C. Mechanical systems and equipment shall include, but are not limited to, all ductwork, piping, air conditioning equipment, heating and ventilating equipment, air handlers, fans, electrical and control panels, conduits and other components.

D. Supports, anchorage and restraints for all piping and ductwork for standard installation details that comply with the latest edition of the latest edition of the Mason Industries "Seismic Restraint Guidelines", or equal, shall be used wherever possible. The Contractor shall provide all supporting documentation required for the Engineer and the reviewing authorities. If compliance with one of these standards is demonstrated, separate structural calculations are not required.

E. For all non-standard installations not detailed in one of the approved systems, the Contractor shall provide details of supports, anchorages and restraints with supporting calculations all stamped and signed by a licensed professional structural engineer registered in the state in which the Work is performed.

1.14 SUBMITTALS

A. See Section 01 33 00 - Submittals, for additional submittal procedures.

B. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project.

E. Organize submittals in sequence according to Specification Section. Submit in bound document with tabs identifying each Specification Section. Provide a Table of Contents identifying the Specifications Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package at one time. Do not submit individual Sections piecemeal.

F. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

G. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

H. Furnish, upon request, installation instructions for all equipment and materials to Inspector of Record prior to installation.

I. Maintain a copy of the fire and smoke damper installation instructions on site for use by the Inspector of Record.

1.15 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Architect will consider requests for substitutions only per the requirements and procedures indicated in the general and special conditions of these specifications.

C. Substitutions will not be considered when a product becomes unavailable through fault of the Contractor.

D. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

F. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with reapproval by authorities including obtaining reapproval by authorities.

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

H. If excessive review, as judged by the Engineer, is required caused by complicated, numerous or repetitive requests, Contractor shall reimburse Engineer and its Consultants for such review at their standard billing rates.

I. Substitution Submittal Procedure:
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. The Architect will notify Contractor in writing of decision to accept or reject request.
   4. Present each substitution individually. If a proposed substitute in not found to be acceptable, then the specified item shall be supplied.

1.16 OPERATION AND MAINTENANCE MANUALS

A. See Section 01 78 23 Operation and Maintenance Data requirements.

B. Provide operating and maintenance instructions, diagrams and parts lists for all components of all mechanical systems and each piece of equipment furnished under these specifications.

C. Operating and maintenance instructions shall be furnished for the following equipment and systems:
   1. Ventilating Systems.
   2. Air Conditioning Systems.
   3. Temperature Controls Systems.
   4. Motors.
   5. Air Balance and Test Reports.

D. Provide manufacturer's model number, design data, capacities, etc. for each piece of mechanical equipment furnished as a part of the Work.

E. The operating instructions shall include procedures for starting, stopping and emergency manual operation for all equipment and systems.

F. Provide maintenance instructions of each item of individual equipment including applicable maintenance data as recommended by the manufacturer, including frequency of lubrication, lubricants, inspections required, adjustment procedures, belt and pulley sizes, etc.

G. Provide manufacturer's parts bulletins with part numbers for each item of equipment included in the Work. Parts bulletins shall be specific to the equipment provided. Extraneous information that does not apply to the equipment provided shall be eliminated from the literature.

H. Include copies of test reports (startup, check, etc.) and inspections performed for each piece of equipment provided in the Work.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Provide supplier and manufacturer contacts, telephone numbers and addresses in the front portion of the operation and maintenance manual.

1.17 PROJECT MODIFICATIONS

A. During the progress of construction, if such conditions arise that require revisions, modifications, or relocations to any mechanical equipment or materials incorporated in this project, such alterations shall be immediately called to the attention of the Architect. Contractor shall then prepare necessary drawings showing proposed changes. Submit proposed changes for review by the Architect prior to actual revision work in the field.

B. Two sets of drawings showing all revisions shall be immediately presented to the Architect for his records. Maintain additional copies on the project as necessary to comply with “RECORD DRAWINGS” requirement of the General Requirements.

C. Incorporate all revisions into record drawings.

1.18 PROJECT RECORD DOCUMENTS

A. See Section 01 77 00 - Closeout for Project Record Document requirements.

B. Record Drawings:
   1. Show changes and deviations from the Drawings. Include issued Addendum and change order items.
   2. Make changes to the Drawings in a neat, clean, and legible manner.

1.19 QUALITY ASSURANCE

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

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

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

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

H. Permits and Inspections:
   1. Unless otherwise distinctly hereinafter specified, apply and pay for necessary permits, plans check, and inspections required by public AHJ.
   2. Refer to General and Supplementary Conditions for payment of water and sewer service connection fees.
   3. Obtain certificates of inspection from AHJs and deliver to Owner before final acceptance.
   4. Each trade to consult local building department and utility companies prior to commencement of work to ascertain existence and location of existing underground utilities. Protect existing service against damage and interruption of use, and reroute as

may be necessary to accomplish new work. Include costs for materials and installation for rerouting as specified for new work in bid price.

I. Regulatory Requirements:
   1. UL and CSA Compliance: Provide units which are UL and CSA listed.
   2. ASME Compliance: Provide units which are ASME listed when water heaters and boilers which exceed 200,000 BTUH, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

1.20 WARRANTY

A. See Section 01 78 36 - Warranties, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 QUALITY AND CARE

A. All materials shall be new and in perfect condition when installed unless specifically indicated otherwise. Materials shall be tested within the Continental United States by an independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements. Materials are to be UL or CSA approved or acceptable by state, county, and city authorities. Equipment supplier is responsible for obtaining state, county, and city acceptance on equipment not UL approved or not listed for installation. When not otherwise specified, all material shall conform to applicable National Standards (ANSI).

B. HAZARDOUS MATERIALS
   1. Do not use products containing asbestos, lead, arsenic, or any other material defined by EPA as hazardous to human or animal life.

C. All capacities, sizes and efficiency ratings shown on the drawing are minimum. Gas meter and gas pressure reducing valve capacities are maximum allowable.

D. Each category of material or equipment shall be of the same brand or manufacturer throughout the Work wherever possible.

E. The quality of materials and equipment to be provided is defined by the brand names, manufacturers, model and catalog numbers listed on the Drawings and in the Specifications. Contractor shall provide each item listed, of the quality specified, or equal. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

F. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.

G. Inspect and report concealed damage to carrier within their required time period.

H. Store materials in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect from dirt, water, construction debris, and traffic.

I. Equipment which has been damaged, exposed to weather or is, in the opinion of the Engineer or Owner, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

2.2 ACCESS DOORS

A. Coordinate access door requirements with Section 08 31 13. The more stringent requirements shall govern.

B. Provide access doors where access through floors, walls or ceilings is required to access mechanical, plumbing, control system components, fire dampers and fire alarm system components (such as smoke detectors, fire/smoke dampers, etc.) or other systems requiring access for maintenance, test or observation.
   1. Access doors requiring hand access or access for observation only shall be 14"x14" minimum usable opening.

2. Access doors where entrance of a service person may be required shall be 24"x30" minimum usable opening.

C. Established standard: Milcor of types listed below. Other acceptable manufacturers: Cesco, J.L. Industries, Karp, Larsen's, or equal. Comply with the following:
   1. Form doors and frames of welded, ground smooth steel construction, 14 gauge for doors, 16 gauge for frames. Provide prime coat finish except for stainless steel type.
   2. Concealed hinges to allow 175 degree opening.
   3. Locks: flush, screw driver operated cam lock(s).
   4. Provide anchoring devices suitable for the construction into which the doors are framed.

D. Application (as applicable):
   1. In gypsum drywall walls and ceilings: Type DW.
   2. In ceramic tile walls: Type MS (stainless steel).
   3. In fire rated walls: Type Fire Rated (rating as required for wall or ceiling), self closing, 250 F in 30 min. temperature rating.

PART 3 EXECUTION

3.1 NOISE AND VIBRATION

A. Install vibration isolators, flexible connectors, expansion joints, and measures required to prevent noise and vibration from being transmitted to occupied areas. Select equipment to operate within noise coefficient (NC) design level for particular type of installation in relation to its location.

B. After installation, make proper adjustments to reduce noise and vibration to acceptable levels as defined by Architect.

3.2 SEISMIC CONTROL

A. Provide the following:
   1. General:
      a. Earthquake resistant designs for mechanical equipment, i.e., air handling units, water heaters, blowers, motors, ductwork, mechanical and plumbing piping, to conform to regulations of CBC.
      b. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment piping, ductwork, and the like, to withstand a force in direction equal to value defined in CBC.
      c. Retain licensed structural engineer to provide shop drawings of seismic bracing and seismic movement assemblies for piping/ ductwork/ equipment/ water heaters, and the like. Engineer to design and provide stamped shop drawings for equipment, ductwork, water heaters, piping seismic bracing, and the like. Submit shop drawings along with equipment submittals.
      d. Retain licensed structural engineer to provide shop drawings of seismic flexible joints for piping/ductwork and the like crossing building expansion or seismic joints. Engineer to design and provide stamped shop drawings for piping/ductwork flexible seismic joints. Coordinate actual design deflection or travel with project structural engineer. Submit shop drawings along with seismic bracing details. Coordinate exact design requirements from project structural engineer.
   2. Piping and Ductwork:
      a. Use "Seismic Restraints Manual Guidelines for Mechanical Systems," published by SMACNA.
      b. Sway bracing is not required for pipes that are installed on very short individual hangers (12 inch or less).
      c. As approved by code authority, use a bracing system manufactured by Tolco, Superstrut, Mason, or Pipe Shields Inc. or approved.

3. Equipment:
    a. Provide a means to prohibit excessive motion of mechanical equipment during earthquake.
    b. Provide mechanical equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

3.3 REVIEW BY ENGINEER

A. Notify Architect/Engineer, in writing, at following stages of construction so that Architect/Engineer may, at their option, visit site for review and construction observation:
    1. Plumbing:
        a. Underground piping installation prior to backfilling.
        b. Prior to covering walls.
        c. When ceiling installation is started.
        d. When main systems, or portions of, are being tested and ready for inspection by AHJ.
    2. HVAC:
        a. When ductwork installation starts.
        b. When installation starts for each different major type of equipment.
        c. When ceiling installation is started.
        d. When lines or ducts are to be permanently concealed by construction or insulation systems.
        e. When balancing and testing is started.

3.4 MUTILATION

A. Repair mutilation of building around pipes, ducts, fixtures, and the like.

3.5 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

B. Maintain design intent where equipment other than as shown in Contract Documents is provided. Where equipment requires piping arrangement, control diagrams, or sequencing different from that indicated in Contract Documents, provide electrical motors, wiring, controls, or other required electrical components at no additional cost to Owner.

3.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and equipment in a manner to prevent damage and deterioration. Store in original container which identifies manufacturer's name, brand and model number. Do not store indoor equipment outdoors unless provided with a waterproof protective cover.

B. Replacement: In event of damage, immediately make repairs and replacements necessary.

3.7 CLEANING

A. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated by this work.

3.8 INSTALLATION

A. A. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level, firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.

B. Access Doors
    1. Coordinate the exact location of access doors to provide proper access to the item concealed. Obtain written approval for access door locations from Architect.
    2. Coordinate installation of access doors with the trades performing the construction assemblies into which the access doors are placed.

3. Install all access doors neatly and securely, to open and close completely, and to operate freely and without binding. Install rated doors in accordance with their listing requirements.
4. Test operate all doors and make all adjustments required for satisfactory operation. Replace all damaged materials.
5. Install in accordance with manufacturer's instructions.

3.9 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with the requirements within this section.

B. Test all piping with no leak or loss in pressure in accordance with the requirements within this section.

3.10 TESTING AND INSPECTION

A. See individual specification sections for additional testing and inspection required.

B. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.11 GENERAL TESTING REQUIREMENTS FOR MECHANICAL AND PLUMBING SYSTEMS

A. Contractor shall assign a responsible person to be an independent representative to witness testing and to sign as witness of times, pressure and losses of testing media for all hydronic, duct and gas piping testing.

1. Test all piping as noted below with no leak or loss of pressure. Repair or replace defective piping until tests are accomplished successfully.
2. Submit to the Engineer for review a log of all tests made which shall include time, temperature, pressure, water makeup and other applicable readings, necessary to indicate the systems have been operated and tested in the manner outlined in the construction documents.
3. After producing the specified test pressure, disconnect the pressurizing source; do not introduce further pressure for the duration of the test period, repair leaky piping and retest. Repeat the procedure until the entire system is proven tight.

B. Test the following systems with the medium listed to the pressure indicated for the time period listed:
1. Refrigerant Liquid: Pressure=300 Psig. / Medium=Dry Nitrogen / Duration=4 Hours.
2. Refrigerant Suction: Pressure=150 Psig. / Medium=Dry Nitrogen / Duration=4 Hours.

3.12 CUTTING AND PATCHING

A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.

B. Execute cutting and patching to complete the work, to uncover work to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.

C. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new Products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Code requirements , to full thickness of the penetrated element.

I. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.13 PRIMING AND PAINTING

A. Apply primer to all exposed ferrous metals that are not factory primed, factory finished, galvanized, stainless steel or anodized. Exposed black steel piping shall be primed and finish painted.
1. Primer shall be as recommended by the paint manufacturer for each specific application.
2. Acceptable Products include: Rust-Oleum product, or equal. See Section 09 90 00 for other acceptable products.

B. Apply two coats of primer to metal surfaces of items to be insulated or jacketed, except ductwork and piping, or factory primed or finished.

C. Preparation:

1. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
2. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal stains and marks which cannot be completely removed using Devoe KILSTAIN primers, shellac, or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.
3. Remove or protect hardware, electrical plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to surfaces to receive coatings.
4. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.
5. Galvanized Surfaces:
    a. Remove surface contamination and oils by solvent cleaning in accordance with SSPC-SP 1 and allow to dry.
    b. Apply Devoe MIRROLAC Galvanized Metal Primer in accordance with manufacturer instructions.
6. Uncoated Steel And Iron Surfaces:
    a. Remove grease, rust, scale, and dust from steel and iron surfaces using solvent in accordance with SSPC-SP 1.
    b. Where heavy coatings of scale or contaminants are evident, hand tool clean in accordance with SSPC-SP 2 or use other approved SSPC SP method as needed.
7. Shop Primed Steel Surfaces: Remove loose primer and dust. Sand and feather edges to smooth surface. Clean areas with solvent and spot prime bare metal surfaces with appropriate Devoe MIRROLAC metal primer or primer recommended by manufacturer.

D. Application:
1. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
2. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
3. Remove dust and other foreign materials from substrate immediately prior to applying each coat.

E. Finish Painting: See Section 09 90 00.

3.14 STARTING EQUIPMENT AND SYSTEMS/COMMISSIONING

A. For commissioning requirements see Section 01 91 00.

B. Start equipment and systems in accordance with manufacturer's written instructions..

C. Provide manufacturer's field representative to prepare and start equipment and systems.

D. Adjust for proper operation within manufacturer's published tolerances.

E. Demonstrate proper operation of equipment to Owner's designated representative.

F. Description:
1. Comply with all start up of mechanical and electrical equipment systems as required in the various sections and herein.
2. Coordinate all testing and startup procedures with all other trades so that all non-mechanical and non-electrical work is completed and operational so that the specified testing can be performed.

G. Preliminary Work:
1. Prior to the startup, the Contractor shall ensure that the systems are ready to operate, and the following items have been completed and checked including but not limited to:
    a. Proper motor and fan/pump rotation.
    b. Flushing and cleaning of the system.
    c. Wiring

d. Auxiliary connections
e. Lubrication.
f. Venting.
g. Controls.
h. Installation of filters and strainers.
i. Setting of relief and safety valves .

2. All electrical testing must be completed and test results submitted before equipment startup to avoid power interruptions during mechanical equipment startup and testing.
3. The Contractor shall submit at least 30 days in advance a schedule listing the date of completion of his work as it will be ready for equipment startup of Electrical/Mechanical equipment. This schedule shall include work on a system by system, floor by floor basis.
4. Two weeks prior to the startup of any major equipment, the Contractor shall certify in writing that the systems will be complete and ready for startup. Completeness shall not only include physical installation of individual pieces of equipment, but all related elements of other crafts to make all equipment operate as a system.
   a. The startup checklist will cover all related crafts, e.g., controls, electrical, mechanical, and a clean environment for equipment startup.
5. The Contractor shall schedule a tour with the Owner's representative to review startup conditions prior to equipment startup. This tour does not relieve the Contractor of any responsibilities to properly start equipment. The Owner's representative will issue a notice of deficiencies that will be required to be corrected prior to equipment startup. The Contractor will be required to reschedule a back check with the Owner's representative prior to attempting an equipment startup.
6. Equipment of systems should not be started until systems and associated subsystems are completed. Verify that other continuing work could not possibly damage completed systems if they are in operation. Furnish signed off prestartup check sheet.

H. Startup and Commissioning:
   1. System Startup and Operation:
      a. The Contractor shall provide all labor, materials and services necessary for the initial startup and operation of all systems and equipment furnished and installed under this section.
      b. The Contractor and the factory representative shall provide for the services of qualified factory representatives for all major equipment prestart setup, startup and initial operation. Such periods shall be sufficient to insure the proper operation of systems and equipment. Major equipment to include, but not limited to rooftop units, modular cooling units, temperature controls, fan systems, electrical systems, emergency power, fire alarm systems, and fire sprinkler, etc.
      c. The Contractor shall check all equipment during initial startup to insure correct rotation, proper lubrication, adequate fluids or air flows, nonoverloading electrical characteristics, proper alignment and vibration isolation. Systems shall be checked for air and/or water flows throughout without blockages. Air handling systems shall be checked for proper damper connections and positions, aligned and adjusted belt drives, proper lubrication, temporary air filters installed, nonexcessive electrical characteristics and minimal vibration. Other miscellaneous equipment shall be started and operated as described above as applicable. Manufacturer's representative shall submit a preliminary written copy of equipment startup check sheet prior to leaving job site.
      d. After initial startup and operation of systems, the Contractor shall submit a report, showing proper operation before commencement of the final "Operation Test".
      e. During initial operation of the system and until substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good running order. Items such as strainers, cleanouts, filter replacement, bearing lubrication, packing replacement, and other consumables shall be provided without cost to the Owner. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor and continued failures shall

be grounds for the Owner to provide such services with back charges to the Contractor. Submit written schedule of completed maintenance to the Engineer.

I. System Acceptance:
   1. General: The system installation shall be complete and tested for proper operation prior to acceptance testing "Operation Test" for the Owners authorized representative. A letter shall be submitted to the Owner requesting system acceptance. This letter shall certify that all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing shall commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the Owner's representative and pass, the system will be accepted. The warranty period may begin at this time.

J. Operation Test:
   1. Provide all labor, equipment, and materials required to perform test.
   2. The test shall occur after all major equipment startup and balance services have been performed as specified. The purpose is to demonstrate that individual pieces of equipment and all related elements operate as one complete system and not to identify incomplete or defective work.
   3. All equipment is to be run in an automatic operating position and exercised for 72 hours to verify that they perform in accordance with the specified sequence of operation and designed operation logic.
   4. The Engineer's representative shall be notified and may be present for the initiation of the test.
   5. A log shall be prepared by the Contractor, to be submitted to the Engineer, of all tests including, but not limited to: time, temperatures, pressures, and other readings to prove all equipment is operating as specified.
   6. All temperatures, pressures, status indication, etc., shall be verified by at least one other means of measurement or visual verification of condition.
   7. Change set points and simulate conditions as directed to demonstrate:
      a. Ability to control to new set point.
      b. Interface between systems, fire alarm/fire sprinkler systems.
      c. Proper sequence and operation.
      d. Equipment safety systems and all automatic changeover/backup systems and alarms are functioning or will function.
   8. If unsatisfactory performance or a system failure is experienced for any reason, the test shall be repeated until 72 hour consecutive hours are achieved. The Engineer's representative shall make all final decisions of a satisfactory test.

3.15 GUARANTEE

A. Be responsible for work done and materials installed under these plans and specifications. Repair or replace, as may be necessary, any defective work, materials, or part which may show itself within one year of filing of Notice of Completion and be responsible for damage to other materials, furnishing, equipment, or premises caused by such defects during this period, if in the opinion of the Architect said defect is due to imperfection of material or workmanship. Provide all such work and materials at no cost to Owner.

B. Be responsible for damage to any part of premises during guarantee period caused by leaks or breaks in work furnished and/or installed under this section.

C. Replace refrigerant, lubricants, or gasses lost as result of defects, breaks, or leaks in work.

3.16 ACCEPTANCE

A. System can not be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
   1. Testing and balancing reports.
   2. Cleaning.

3. System balancing and balancing logs.
4. Operating and Maintenance Manuals.
5. Training of operating personnel.
6. Record Drawings.
7. Guaranty certificates.
8. Start-up and test document.
9. Letter of conformance.

3.17 LETTER OF CONFORMANCE

A. Provide letter and copies of extended warranties with a statement in letter that mechanical items were installed in accordance with manufacturer's recommendations. Include letter of conformance and warranties in operating and maintenance manuals.

B. Warranties to begin at date of substantial completion.

END OF SECTION

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 09 91 23 - Interior Painting: Identification painting.

1.3 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2022.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

A. Air Handling Units, Fan Coil Units: Nameplates.

B. Air Terminal Units: Tags.

C. Automatic Controls: Tags. Key to control schematic.

D. Control Panels: Nameplates.

E. Dampers: Ceiling tacks, where located above lay-in ceiling.

F. Ductwork: Stenciled painting.

G. Instrumentation: Tags.

H. Major Control Components: Nameplates.

I. Piping: Pipe markers.

J. Thermostats: Nameplates.

K. Access Doors (hard ceilings and walls) accessing actuators, equipment, dampers, duct detectors, smoke/fire dampers, etc.: Nameplates.

2.2 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.

B. Seton Identification Products: www.seton.com/aec.

2.3 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.

1. Letter Color: White.

2. Letter Height, Equipment, control panels: 1 inch.
3. Letter Height, Thermostats and small control components: 1/4 inch.
4. Background Color: Black.

2.4 TAGS

A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.5 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
1. Ductwork: Minimum 1-1/4 inch high letters.

B. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors conforming to ASME A13.1.

2.6 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Secure to pipe using two (2) bands of adhesive tape with flow arrows supplied by the manufacturer. Install securing bands completely around pipe and overlapped.

2.7 CEILING TACKS

A. Description: Steel with 7/8-inch diameter color coded head. Heads shall be engraved with designation of above ceiling equipment.

PART 3 EXECUTION

3.1 PREPARATION

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

B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.2 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Section 09 91 23.

D. Identify air conditioning units and exhaust fans with plastic nameplates.

E. Identify control panels and major control components outside panels with plastic nameplates.

F. Identify thermostats relating to terminal boxes or valves with nameplates.

G. Tag automatic controls, instruments, and relays. Key to control schematic.

H. Identify piping, concealed or exposed, with plastic pipe markers. 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.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Materials, equipment and labor required for testing, adjusting, and balancing work required by this Section, including air, plumbing, hydronic systems, and associated equipment and apparatus. The work consists of setting speed and volume (flow) adjustments, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.

1.2 QUALIFICATIONS

A. Perform work of this Section by a firm certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC).

B. Do work of this Section under the direct supervision of a person who has passed written and practical NEBB or AABC examinations for testing, adjusting, and balancing of air and hydronic systems.

1.3 SUBMITTALS

A. Procedures: Submit certified test reports, signed by Test and Balance (TAB) supervisor who performed TAB work.

B. Report Forms:

1. Submit copies of report forms to Architect within 30 days of award of the Contract by Owner prior to commencement of testing and balancing work at the site.

2. Provide 8-1/2- by 11-inch paper for looseleaf binding, with blanks for listing the required test ratings and for certification of report.

3. Submit reports on forms similar in content to standard AABC or NEBB test forms.

4. Submit final test and balance report. Include Record Drawings with terminal codes for cross-reference with the Submittal, such that terminals referenced in the Submittal are easily located on the Drawings.

5. Include identification and types of instruments used, and their most recent calibration date.

6. Submit resume data on person who is to directly supervise testing, adjusting and balancing work.

C. Maintenance Data: Include copies of balancing report and identification of instruments in maintenance manuals.

D. NEBB or AABC Certificate: At time of submittal of forms, submit NEBB or AABC certification form for review.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

A. Ductwork and Housings: Use plastic plugs with retainers to patch drilled holes.

B. Insulation: Refer to Section 15250, Insulation, for patching.

2.2 INSTRUMENTS

A. Utilize test instruments and equipment as recommended in the following:

1. NEBB's Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.

2. AABC's Manual MN-1, "AABC National Standards."

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Do not proceed with testing, adjusting and balancing work until construction of relevant systems has been completed and is operable. Do not proceed until systems scheduled for testing, adjusting and balancing are clean and free from debris, dirt and discarded building materials.

B. Verify the following:

1. Equipment is operable and in a safe and normal condition.

2. Temperature control systems are installed complete and operable.

3. Final filters are clean and in place.

4. Duct systems are clean of debris.

5. Fan rotation is correct.

6. Dampers are in place and open.

7. Access doors are closed.

8. Air outlets are installed and connected.

9. Hydronic Systems have been flushed, filled, and vented.

10. Correct pump rotation.

11. Proper strainer baskets are clean and in place.

12. Service and balance valves are open.

13. Any conditions affecting system operation, such as open doors, adjacent pressurized areas, and the like, are in final operating conditions prior to testing and balancing.

C. Report any defects or deficiencies noted during performance of services to Architect. Promptly report abnormal conditions in Mechanical Systems or conditions which prevent system balance.

D. Automatic Temperature Control Systems:

1. Set and adjust automatically operated devices to achieve required sequence of operations. Coordinate with the automatic temperature control supplier. Do not proceed without his representation.

2. Verify controls for proper calibration and correct as necessary.

3.2 TEST HOLE LOCATIONS

A. Install test holes at the inlet and outlet of air handling unit fans, exhaust fans, utility fans, and the like, and elsewhere as required to facilitate traverses and to test the air systems. Plug holes when finished.

3.3 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

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. Log shall show each successive test.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper regulation.

G. Adjust fans to deliver within 5 percent of specified flow. Adjust air outlets and inlets to within 10 percent of specified flow.

H. Adjust fan and inlet vanes for variable air volume systems with sufficient number of terminal units at full cooling to achieve fan flow specified. Close other units.

I. Adjust outside air to fans as scheduled. Measure outside air for variable air volume fans at full flow.

J. Adjust relief exhaust fans on variable air volume systems to maintain a positive building static pressure of 0.05 inch w.c.

3.4 AIR MOVING EQUIPMENT TESTING

A. Location.

B. Manufacturer.

C. Model.

D. Supply airflow, specified and actual.

E. Return airflow, specified and actual.

F. Outside airflow, specified and actual.

G. Total external static pressure, specified and actual.

H. Inlet pressure.

I. Discharge pressure.

J. Fan RPM.

3.5 RETURN AIR/OUTSIDE AIR TESTING

A. Identification/location.

B. Design airflow.

C. Actual airflow.

D. Design return airflow.

E. Actual return airflow.

F. Design outside airflow.

G. Actual outside airflow.

H. Return air temperature.

I. Outside air temperature.

J. Required mixed air temperature.

K. Actual mixed air temperature.

L. Design outside/return air ratio.

M. Actual outside/return air ratio.

3.6 ELECTRIC MOTORS TESTING

A. Manufacturer.

B. HP/BHP.

C. Phase, voltage, amperage; nameplate, actual, no load. Record voltage and amperage on all phases of 3 phase motors.

D. RPM.

E. Service factor.

F. Starter size, rating, heater elements.

3.7 V-BELT DRIVES TESTING

A. Identification/location.

B. Required driven RPM.

C. Driven sheave, diameter and RPM.

D. Belt, size and quantity.

E. Motor sheave, diameter and RPM.

3.8 DUCT TRAVERSE TESTING

A. System zone/branch.

B. Duct size.

C. Area.

D. Design velocity.

E. Design airflow.

F. Test velocity.

G. Test airflow.

H. Duct static pressure.

I. Air temperature.

J. Air correction factor.

3.9 AIR DISTRIBUTION TESTING

A. Air terminal number.

B. Room number/location.

C. Terminal type.

D. Terminal size.

E. Design velocity.

F. Design airflow.

G. Test (final) velocity.

H. Test (final) airflow.

I. Percent of design airflow.

END OF SECTION

SECTION 23 08 00 - TITLE 24 COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for commissioning of HVAC systems for Title 24 (T-24) compliance.

B. Scope: Commissioning Coordinator shall complete the building systems commissioning requirements of the California Energy Code, as applicable to Project. It is not the intention of Project specifications to require duplication in testing.

1. T-24 commissioning activities may be coordinated with Contractor tests and TAB work specified in technical Sections.

1.2 RELATED REQUIREMENTS

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

B. The requirements of this Section apply to all Sections of Division 23.

C. In the event of conflict between requirements of Division 01 Title 24 commissioning specifications and this Section, Division 01 requirements shall prevail.

1.3 REFERENCES

A. 2022 California Energy Code.

B. 2022 California Energy Code and Building Energy Efficiency Standards Reference Appendices.

C. 2022 Building Energy Efficiency Standards Nonresidential Compliance Manual.

1.4 DEFINITIONS

A. Commissioning Coordinator: General Contractor, or an entity engaged by the General Contractor to perform T-24 commissioning.

B. Covered Processes: Process equipment for which there are listed requirements in the California Energy Code.

C. OPR: Owner’s Project Requirements.

D. TAB: Testing, Adjusting, and Balancing.

1.5 SUBMITTALS (FOR RECORD ONLY)

A. Submit the following:

1. Commissioning Plan.

2. Systems Manual.

3. Commissioning Report.

4. Certificates of Installation.

5. Certificates of Acceptance.

B. Above items for inclusion in closeout documents submitted to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 TEST INSTRUMENTS

A. Commissioning Coordinator shall supply test instruments. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if recommended by instrument manufacturer, and be checked for accuracy prior to start of work.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

A. Architect/Engineer:

1. Performs construction observation. Provides construction observation reports.

2. Reviews and approves Commissioning Plan, Systems Manual, and Commissioning Report.

3. Assists in problem resolution.

B. Commissioning Coordinator:

1. Coordinates commissioning process.

2. Develops Commissioning Plan.

3. Schedules and conducts functional testing. Completes Certificates of Acceptance.

4. Assembles Systems Manual.

5. Schedules and conducts systems operations training. Verifies systems operations training completion.

C. HVAC Subcontractor: Assists in functional testing.

D. Electrical Subcontractor: Assists in functional testing.

E. Controls Subcontractor: Assists in functional testing.

F. TAB Subcontractor: Assists in functional testing.

G. Equipment Manufacturers/Vendors:

1. Performs Check, Test, and Start of equipment and systems, as required by Project technical Sections.

2. Provides systems and equipment documentation required to complete functional testing and assemble Systems Manual.

3.2 COMMISSIONING PLAN

A. Commissioning Coordinator shall author the code-required Commissioning Plan. The Commissioning Plan shall address HVAC systems for which commissioning is required. The Commissioning Plan shall be updated by Commissioning Coordinator throughout the construction process. The Commissioning Plan shall contain the following:

1. General Project Information: Commissioning Coordinator shall obtain general Project information from Project architectural Drawings.

2. Commissioning Goals:

a. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.

b. Verify and document proper integrated performance of equipment and systems utilizing functional testing for mechanical system acceptance, as required by the California Energy Code.

c. Verify that Systems Manual documentation is complete.

d. Verify that operating personnel are trained to enable them to operate, monitor, adjust, and maintain HVAC systems in an effective and energy-efficient manner.

3. Commissioning Coordinator shall compile the following information and include in Commissioning Plan:

a. An explanation of original design intent: Commissioning Coordinator shall obtain copies of the OPR and BOD for the Project.

b. Equipment and systems to be tested, including the extent of tests: Test 100 percent of a given type of installed equipment having associated Acceptance Requirements.

1) Refer to forms MCH-01-E on Drawings for systems to be commissioned.

2) Covered Processes: In addition to systems listed in MCH-01-E on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:

a) Parking garage ventilation systems.

b) Compressed air systems.

c) Type 1 Kitchen exhaust systems.

c. Functions to be tested: Refer to 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.

d. Conditions under which the test shall be performed.

e. Measurable criteria for acceptable performance: Refer to 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.

f. Commissioning team information:

1) Refer to Project information on architectural Drawings for design team participants. Commissioning Coordinator shall add subcontractor information to provided design team information and include in Commissioning Plan.

g. Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, systems operations training, and commissioning report.

3.3 CERTIFICATES OF INSTALLATION

A. Commissioning Coordinator shall complete applicable Certificates of Installation forms.

3.4 FUNCTIONAL TESTING REQUIREMENTS

A. Contractor shall complete the applicable Acceptance Requirements for Code Compliance contained in the California Building Energy Efficiency Standards. Refer to T-24 compliance forms on Drawings for systems having Acceptance testing requirements. Contractor shall perform Acceptance tests and complete the appropriate “Certificates of Acceptance.” Contractor shall engage certified HERS Rater to verify duct leakage rate for duct systems indicated on T-24 compliance forms on Drawings as requiring duct leakage rate testing. For additional duct leak testing requirements, refer to Section 23 80 00, “Heating, Ventilating, and Air Conditioning,” Article, “Ductwork Sealing and Leak Testing.”

1. Covered Processes: In addition to systems listed on T-24 compliance forms on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:

a. Parking garage ventilation systems.

b. Compressed air systems.

c. Type 1 Kitchen exhaust systems.

3.5 SYSTEMS MANUAL

A. Commissioning Coordinator shall assemble Systems Manual in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications.

3.6 SYSTEMS OPERATIONS TRAINING

A. Commissioning Coordinator shall provide systems operations training in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications.

3.7 COMMISSIONING REPORT

A. Commissioning Coordinator shall complete Commissioning Report in accordance with the requirements of the California Energy Code and Division 01 commissioning specifications.

END OF SECTION

SECTION 23 09 33 – FACILITY MANAGEMENT SYSTEM

PART 1 - GENERAL

1.01 PRODUCT DESCRIPTION

A. The Facility Management System shall be **Johnson Controls Metasys "Network Automation Engine"** and capable of integrating multiple building functions including equipment supervision and control, alarm management, energy management, and historical data collection and archiving via browser by the existing Johnson Controls "ADS" Application and Data Server. No other manufacturers or systems will be considered. NO SUBSTITUTION.

B. The Facility Management System shall consist of the following:

1. Standalone DDC panels
2. Standalone application specific controllers. (ASCs)
3. Personal Computer Operator Workstations.

C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

D. Standalone DDC panels shall be able to access any data from, or send control commands and alarm reports directly to any other DDC panel or combination of panels on the network without dependence upon a central processing device. Standalone DDC panels shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.

E. Installation: The Network Automation Engine (NAE) unit will be installed at or near the main distribution frame (MDF) at the school site. See plans for location.

1.02 NETWORKING / COMMUNICATIONS

The design of the FMS shall network operator workstations and Standalone DDC panels as shown on the architectural system configuration drawing. Inherent in the system's design shall be the ability to expand or modify the network via the local area network.

A. Local Area Network

1. Workstation / DDC Panel Support: Operator workstations and DDC panels shall directly reside on a local area network such that communications may be executed directly between controllers, directly between workstations, and between controllers and workstations on a peer-to-peer basis.
2. Dynamic Data Access: All operator devices, either network resident or connected via dial-up

modems, shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment.

Access to system data shall not be restricted by the hardware configuration of the Facility Management System. The hardware configuration of the FMS network shall be totally transparent to the user when accessing data or developing control programs.

3. General Network Design: Network design shall include the following provisions:

   a. High-speed data transfer rates for alarm reporting, quick report generation from multiple controllers, and upload/download efficiency between network devices. The minimum baud rate shall be 2.5 Megabaud.
   b. Support of any combination of controllers and operator workstations directly connected to the local area network. A minimum of 50 devices shall be supported on a single local area network.
   c. Detection and accommodation of single or multiple failures of either workstations, DDC panels or the network media. The network shall include provisions for automatically reconfiguring itself to allow all operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.

1.03 STAND ALONE DDC PANELS

A. General: Stand alone DDC panels shall be microprocessor based, mullet-asking, multi-user, real-time digital control processors. Each stand alone DDC panel shall consist of modular hardware with plug-in enclosed processors, communication controllers, power supplies, and input/output modules. A sufficient number of controllers shall be supplied to fully meet the requirements of this specification and the attached point list.

B. Memory: Each DDC panel shall have sufficient memory to support its own operating system and database including:

Control processes
Energy Management Applications
Alarm Management
Historical/Trend Data for all points
Operator I/O
Manual Override Monitoring

C. Point Types: Each DDC panel shall support the following types of point inputs and outputs:

Digital Inputs for Status/Alarm Contacts.
Digital Outputs for on/off Equipment Control.
Analog Inputs for Temperature
Analog Outputs for Valve and Damper Position Control and
Capacity Control of Primary Equipment.

D. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field controllers, sensors, and actuators.

E. Serial Communication Ports: Standalone DD. panels shall provide at least two RS-232C serial data communication ports for simultaneous operation of multiple operator I/O devices such as industry standard printers, laptop workstations, PC workstations, and panel mounted or portable DD. panel Operator's terminals.

F. Hardware Override Monitoring: DDC panels shall monitor the status or position of all overrides, and include this information in logs and summaries to inform the operator that automatic control has been inhibited. DDC panels shall also collect override activity information for daily and monthly reports.

PART 2 - SYSTEM SOFTWARE FEATURES

2.01 GENERAL

All Necessary software to form a complete operating system as described in this specification shall be provided.

The software programs specified in this section shall be provided as an integral part of the DDC panel and shall not be dependent upon a higher-level computer for execution.

2.02 CONTROL SOFTWARE DESCRIPTION

A. Pre-Tested Control Algorithms: The DDC panels shall have the ability to perform the following pre-tested control algorithms:

1. Two Position Control
2. Proportional Control
3. Proportional plus Integral Control
4. Proportional, Integral, plus Derivative Control
5. Automatic Control Loop Tuning

B. Equipment Cycling Protection: Control software shall include a provision for limiting the number of times each piece of equipment may be cycling within any one-hour period.

C. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start demands to heavy electrical loads.

D. Power fail Motor Restart: Upon the resumption of normal power, the DDC panel shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.

2.03 ENERGY MANAGEMENT APPLICATIONS

DDC panels shall have the ability to perform any or all of the following energy management routines:

Time of Day Scheduling
Calendar Based Scheduling
Holiday Scheduling
Temporary Schedule Override
Optimal Start
Optimal Stop
Night Setback Control
Enthalpy Switchover (economizer)
Fan Speed/CFM Control
Heating/Cooling Interlock
Cold Deck Reset
Hot Deck Reset
Hot Water Reset
Chilled Water Reset
Condenser Water Reset
Chillier Sequencing

2.04 CUSTOM PROCESS PROGRAMMING CAPABILITY

DDC panels shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

A. Process Inputs and Variables: It shall be possible to use any of the following in a custom process:

Any system-measured point data or status
Any calculated data
Any results from other processes
User-Defined constants
Arithmetic functions (+, -, *, /, square root, exp., etc.)
Boolean logic operators (and, or, exclusive or, etc.)
On-delay / Off-delay / One-shot timers

B. Process Triggers: Custom processes may be triggered based on any combination of the following:

Time interval
Time of day
Date
Other processes
Time programming
Event (e. g., point alarms)

C. Dynamic Data Access: A single process shall be able to incorporate measured or calculated data from any and all other DDC panels on the local area network.

2.05 ALARM MANAGEMENT

Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the DDC panel's ability to report alarms be affected by either operator activity at a PC workstation or local I/O device, or, communications with other panels on the network.

A. Point Change Report Description: All alarm or point change reports shall include the point's English language description, and the time and date of occurrence.

B. Prioritization: The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three priority levels shall be provided. Each DDC panel shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.

C. Report Routing: Alarm reports, email messages, and files will be directed to a user-defined list of operator devices, or PCs automatically directed to a default device in the event a primary device is found to be off-line.

D. Alarm Messages: In addition to the point's descriptor and the time and date, the user shall be able to email, display or store a 65-character alarm messages to more fully describe the alarm condition or direct operator response.

2.06 HISTORICAL DATA AND TREND ANALYSIS

A variety of historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways.

A. Continuous Point Histories: Standalone DDC panels shall store Point History Files for all analog and binary inputs and outputs.

The Point History routine shall continuously and automatically sample the value of all analog inputs at half hour intervals. Samples for all points shall be stored for the past 24 hours to allow the user to immediately analyze equipment performance and all problem-related events for the past day. Point History Files for binary input or output points and analog output points shall include a continuous record of the last ten status changes or command for each point.

B. Control Loop Performance Trends: Standalone DDC panels shall also provide high resolution sampling capability with an operator-adjustable resolution of 10-300 seconds in one-second increments for verification of control loop performance.

C. Extended Sample Period Trends: Measured and calculated analog and binary data shall also be assignable to user-definable trends for the purpose of collecting operator-specified performance data over extended periods of time. Sample intervals of 1 minute to 2 hours, in one-minute intervals, shall

be provided. Each standalone DDC panel shall have a dedicated buffer for trend data, and shall be capable of storing a minimum of 5000 data samples.

D. Data Storage and Archiving: Trend data shall be stored at the standalone DDC panels, and uploaded to hard disk storage when archival is desired. Uploads shall occur based upon either user-defined interval, manual command, or when the trend buffers become full. All trend data shall be available in disk file form for use in 3rd party personal computer applications.

PART 3 - APPLICATION SPECIFIC CONTROLLERS

3.01 H.V.A.C. APPLICATIONS

Each stand alone DDC controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).

Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.

Each ASC shall have sufficient memory to support its own operating system and data bases including:

Control Processes
Energy Management Applications
Operator I/O (portable service terminal)

The operator interface to any ASC point data or programs shall be through any network-resident PC workstation, or and PC or portable operator's terminal connected to any DDC panel in the network.

Application Specific Controllers shall directly support the temporary use of a portable service terminal. The capabilities of the portable service terminal shall include but not be limited to the following:

Display temperatures
Display status
Display set points
Display control parameters
Override binary output controls
Override analog set points
Modification of gains and offset

3.02 APPLICATION DESCRIPTIONS

A. Zone Thermostats – Shall be provided with “WARMER/COOLER” slide adjustment and allow occupants to modify temperature 1.5F above or below the current heat or cool set-point. Thermostats shall also have an override button or after hours feature.

B. Zone Set-points for all applications shall be: Occupied Set-points, Heat – 70F, Cool – 74F, Unoccupied Set-points, Heat – 55F, Cool – 90F

C. Override Button – Shall allow for up to 60 minutes of after hours use.

D. Supply Air Temp Sensor – All heating/cooling equipment shall be equipped with a supply air temperature sensor for monitoring/troubleshooting purposes.

E. Unitary Controllers

1. Unitary Controllers shall support, but not be limited to, the following types of systems to address specific application described in the Execution portion of this specification, and for future expansion:
   Unit Vents (ASHRAE Cycle I, II, III or W)
   Heat Pumps (Air-to-Air, Water-to-Air)
   Packaged Rooftops
   Fan Coils (Two-Pipe, Four-Pipe)

2. Unitary Controllers shall support the following types of point inputs and outputs:
   Economizer Switchover Inputs
   1. Dry bulb
   2. Outdoor Air Enthalpy
   3. Differential Temperature Binary Input from a separate controller

   Economizer Outputs
   1. Integrated
   2. Analog with minimum position
   3. Binary output to enable self-contained economizer actuator

   Heating and Cooling
   1. Outputs
   2. 1 to 3 Stages
   3. Analog Output with two-pipe logic
   4. Reversing valve logic for Heat Pumps
   5. Fan Output On/Off Logic Control

3. Unitary controllers shall support the following library of control strategies to address the requirements of the sequences described in the Execution portion of this specification, and for future expansion:
   Daily/Weekly Schedules
   Comfort / Occupancy Modes
   Economy Mode
   Standby Mode / Economizer Available
   Unoccupied / Economizer Not Available
   Shutdown
   Temporary Override Mode
   Temporary Comfort Mode
   (Occupancy-Based Control)
   Boost (Occupancy Warmer / Cooler Control)

4. Comfort Mode Control: Each Unitary Controller shall have a provision for occupancy sensing overrides. Based upon the contact status of either a manual wall switch or an occupancy-sensing device, the Unitary Controller shall automatically select either Standby or Comfort

mode to minimize the heating and cooling requirements while satisfying comfort conditions.

5. Continuous Zone Temperature Histories: Each Unitary Controller shall automatically and continuously, maintain a history of the associated zone temperature to allow users to quickly analyze space comfort and equipment performance for the past 24 hours. A minimum of two samples per hour shall be stored.

PART 4 - OPERATOR INTERFACE

4.01 BASIC INTERFACE DESCRIPTION:

A. Microsoft Internet Explorer 6.0 shall be used to access all sites. No proprietary Workstation software of proprietary software licensing shall be required to access any supervisory controller at the school site. The supervisory controller shall have full programmability embedded to add/remove/delete controllers, objects, features or other supervisory controllers via the Browser.

B. Multiple, Concurrent Displays: The Operator Interface shall provide the ability to simultaneously view several different types of system displays in overlapping windows to speed building analysis. For example, the interface shall provide the ability to simultaneously display a graphic depicting an air-handling unit, while displaying the trend graph of several associated space temperatures to allow the user to analyze system performance. If the interface is unable to display several different types of displays at the same time, the FMS contractor shall provide at least two operator stations.

C. Password Protection: Multiple-level password access protection shall be provided to allow the user/manager to limit workstation control, display and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password.

1. Passwords shall be exactly the same for all operator devices, including portable or panel-mounted network terminals. Any additions or changes made to password definition shall automatically cause passwords at all DDC panels on a network to be updated and downloaded to minimize the task of maintaining system security. Users shall not be required to update passwords for DDC panels individually.

2. A minimum of five levels of access shall be supported:
   Level 1 = Data Access and Display
   Level 2 = Level 1 + Operator Overrides
   Level 3 = Level 2 + Database Modification
   Level 4 = Level 3 + Database Generation
   Level 5 = Level 4 + Password Add/Modification

3. A minimum of 50 passwords shall be supported at each DDC panel.

4. Operators will be able to perform only those commands available for their respective passwords. Menu selections displayed at any operator device, including portable or panel mounted devices, shall be limited to only those items defined for the access level of the password used to log-on.

D. Operator Commands: The operator interface shall allow the operator to perform commands including, but not limited to, the following:

1. Start-up or shutdown selected equipment
2. Adjust set points
3. Add/Modify/Delete time programming
4. Enable/Disable process execution
5. Lock/Unlock alarm reporting for each point
6. Enable/Disable Totalization for each point
7. Enable/Disable Trending for each point
8. Enter temporary override schedules
9. Define Holiday Schedules
10. Change time/date
11. Entry/Modify analog alarm limits
12. Enter/Modify analog warning limits
13. View limits

E. Logs and Summaries: Reports shall be generated automatically or manually, and directed to either CRT displays, printers, or disk files. As a minimum, the system shall allow the user to easily obtain the following types or reports:

1. A general listing of all points in the network
2. List all points currently in alarm
3. A general listing of all points in the network
4. List all points currently in alarm
5. List of all off-line points
6. List all points currently in override status
7. List of all disabled points
8. List all points currently locked out
9. List of all items defined in a “Follow-Up” file
10. List all Weekly Schedules
11. List all Holiday Programming

Summaries shall be provided for specific points, for a logical point group, for a user-selected group of groups, or for the entire facility without restriction due to the hardware configuration of the facility management system. Under no conditions shall the operator need to specify the address of hardware controller to obtain system information.

4.02 COLOR GRAPHIC DISPLAY

Color graphic floor plan displays shall be provided.

A. Site Plan: A graphic showing all buildings of a school site shall be provided.

B. Building: Each building within a site shall show individual classrooms by room name or number. Room Identification shall be verified by the controls contractor on site.

C. Displays: Each room within a building shall show the current zone temperature value.

4.03 SYSTEM CONFIGURATION AND DEFINITION

A. All temperature and equipment control strategies and energy management routines shall be definable by the operator. System definition and modification procedures shall not interfere with normal system operation and control.

The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently perform the following functions:

1. Add/Delete/Modify Standalone DDC Panels
2. Add/Delete/Modify Standalone DDC Panels
3. Add/Delete/Modify Operator Workstations
4. Add/Delete/Modify Application Specific Controllers
5. Add/Delete/Modify points of any type, and all associated point parameters, and tuning constants
6. Add/Delete/Modify alarm reporting definition for each point
7. Add/Delete/Modify control loops
8. Add/Delete/Modify energy management applications
9. Add/Delete/Modify time- and calendar-based programming
10. Add/Delete/Modify Totalization for every point
11. Add/Delete/Modify Historical Data Trending for every point
12. Add/Delete/Modify custom control processes
13. Add/Delete/Modify any and all graphic displays, symbols, and cross-references to point data
14. Add/Delete/Modify dial-up telecommunication definition
15. Add/Delete/Modify all operator passwords
16. Add/Delete/Modify Alarm Messages

B. Programming Description: Definition of operator device characteristics, DDC panels, individual points, applications and control sequences shall be performed through fill-in-the-blank templates and graphical programming approach.

1. Graphical Programming: Control sequences are created by using a mouse input device to draw interconnecting lines between symbols depicting inputs, operators (comparisons and mathematical calculations), and outputs of a control sequence. As a minimum, graphic symbols shall be used to represent:

    a. Process Inputs, such as temperature, humidity, or pressure values, status, time, date, or any other measured or calculated system data.
    b. Mathematical Process Operators, such as addition, subtraction, multiplication, or greater than, equal to, less than, etc.
    c. Time Delays
    d. Process Control Outputs such start/stop control points, analog adjust points, etc.
    e. Process Calculation Outputs
    f. Text file Outputs and Advisories

2. Network-Wide Strategy Development: Inputs and outputs for any process shall not be restricted to a single DDC panel, but shall be able to include data from any and all other DDC panels to allow the development of network-wide control Strategies. Processes shall also allow the operator to use the results of one process as the input to any number of other processes (cascading).

3. Sequence Testing and Simulation: A software tool shall be provided, which allows a user to simulate control sequence execution to test strategies before they are actually applied to mechanical systems. Users shall be able to enter hypothetical input data, and verify desired control response and calculation results via graphical displays and hardcopy printouts.

C. System Definition/Control Sequence Documentation: All portions of system definition shall be self-documenting to provide hardcopy printouts of all configuration and application data. Control process and DDC control loop documentation shall be provided in logical, graphical flow diagram format to allow control sequences to be easily interpreted and modified at any time in the future.

4.04 LAPTOP PC WORKSTATION DESCRIPTION:

A. Laptop Personal Computer Operator Workstations shall be provided for command entry, alarm management, information management, and database management functions shall be resident in the Standalone DDC panels to facilitate greater fault tolerance and reliability.

B. Laptop PC Operator Workstations shall be general purpose, commercially available, personal computers with sufficient memory and processor capacity to perform all functions described in this specification and shall included a 9 pin serial port.

C. The Laptop display shall have a diagonal screen measurement of no less than 9”, and a minimum display resolution of no less than 640 X 320 pixels. The screen shall be non-reflective.

D. The DDC panel Operator Terminal shall provide access to all real or calculated points in the controller to which it is connected, or any other controller in the network. This capability shall not be restricted to a subset of predefined “global points”, but shall provide totally open exchange of data between the operator terminal and any DDC panel in the network.

E. Operator access at all DDC panel Operator Terminals shall be identical to each other, as well as identical to the PC or Laptop Operator Workstations, Any password changes shall automatically be downloaded to all controllers on the network

F. The DDC panel operator terminal shall provide English language prompting to eliminate the need for the user to remember command formats or point names. Prompting shall be provided consistent with a user’s password clearance and possibility of operator error.

G. A multi-function touchpad shall be provided for point and command selection, as well as parameter entry. To minimize the possibility of operator error, the DDC panel Operator Terminal shall change and limit touchpad functions based upon an operator’s password clearance, the function being performed, and types of points being displayed. Screen displays shall clearly indicate only valid touchpad functions.

H. Identification for all real or calculated points shall be consistent for all network devices. The same English language names used at PC workstations shall be used to access points at the DDC panel Operator’s Terminal to eliminate cross-reference or look-up tables.

END OF SECTION

SECTION 23 31 00 - DUCTWORK

PART 1 - GENERAL

1.01 CONDITIONS OF THE CONTRACT

A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

B. Division - 15 Basic Mechanical Materials and Methods apply to work of this section.

1.02 WORK INCLUDED

A. Types of ductwork required for this project include the following:

B. Sheet Metal Ductwork

C. Construct all ductwork for 2-inch w.g. pressure class, except as noted, per SMACNA requirements.

D. Fabric Ductwork

1.03 QUALITY ASSURANCE

A. Installer: A firm with at least three years of successful installation experience on projects similar to that required for this work.

B. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) for all work in this section.

C. ASHRAE Standards: Comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations, latest edition, for all work in this section.

D. NFPA Compliance: Comply with ANSI/NFPA 90A, " Standard for the Installation of Air-Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems".

E. Design Criteria:

1. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture. All gas-fired equipment shall be UL, ETL or CSA listed.

2. Supply all equipment and accessories in accordance with requirements of applicable national, state and local codes.

3. All items of a given type shall be products of the same manufacturer.

4. Scheduled equipment performance is minimum capacity required.

5. Scheduled electrical capacity shall be considered as maximum available.

6. Scheduled gas BTU input shall be considered as maximum available.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, weight, corner or mounting point weights, furnished specialties and accessories; and installation and start-up instructions. Product data shall include applicable product listings and standards.

B. Record Drawings: At project closeout, submit Record Drawings of Installed ductwork, duct accessories, and outlets and inlets in accordance with requirements of Division 1.

PART 2 - MATERIALS

2.01 GENERAL

A. All standing seams and transverse joints in ALL sheet metal ductwork shall be covered with 4-inch wide strip of 6-ounce canvas and lagging adhesive to assure airtight joints. Pressure-sensitive tapes not acceptable.

2.02 TWO-INCH PRESSURE CLASS DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discoloration, and other imperfections, including those which would impair painting.

B. Sheet Metal Ductwork: Except as otherwise indicated, fabricate ductwork with commercial grade of galvanized steel.

C. Internal Duct Lining:

1. Provide internal duct lining for the following;

   Rectangular Supply air ducts
   Rectangular Return air ducts

2. Linings shall be 1-1/2 inches thick, 1-1/2-pound density with matt facing. Adjust duct sizes to accommodate liner and to give net internal dimensions shown on Drawings.

3. Cement duct liner in place with nonflammable, nonhardening duct adhesive. Seal up all raw edges of insulation inside ductwork with adhesive.

4. Provide sheet metal weld pin fasteners and washers on all duct work on 18-inch intervals with the first row within 3 inches of the leading edge of each piece of insulation and 4 inches from corners. No substitutions on fastening method will be allowed.

5. Duct liner and adhesive shall not exceed flame-spread rating of 25 and smoke-developed rating of 50, all in conformance with NFPA 90A.

Manufacturer:	**Product:**
Owens-Corning Fiberglass Corp.	Aeroflex
John Manville Corp.	Linacoustic
Fosters	85 - 20
Swifts	7336

D. Round supply ductwork and fittings shall be spiral lockseam equal to “United McGill” Uni-Seal duct.

E. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.

2.03 TWO-INCH PRESSURE CLASS FABRICATION

A. Shop fabricate ductwork in 4-, 8-, 10-, or 12-foot lengths, unless otherwise indicated or required, to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

B. Shop fabricate ductwork of gauges and reinforcement complying with SMACNA HVAC Duct Construction Standards, latest edition.

C. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with enter-line radius equal to 1.5 times associated duct width and fabricate to include turning vanes in elbows where shorter radius in necessary. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.

D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section “DUCT ACCESSORIES” for accessory requirements.

2.04 MISCELLANEOUS DUCTWORK MATERIALS

A. Provide miscellaneous materials and products of types and sizes indicated, and where not otherwise indicated, provide requirements as listed in the latest SMACNA manuals, including proper connection of ductwork and equipment.

B. Fittings: Unless otherwise shown on Drawings, following fittings shall be used: two-piece, die-stamped, 45-degree to 90-degree elbows for sizes up to 8 inches; five-piece, 90-degree elbows for sizes over 8 inches; conical tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style.

C. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

D. Duct Joints: Joint and seal prefabricated, factory-build ducts, fittings, and couplings in strict accordance with duct manufacturer’s instructions. Install duct sealers, pop rivets or sheet metal screws and canvas and Arabol on each joint. Duct sealer shall be fire retardant. Sheet metal screw for joints shall be minimum #10 size galvanized.

E. Duct Access: Provide access panel sections in prefabricated, factory-build ducts for access to fire dampers, control equipment, etc. as specified in Duct Accessories Section. Access panel size shall be duct diameter wide by duct diameter high for all ducts under 24 inches. Ducts over 24 inches in diameter shall have 24-inch by 18-inch access panels. Minimum size access panels shall be 6 inches by 6 inches.

F. Fabric Duct Air Dispersion System:

1. Duct: Fabric duct shall be constructed of inherently fire resistant polyester fabric complying with flame spread and smoke development index requirements of NFPA 90A when evaluated in accordance with UL 723 or other standard acceptable to authorities having jurisdiction. Treated or laminated fabric is not acceptable. Fabric shall be classified according to ICC AC167 and UL 2518. Fabric weight shall be minimum 6.75 oz./sq. yd. as tested per ASTM D3776. Duct shall be designed for inlet static pressure range of 0.25-3.0 in. wg. Fabric shall withstand without damage temperature range of 0-180 degrees F. Fabric air permeability shall be 0.5 CFM per sq. ft. when tested according to the requirements of ASTM D737.

    a. Linear vent shall consist of round, open orifices in duct fabric, sized and spaced per Drawings, or as recommended by the manufacturer.
    b. Duct color shall be selected by Architect from among manufacturers' available colors.

2. Duct Shape Retention System: Provide duct with shape retention system consisting of removable, round, 360 degree hoops, placed inside duct and spaced at 5 ft. o.c., or as recommended by fabric duct system manufacturer.

3. Duct Connections: Provide fabric duct system with hardware for duct inlet connection to metal duct. Inlet connection shall include zipper for removal or maintenance of duct. Duct sections and end caps shall be provided with zippers for connection, removal, and maintenance, number and location as normally provided by the manufacturer for the size and arrangement of duct as shown on Drawings.

4. Provide system with airflow, pressure control, and balancing devices as shown on Drawings and Drawing schedules.

5. Mounting: Provide fabric duct system with hardware for galvanized cable suspension system detailed on Drawings. Provide hanger attachment points on fabric duct, with locations compatible with duct suspension system detailed on Drawings.

6. Warranty: Provide with manufacturers' minimum 10 year warranty.

7. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. DurkeeSox.
    b. DuctSox.

8.

PART 3 - EXECUTION

3.01 INSTALLATION OF DUCTWORK

A. Assemble and install ductwork in accordance with recognized industry practices, which will achieve air tight (leakage class 12 for 2-inch pressure class) and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8- inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type, which will hold ducts true to shape and to prevent buckling.

B. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct-plus- insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1-1.2 inches.

C. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards." latest edition, hangers and supports sections. Where special hanging of duct work is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.

D. Seal ductwork after installation to seal class required and method prescribed in SMACNA "HVAC Leakage Test Manual", latest edition.

3.02 CLEANING AND PROTECTION

A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances, which might cause corrosive deterioration of metal or where ductwork is to be painted.

B. Temporary Closure: At ends of ducts, which are not connected to equipment or air distribution devices as time of ductwork installation, provide temporary closure of polyethylene film or other covering, which will prevent entrance of dust and debris until time connections are to be completed.

C. All existing ductwork and equipment to be reused shall be cleaned as follows:

1. The contractor shall comply with and follow all approved National Air Duct Cleaning Association (NADCA) standards.

2. Duct cleaning shall be performed with a proper truck vacuum with a high velocity airflow, which should include gentle, well-controlled brushing at duct surfaces. The contractor shall brush; scrape, air wash, and/or power wash the system until properly cleaned, as determined by SUSD representatives.

3. The contractor will remove, clean and reinstall all diffusers and vent grills.

4. If the contractor must gain additional access to duct work, access doors of an approved type shall be installed. Approval must be obtained from SUSD prior to installation.

5. All filters on existing HVAC systems shall be removed and disposed of prior to cleaning of the HVAC units. The contractor shall furnish and install new 2-inch thick non-pleated fiberglass throwaway filters with cardboard holding frames upon completion of the cleaning process. One replacement filter for each unit will be provided to the site for future use.

6. All air conditioning coils shall be cleaned with a detergent solution specifically designed for this purpose. This procedure shall be repeated until all coils are rendered clean.

7. All plenum area interior walls, ceilings, and floors shall be power vacuumed. Plenum areas shall be inspected and those areas disturbed sealed airtight by approved method. The contractor shall notify SUSD prior to sealing any plenum areas.

8. Fan and fan assemblies shall be thoroughly cleaned by power vacuuming and power washing, degreasing, scrapping, and wire brushing where required.

9. All volume air velocity (VAV) and exhaust systems shall be thoroughly cleaned if applicable.

10. All evaporators drain pans and condensate lines shall be cleaned.

11. All condenser fan motors and blower motors shall be oiled and bearing lubricated if necessary.

12. The heat exchanger shall be inspected by a qualified HVAC service technical with a minimum of five- (5) year's experience. The contractor before the issuance of a purchase order number will submit HVAC Technical qualification statements to SUSD. Any deficiency noted shall be reported to SUSD.

13. The contractor and SUSD shall conduct a routine inspection of all ducts and related equipment after cleaning. If, as a result of said inspection, any dangerous or defective condition exits, the Contractor shall advise SUSD of condition in writing. Inspection as follows: Fire dampers, springs, and fusible links, duct and vane surfaces, duct liners and insulation, coils and fans, condensation drains, combustion chambers and support structures of the ducts and equipment.

14. Each room shall be restored to its original condition and shall be ready for occupancy upon completion of each day of contracted work.

15. An SUSD employee shall be on the premises during the performance of contracted work and shall ensure access to all areas and provide security of each accessed.

16. Only the areas actually undergoing contracted work shall be unlocked and shall be immediately secured upon completion of contracted work in that area.

17. The contractor shall immediately notify SUSD employees on site should any unauthorized or unknown person (s) enter the work area during performance of contracted work.

18. This work shall be performed typically after normal working hours, unless otherwise requested by SUSD.

3.03 OPERATION TEST

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.04 CLEANING UP

A. Upon completion of work remove materials, equipment, apparatus, and tools, and leave premises clean, neat, and orderly.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air turning devices.

B. Backdraft dampers.

C. Combination fire and smoke dampers.

D. Duct access doors.

E. Duct test holes.

F. Flexible duct connections.

G. Volume control dampers.

1.2 RELATED REQUIREMENTS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 23 05 53 – Identification for HVAC Piping and Equipment.

C. Section 23 31 00 - HVAC Ducts and Casings.

1.3 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2022.

B. NFPA 92 - Standard for Smoke Control Systems; 2022.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2022.

D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

E. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and hardware used. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Provide instructions for combination fire and smoke dampers.

1.5 PROJECT RECORD DOCUMENTS

A. Record actual locations of access doors and test holes.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES

A. Manufacturers:

1. ProRail, Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Airsan Corporation
4. Anemostat Products Division, Dynamics Corporation of America
5. Environmental Elements Corporation, Subs. Koppers Company, Inc.

B. Manufactured turning vanes with 2" single thickness curved blades set at 1-1/2" on-center mounted in 2" vane rails, self-aligning, hot dipped galvanized steel.

C. Turning vanes, vane rails and mounting shall be constructed and installed in accordance with the SMACNA "HVAC Duct Construction Standards".

2.2 BACKDRAFT DAMPERS

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.3 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:

1. Ruskin Company: www.ruskin.com.
2. Ruskin Manufacturing; Model FSD60FA or FSD60G (actuator accessible from rear) for sidewall grille application.
3. Ruskin Manufacturing; Model FSD36C for ceiling application.

B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

C. Provide factory sleeve and collar for each damper.

D. Multiple Blade Dampers: Fabricate with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

E. Operators: UL listed and labelled oil immersed with spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct and link to damper operating shaft. Provide circuitry to activate pilot light on remote key (test) switch located in corridor ceiling adjacent to damper.

F. All actuators for combination fire and smoke dampers or smoke dampers shall be rated for continuous "On" duty and shall have a cycle time requirement of no more frequently than every six months.

2.4 DUCT ACCESS DOORS

A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.

B. Access doors with sheet metal screw fasteners are not acceptable.

2.5 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.6 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections (Indoors): Fabric crimped into metal edging strip.

1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.

a. Net Fabric Width: Approximately 8-inches wide.

2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.

C. Flexible Duct Connections (Outdoors): Fabric crimped into metal edging strip.

1. Fabric: Ventfabrics Ventlon UL listed fire-retardant duPont's Hypalon coated woven glass fiber fabric to NFPA 90A, minimum density 26 oz per sq yd, sunlight, ozone and weather resistant.

a. Net Fabric Width: Approximately 6 inches wide.

2. Metal: 3 inches wide, 24 gage thick galvanized steel.

2.7 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Single Blade Dampers for Round Ductwork and Rectangular Ductwork up to 10 inches in Height: 16 gauge steel minimum.

C. Multi-Blade Damper for Rectangular Ductwork: 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; Model CD35 Manufactured by Ruskin. Provide Ruskin Model CD50 for installation in medium pressure ductwork and/or ducts with velocities exceeding 1500 FPM.

D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings, Ventlok Model 607. On multiple blade dampers, provide oil impregnated nylon or sintered bronze bearings.

E. 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.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before filters, before coils, at fans where not supplied with equipment access doors, at automatic dampers, at fire dampers, at combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 24 x 30 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install combination smoke and fire dampers in accordance with NFPA 92A.

G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

I. 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.

J. 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.

K. Provide label at access points to above ceiling and in-wall Air Duct Accessory locations. Refer to Section 23 05 53 Identification for HVAC Piping and Equipment.

END OF SECTION

SECTION 23 40 00 - HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Disposable, extended area panel filters.

B. Disposable panel filters.

1.2 RELATED REQUIREMENTS

A. A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section. Section 01 50 00 - Temporary Facilities and Controls: Filters for temporary heating and ventilating.

1.3 REFERENCE STANDARDS

A. AHRI 850 (I-P) - Standard for Performance Rating of Commercial and Industrial Air Filter Equipment; 2013.

B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2022.

C. UL 900 - Standard for Air Filter Units; Current Edition, Including All Revisions.

1.4 PERFORMANCE REQUIREMENTS

A. Conform to 1 Section 7.4.
   1. Dust Spot Efficiency: Plus or minus 5 percent.

1.5 SUBMITTALS

A. A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

C. Shop Drawings: Indicate filter assembly and filter frames, dimensions, motor locations, and electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate assembly and change-out procedures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Filters: One set of each type and size.

PART 2 PRODUCTS

2.1 FILTER MANUFACTURERS

A. American Filtration Inc: www.americanfiltration.com.

B. AAF International/American Air Filter: www.aafintl.com.

C. The Camfil Group: www.camfilfarr.com.

D. TriDim; A Mann+Hummel Company: www.tridim.com.

2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS

A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
   1. Frame: Non-flammable.
   2. Nominal thickness: 1 inch.

B. Minimum Efficiency Reporting Value (MERV): 13, when tested in accordance with ASHRAE Std 52.2.

C. Rating, per ASHRAE Std 52.2:
   1. Weight arrestance: >98 percent.
   2. Initial resistance at 300 FPM face velocity: 0.25 inch WG.
   3. Recommended final resistance: 1.0 inch WG.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

C. Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.

D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

END OF SECTION

SECTION 23 74 15 - PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Packaged rooftop unit.

B. Unit controls.

C. Roof mounting curb and base.

1.2 RELATED SECTIONS

A. Refer to the General Conditions, Special Conditions and Division 1 General Requirements. The requirements of these sections apply to this section.

B. Section 23 40 00 - HVAC Air Cleaning Devices.

C. Section 23 09 33 – Facility Management System; Control components, EMCS.

E. Division 26 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

A. AHRI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute; 2022.

B. AHRI 270 - Sound Rating of Outdoor Unitary Equipment; Air-Conditioning, Heating and Refrigeration Institute; 2022.

C. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilation Systems; National Fire Protection Association; 2022.

D. Unit shall be designed to conform to ASHRAE 15, latest revision, and in accordance with UL 2022.

E. Units shall be UL tested and certified in accordance with ANSI Z21.47 Standard. Units may be ETL listed.

F. New roof curbs shall be designed to conform to NRCA Standards.

G. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

1.4 SUBMITTALS

A. B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Provide construction details, motor horsepower, brake horsepower and filter (size, capacity and efficiency). Submit complete fan performance charts and curves marked to indicate anticipated operating points for intended application. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.7 WARRANTY

A. See Section 01 78 36 - Warranties, for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigeration compressors.

C. Provide a full parts and labor warranty for one year from the date of substantial completion or 24 months from shipment, whichever occurs first.

D. Provide five-year limited warranty for heat exchanger including materials only.

1.8 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. Provide one set of new filters at the completion of construction and one set of extra filters.

C. Furnish one complete set of fan motor drive belts.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Packaged Air Conditioning Units (3 to 12-1/2 Tons)
   1. Basis of Design: The Trane Company.
   2. Rheem Manufacturing Company; RUUD.
   3. or approved equal.

B. Substitutions: As indicated under the general and/or supplemental conditions of these specifications. Mechanical contractor shall be responsible for electrical and mechanical changes to the structure when using a product other than the specified product. General Contractor shall be responsible for Structural Changes to the structure when using a product other than the specified product. Costs associated with Changes to the DSA approved plans and obtaining DSA approval shall be paid for by the General and Mechanical Contractors. As built drawing changes are the responsibility of the mechanical contractor.

C. Manufacturer shall provide at a minimum:
   1. Manufacturer shall maintain a minimum of (8) factory direct service technicians within a 75 mile radius from the jobsite to ensure timely on-site assistance.
   2. Manufacturer shall maintain a parts store within a 75 mile radius to ensure availability of replacement parts and minimize equipment downtime.
   3. Manufacturer shall provide a factory direct service agency with 24 hour Emergency Support.
   4. Manufacturer shall provide local factory direct representative for engineering, installation, controls and design support.
   5. Equipment shall be supplied directly by manufacturer. Manufacturer dealer and/or representatives will not be acceptable
   6. Equipment startup up shall be performed by a factory direct service technician.

2.2 PACKAGED ROOFTOP AIR CONDITIONING UNITS (3-10 TON)

A. GENERAL UNIT DESCRIPTION
   1. Units furnished and installed shall be gas/electric packaged rooftops as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on AHRI Standard 210. Units shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors and unit controls and drives.
   2. Units shall be 100% factory run tested and fully charged with refrigerant.
   3. Units shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
   4. Units shall be convertible airflow design as manufactured.

5. Units shall operate between 0 deg F and 115 deg F.

B. UNIT CASING
1. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18 gauge with access doors and removable panels of minimum 20 gauge.
2. Provide coil guards.
3. Units cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.
4. Cabinet construction shall allow for all service/ maintenance from one side of the unit.
5. Cabinet top cover shall be one-piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.
6. Access Panels: Water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
7. Units base pan shall have a raised 1 1/8-inch-high lip around the supply and return openings for water integrity.
8. Insulation: Provide 1/2-inch-thick fiberglass insulation with foil face on all exposed vertical panels and top covers in the indoor air sections. The insulation shall be fire-retardant and odorless. All edges must be captured so that there is no insulation exposed in the air stream. The base of the unit shall be insulated with 1/2 inch, 1 pound density foil faced, closed-cell material.
9. Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.
10. The base of the unit shall have 3 sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.

C. AIR FILTERS
1. Factory installed 2 inch 30% efficiency throwaway filters.

D. FANS AND MOTORS
1. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.
2. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.
3. Provide units 5 tons and below with direct drive, multiple speed, dynamically balanced supply fans. Provide oversized motors where necessary to meet scheduled external static pressures.
4. Provide units 6 tons and above with belt driven, supply fans with adjustable motor sheaves and an adjustment idler-arm assembly for quick adjustment to fan belts and motor sheaves. Provide oversized motors where necessary to meet scheduled external static pressures.
5. Outdoor and Indoor Fan motors shall be permanently lubricated and have internal thermal overload protection.
6. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.
7. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

E. GAS FIRED HEATING SECTION
   1. Completely assembled and factory installed heating system shall be integral to unit, UL or CSA approved specifically for outdoor applications for use downstream from refrigerant cooling coils. Threaded connection with plug or cap provided. Provide capability for gas piping through the side of the unit.
   2. Heating section shall be factory run tested prior to shipment.
   3. Induced draft combustion type with direct spark ignition system.
   4. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Provide flame rollout switches.
   5. Induced draft blower shall have combustion air proving switches and built-in thermal overload protection on fan motor.
   6. Heat Exchanger: Provide tubular section type constructed from 18-gauge aluminized steel.
   7. Burners: Burners shall be of the in-shot type constructed of stainless steel.
   8. Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.

F. EVAPORATOR AND CONDENSER COILS
   1. Provide 5/16” copper tubes, mechanically bonded to configured aluminum plate fins.
   2. Factory pressure test each circuit at 450 psig and leak test at 200 psig.
   3. Provide standard IAQ sensitive removable, reversible, cleanable, double sloped drain pan for base of evaporator coil constructed of stainless steel.

G. COMPRESSORS
   1. Compressor(s): Provide direct drive scroll compressors operating at 3600 rpm with centrifugal type oil pumps. Motors shall be suction gas cooled and have a voltage utilization range of +/- 10% of unit nameplate voltage.
   2. Crankcase Heaters shall be factory installed.

H. REFRIGERANT CIRCUITS
   1. Provide each refrigerant circuit completely piped with liquid line filter-drier, suction and liquid line pressure ports.
   2. Provide factory installed thermal expansion valve (TXV) for each refrigerant circuit.

I. ECONOMIZER WITH BAROMETRIC RELIEF
   1. Provide a fully integrated factory-installed 100% modulating outside air economizer with unit return and barometric relief air dampers, minimum position setting, preset linkage, wiring harness with plug, and fixed dry bulb control. The factory installed economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.
   2. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.
   3. Provide direct acting direct drive actuators as specified in Section 23 09 33,
   4. Where indicated on plans provide centrifugal blower power exhaust per “Modulating and Power Exhaust Economizer” specification requirements.

J. UNIT CONTROLS AND POWER REQUIREMENTS
   1. Unit manufacturer shall provide microprocessor controls as standard that provide the following features and diagnostics preprogrammed and installed at the factory:
      a. Have built in anti-short cycle timer, time delay relay, and minimum on time controls.
      b. Have Adaptive Control that will allow the unit to continue to operate at predetermined temperature set points if a component goes astray.
   2. Provide unit with single-point power entry.
   3. BACnet Communications: The BACnet communications interface allows the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

K. ROOF CURB

1. Units shall be supplied with 34-inch-tall spring isolated, structurally calculated vibration isolation roof curb with hold down brackets, 16-gauge perimeter made of zinc coated steel with supply and return air gasketing and wood nailer strips. Curb shall be shipped fully assembled. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.

    a. Basis of Design: Micrometal Corporation.
    b. ProVent.
    c. or approved equal.

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.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.3 STARTING EQUIPMENT AND SYSTEMS

A. Provide factory start-up and supervise installation by Contractor.

B. Manufacturer shall furnish a factory trained service engineer without additional charge to start the unit(s). Package rooftop unitary manufacturers shall maintain service capabilities no more than 100 miles from the jobsite.

END OF SECTION

SECTION 26 00 00 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnish and install all necessary labor, materials, tools and equipment to perform and completely finish the work according to the intent of this specification, and the accompanying drawings.

B. Furnish and install any incidental work which can reasonably be inferred as required and necessary to provide complete and workable systems.

C. Provide connections of all equipment specified under these sections and other Divisions including Divisions 22 (Plumbing) and 23 (HVAC) including installation and connection of all motors, relays, remote starters, etc.

D. The requirements of the General and Supplemental Conditions, and Division 01 apply to Divisions 26, 27 and 28, and these specifications. All sections in Divisions 26, 27, and 28 are interrelated. Work specified in other sections, as applicable, shall apply to all work hereunder.

1.2 LOCAL CONDITIONS

A. Examine site; verify dimensions and locations against drawings and become informed of all conditions under which work is to be done before submitting proposal. No allowance will be made for extra expenses because of omission on Contractor's part to include cost of work under prevailing conditions.

B. Information shown relative to services is based upon available records and data shall be regarded as approximate only. Minor deviations found necessary to conform with actual locations and conditions shall be made without extra cost.

C. Extreme care shall be exercised in excavating near existing utilities to avoid any damage thereto. It shall be the contractor's responsibility to verify existing underground utilities prior to digging anywhere. Information provided on these plans indicating existing conditions shall only be used as reference, and shall not be deemed considered accurate. Any damage to existing utilities done by the contractor shall be repaired and/or replaced by the contractor at their expense to its pre-damage condition.

1.3 PERMITS AND INSPECTIONS

A. Obtain and pay for all permits and service charges required in installation of the work. Arrange for required inspections and secure approvals from authorities having jurisdiction.

B. During its progress, work shall be subject to inspection by Project Inspector.

1.4 CODES AND STANDARDS

A. Work and materials shall be in full accordance with California Occupational Safety Health Act (CAL-OSHA), California Electrical Code (CEC), State Fire Marshal, Electrical Safety Orders (Title 8, Subchapter 5), the National Fire Protection Association, California Building Code (CBC); California Code of Regulations - Title 24 and other applicable State or local laws or regulations. Nothing in the Drawings or Specifications shall be construed to permit work not conforming to these codes.

B. Electrical materials shall bear the label of, or be listed by, the Underwriter's Laboratories (UL) unless of a type for which label or listing service is not provided.

C. Materials and components shall conform to Industry Standards, including:

NEMA	-	National Electrical Manufacturer's Association
ANSI	-	American National Standards Institute
ASTM	-	American Society For Testing Material Association
IPCEA	-	Insulated Power Cable Engineer's Association
CBM	-	Certified Ballast Manufacturers

D. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge.

1.5 REVIEW OF MATERIALS

A. Prior to commencement of Work and within 35 days after award of contract, submit for approval in accordance with General Conditions all equipment and materials to be furnished.

1. Equipment/Product submittals shall be bound and indexed and shall include a table of contents listing all equipment submitted. The table of contents shall include: Project designation, submittal number, submittal name including specification section, date, and include manufacturer, model number, reference specification paragraph or sheet detail number, description, and page location. Where a group or series of products are submitted, each item does not have to be listed, only the series need to be identified. Example:

Project:
Submittal No.
Submittal Name:
Date:

Page(s)	Manufacturer	Model No.	Detail No.	Spec para., Description
1-12	**XYZ Corp**	**123ABC**	**2.05**	**Control pane**
13,14	**XYZ Corp**	**456DEF**	**2.06-A**	**Power supply**
15	**ABC Corp**	**789GHK**	**A/E9.5**	**Rack**
16,17	**Cantex**	**PVC-40**	**2.01**	**PVC conduit**
18	**Steel City**	**XYZ series**	**2.02**	**Steel fittings**

2. Shop drawings submittals shall be neat and professionally done using CAD (computer aided drafting), hand-drawn submittals will not be accepted. Shop drawings shall have sufficient information to clearly indicate work to be performed and be complete including device/equipment locations, wire sizes, wire types and number of wires, symbol list or legend, point-to-point connections, wiring diagrams, and equipment anchorage detail where needed. Shop drawings shall utilize the same size paper as the Bid set of plans.

3. Electronic submittals in PDF format are allowed and preferred.

B. Substitutions:

1. Only one request for substitution will be considered on each item of material or equipment. No substitutions will be considered thereafter. Substitutions will be interpreted to be all manufacturers other than those specifically listed by model or catalog number. Should the original submittal of a proposed substitution be rejected, the specified item shall be furnished.
2. Submit complete information or catalog data to show equality of equipment or material offered to that specified. Identify which product is being substituted in the specifications and/or the plans and provide analysis as indicating either it "Complies" or that it "Does Not Comply" and providing a reason. Each Specification paragraph shall be provided with this analysis. No substitutions will be allowed unless requested and approved in writing. Materials of equal merit and appearance, in the opinion of the Engineer, will be approved for use. Engineer reserves the right to require originally specified item.
3. Acceptance of a substitute is not to be considered a release from the Specifications. Any deficiencies in an item, even though approved, shall be corrected by the Contractor at his expense.
4. Responsibility for installation of approved substitution is included herein. Any changes required for installation of approved substituted equipment shall be made without additional cost to Owner.

C. Where it is in the best interest of the Owner, Engineer may give written consent to a submittal received after expiration of designated time limits, or for an additional resubmittal.

D. Submit for approval in ample time to avoid delay of construction, shop drawings or submittals on all items of equipment and materials covered in list mentioned above. Submit in accordance with General Conditions in a complete package; partial submittals will not be considered.

E. Failure to comply with any of the preceding requirements will necessitate that the specified materials be submitted and supplied.

1.6 RECORD DRAWINGS

A. Upon completion of Work, furnish Engineer with Autocad file, PDF file, and one printed full-size hardcopy upon which shall be shown all Work installed under contract including any work which are not in accordance with Original Contract Drawings. Autocad files shall be 2004 or later version, with external references bound to its parent drawing. Provide a separate PDF file for each sheet, do not combine all sheets into a single file. Furnish digital files on a USB flash drive or CD.

1. The above shall also include shop drawings.

B. All symbols and designations used in preparing Record Drawing shall match those used in Contract Drawings.

C. Show all buried and concealed conduit, stub-outs, etc. Locate all buried conduit and stub-outs by dimensions from permanent, easily located and identifiable portions of structure; also, dimension ends of stub-outs, etc. Note depth of buried items below grade.

1.7 ADDENDA AND CHANGE ORDERS

A. Changes in the plans and specifications shall be made by Addenda or Change Orders signed by the Architect and Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials mentioned herein or on drawings require that each item listed be provided and of quality noted, or an approved equal. All material shall be new, full weight and standard in all respects and in first-class conditions. Where possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.

B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein. Dimensions, sizes and capacities shown are a minimum and shall not be changed without permission of Engineer.

PART 3 EXECUTIONDRAWINGS AND COORDINATION

A. Examine Drawings and Site; be familiar with types of construction where electrical installation is involved. Work shall be neatly installed in a workmanlike manner in accordance with NECA Standard of Installation. Work shall be coordinated with other trades to avoid conflicts. Clarifications will be made by Engineer and minor adjustments shall be made without additional cost to Owner. Obtain ruling from Engineer concerning any obvious discrepancies or omissions in work before bidding. All work involved in correcting obvious errors or omissions after award of Contract shall be performed as directed by Engineer without additional cost to Owner.

B. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Drawings and Specifications are for assistance and guidance, and exact locations, distances, levels, etc., will be governed by Site.

C. All equipment (devices, conduits, boxes, etc.) shall be flush or semi-flush mounted unless otherwise noted. Where conditions do not allow flush mounting and where acceptable to the Architect, equipment may be surface mounted.

3.2 WORKING SPACE

A. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders. In general, provide 36 inches minimum clear work space in front of panelboards and controls of 120/208 volt systems and 42 inches minimum for 277/480 volt systems.

3.3 CARE AND CLEANING

A. All broken, damaged or otherwise defective parts shall be repaired or replaced without additional cost to Owner. Work shall be left in a condition satisfactory to Engineer. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work. Systems and equipment shall be left in a satisfactory operating condition.

B. All surplus materials and debris resulting from this work shall be cleaned out and removed from site; this includes surplus excavated material.

3.4 EXCAVATING AND BACKFILLING

A. Excavate and backfill as required for installation of electrical work. Restore all surfaces, roadways, sod, walks, curbs, walls, existing underground installation, etc., cut by installations to original condition in an acceptable manner. Maintain all warning signs, barricades, flares and lanterns as required by the Safety Orders and local ordinances.

B. Excavation: Dig trenches straight and true to line and grade, with bottom clear of any rock

points. Minimum conduit depth of pipe crown shall be 24 inches below finished grade.

C. Backfill: Support conduits with 2" sand bedding at bottom of trench. Provide sand backfill from bottom to 12" below finished grade. The top 12" to be local fine earth material free of rubble, rubbish or vegetation. Trenches shall be backfilled and compacted to 90% (per ASTM D1557) (95% under AC pavement and all roadways) of maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3.5 PROTECTION

A. In performance of work, protect work from damage. Protect electrical equipment, stored and installed, from dust, water or other damage.

3.6 EQUIPMENT IDENTIFICATION

A. Panelboards, remote control switches, terminal boxes, etc., shall be properly identified with a descriptive nameplate. Nameplate shall be made of 3/32-inch laminated plastic with black background and white letters. Size of letters shall be 1/4-inch-high for equipment in device box or boxes 12" or smaller, and 1/2-inch-high for panelboard, terminal can, or larger items. Letters shall be machine engraved. Punched strip type nameplates and cardholders in any form are not acceptable. Nameplates shall be attached with oval head machine screws tapped into front panel.

B. Indicate type of equipment and equipment designation, ex. "PANEL-XXX", "MAIN SWITCHBOARD-XXX", "TRANSFORMER-XXX", "SIGNAL-XXX", "TV-XXX", "EF-1", "AC-1", etc.

C. Switchgear, Distribution Panels, and Panelboards shall be labeled with “FED FROM PANEL-XXX”, “PANEL-XXX”, “VOLTAGE”, and “AMPS”, and “X-PHASE”.

D. Label receptacles and light switches with printed plastic adhesive letters on cover plates. Labels shall indicate “PANEL-XXX” and “Circuit Number”.

3.7 RUST INHIBITOR

A. Channels, joiners, hangers, straps, clamps, brackets, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of one hundred twenty (120) hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized.

3.8 EQUIPMENT PADS

A. Concrete reinforced pads for mounting of equipment (i.e. switchboard, transformers, freestanding panels, etc.) shall be minimum 3000psi, 6" thick with #4 rebars at 12" on center each way. Rebars shall be centered in pad. Pad shall extend 2" beyond equipment and 1.5" above surrounding area. Backfill and compact to 95% maximum dry density at optimum moisture content in layers not to exceed 6" when compacted.

3.9 EQUIPMENT ANCHORAGE

A. Seismic Anchorage of Electrical equipment shall conform to the regulations of 2019 CBC (California Building Code) and ASCE 7-16, sections 13.3, 13.4, and 13.6. All equipment shall be braced or anchored to resist a horizontal force acting in any direction using the following criteria:

1. The total design lateral seismic force shall be determined from section 1614A of 2019 CBC and 13.3 ASCE 7-16. Forces shall be applied in the horizontal directions which results in the most critical loading for design.
2. The value if Ap (component Amplification factor) and Rp (component response modification factor) of section 13.3.1 ASCE 7-16 shall be selected from section 13.6-1 ASCE 7-16. The value of Ip (seismic importance factor) shall be selected from 13.1.3 ASCE 7-16.

B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the structural engineer and the field representative of the Division of the State Architect.

3.10 ARC FLASH

A. Electrical equipment such as switchboards, panelboards, load centers, motor control centers, industrial control panels, meter centers shall be field marked to warn persons of potential electric arc flash hazards per CEC 110.16 and NFPA 70E Standard for Electrical Safety in the Workplace. Minimum label wording shall be as follows:

DANGER
Arc Flash and Shock Hazard.
Appropriate PPE Required.
Do not operate controls or open doors without appropriate
personal protection equipment.
Failure to comply may result in injury or death.

3.11 TEST

A. Test all wiring and connections for continuity and grounds; where such test indicate faulty insulation or other defects, locate, repair and retest. Balance loads at panelboards. Furnish all testing equipment.

3.12 CLOSING OF AN UNINSPECTED WORK

A. Do not allow or cause any of work installed hereunder to be covered up or enclosed before it has been inspected and approved.

B. Should any work be enclosed or covered up before it has been approved, uncover such work and after it has been inspected and approved, make all repairs necessary to restore work of others to conditions in which it was found at time of cutting, all without additional cost to Owner.

3.13 WARRANTY

A. All materials and installation shall be provided with a minimum of one (1) year warranty which shall include replacement parts, labor, retesting, and travel to and from the job site. The warranty period shall begin after final acceptance of the project. The warranty shall cover but

is not limited to the following:

1. Defective workmanship and installation.
2. All System components, devices, conduit, wires, etc.
3. Manufactured items such as light fixtures, receptacles, switchboard, panelboard, transformer, switches, etc.
4. Basic materials such as conduit, wires, boxes, cabinets, etc.

B. Certain manufactured items will have longer warranty periods. Refer to specific item and specification section for warranty information and terms.

END OF SECTION 26 00 00

SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SCOPE

A. The work of this Section consists of basic materials and methods for all work included under Divisions 26, 27, and 28. Additional specifications requirements for electrical work are specified under other sections of Divisions 26, 27 and 28 and where those requirements differ from the requirements of this Section, they shall govern.

1.2 SUBMITTALS

A. Submit product data per Section 26 00 00.

PART 2 PRODUCTS

2.1 CONDUIT

A. Rigid Steel Conduit: Standard weight, mild steel pipe, zinc coated on both inside and outside by a hot dipping or sherardizing process. Inside and outside of conduit shall be finished with a protective coating. All threads galvanized after cutting. Meets UL 6, UL Card #DYIX, and ANSI C80.1.

B. Intermediate Metallic Conduit (IMC): Intermediate weight, mild steel pipe, meeting same requirements for finish and material as rigid steel conduit. Meets UL 1242, UL Card #DYIX, and ANSI C80.6.

C. Electrical Metallic Tubing (EMT): Cold rolled steel tubing, hot-dipped galvanized, with zinc coating on outside and protective lubricating coating on inside. Fittings shall meet same requirements for finish and material as EMT. Meets UL 797 and ANSI C80.3.

D. Flexible Conduit: UL Listed. Flexible steel, zinc coated on both inside and outside by hot dipping or sherardizing process. Liquid-tight conduit shall be galvanized with extruded polyvinyl covering and with watertight connectors, sunlight resistant, direct burial rated. Flexible steel conduit less than ½" shall not be used except that 3/8" shall be permitted in lengths not in excess of 6 feet as part of a listed assembly or for tap connections to lighting fixtures as required in CEC Section 410-67©. Flexible conduit to be one continuous length, no couplings. AFC Liquid-Tuff Type-LFMC and AFC Reduced Wall Flexible Steel Conduit, or equal.

E. PVC Conduit:

1. Type 40, 90°C, UL listed, composed of polyvinyl chloride, conforming to NEMA TC-2, Fed Spec WC1094A, UL651 Standards. Material shall have minimum tensile strength of 6,500 psi at 73.4°F, flexural strength of 12,500 psi and compressive strength of 9,000 psi per ASTM testing. PVC conduit shall be suitable for direct burial without concrete encasement. Fittings shall be of same manufacture. All joints shall be solvent welded.
2. Type 80, similar to type 40 except with extra heavy wall.
3. Only manufactured elbows/bends shall be used. Where field bends have to be made, obtain prior approval by the engineer.

F. Raceway Fittings:

1. Rigid Steel Conduit: Fittings, such as couplings, connectors, condulets, elbows, bends, etc., shall be subject to same requirements as for rigid steel conduit. Couplings and unions shall be threaded type, assembled with anti-corrosion, conductive anti-seize compound at joints made absolutely tight to exclude water. Connectors shall be threaded hubs with bonding insulated metallic bushings. Unions shall be equal to Crouse Hinds UNY or UNF.
2. IMC: Fittings shall be as specified for rigid steel conduit.
3. EMT: Fittings shall be steel, box connectors shall have insulated throat. Connectors and couplings to be compression type.
4. Flexible Metallic Conduit: Connectors to be insulated. Metallic connectors (except for liquid-tight) shall be steel “squeeze” type via a screw, Steel City XC-90X and XC-49X series. Liquid-tight metallic connectors shall be watertight approved for such use.
5. Bushings: Metallic insulated type. Weatherproof or dust-tight installations; liquid-tight with sealing ring and insulated throat, OZ/Gedney type “KR”.
6. Expansion and Deflection Fittings: OZ/Gedney, Type “DX” or accepted equal.
7. All box connectors to be insulated throat type.
8. Conduit Straps: Galvanized steel, 2-hole straps. 1-hole straps may be used for conduit sizes 1” and smaller concealed in wall or above ceiling.
9. PVC Conduit: Fittings shall be same grade of material as conduit, solvent welded to conduit.

G. Metallic conduits, raceways, and fittings shall be listed and approved as a grounding means.

2.2 BOXES

A. Galvanized one-piece or welded pressed steel type. Boxes for fixture shall not be less than 4” square and shall be equipped with fixture stud. Boxes shall be at least 1-1/2” deep, 4” square for 1 or 2 gang devices, with plaster rings and gang box with gang cover. Boxes mounted in wall or ceiling finished with gypsum board shall be furnished with ¾” deep plaster rings. Use screws and not nails to support/secure outlet boxes. Provide blank cover plates for all boxes without devices.

1. 1-gang and 2-gang outlet and junction boxes installed exposed outdoors shall be weatherproof type FS, FD, WS, WD die cast metal or aluminum boxes, Appleton or equal. Plug all unused hubs.
2. Provide an equipment grounding pigtail at all receptacle, switch, and device outlet boxes. Ground conductor size to match circuit overcurrent protection complying with CEC.
3. Outlet boxes for data, telecommunications, video, and TV outlets shall be 4 11/16” square x 2.125” deep.
4. Outlet boxes containing #8, #6, or #4 AWG wires shall be a minimum 2.125” deep per CEC.

B. Junction boxes located outdoors, or in wet or damp locations shall be rated NEMA-3R, with hinged door and pad-locking tabs.

C. Floor boxes shall be one-gang or multi-gang recessed, fully adjustable with brass lids, cover plates, rings, flanges, etc. for respective tile or carpet floor finish, meet UL514A & UL514C scrub water exclusion requirements for tile and carpet floors. For carpet floors, provide with carpet flange. For “hard” floors such as tile or wood, the top of the cover shall be flush with the top of the finished floor. Receptacle covers shall have individual flip-lids with screw lock. Junction boxes shall have screwed on plugs.

1. Grade Level or Below: Watertight and concrete-tight of cast iron construction, Walker 880CS series or equal.
2. Above Grade Level: Concrete-tight of stamped steel construction, Walker 880S series or equal.
3. Raised Wood Floors: Steel box, Walker 880W series or equal.

D. Equipment furnished by other trade but require electrical connection shall be provided with appropriate backbox.

2.3 WIRES

A. Wire shall be copper only, manufactured by General Cable Co., Rome, General Electric Co., or Anaconda. Wire shall be rated 90 degrees C for both dry and wet locations, THWN-2, XHHW-2, or RHW-2 insulation. 90 degrees C THHN may be used in dry and damp locations. Wire installed in high temperature areas, including branch circuits in or above roof insulation or in fluorescent ballast channel, shall have type RHW-2 or XHHW-2 90° insulation.

1. Feeders sized #2 and larger routed below grade, extending beyond or outside the building foundation line shall use types XHHW-2, THW-2, or RHW-2 insulation, 90 degrees C dry and wet rated.

B. Wire shall be Code type copper wire of not less than 98% conductivity. Wires #8 gauge and larger, shall be stranded. Wires shall bear the Underwriters' label, be color coded and be marked with gauge, type and manufacturer's name on 24" centers. Wires smaller than #8 may be solid or stranded. Where stranded wire is used, provide solid pigtail for connection to screw terminals of receptacles, switches, etc.

C. Color Coding to be as follows:

	208/120 Volts	480/277 Volts
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Grey
Ground	Green	Green

1. Switch legs shall use the same branch circuit phase color coding which they are connected to. IG ground wire shall be green with yellow tracer.

D. Bring wire to job in original unbroken packages. Obtain approval of inspector or Engineer before installation of wires.

2.4 WALL SWITCHES

A. Shall be "AC" rated, heavy duty, quiet type, rated 20 amperes at 277 volts A.C. Application of switches shall comply with CEC Section 380-8. Handles shall be bakelite; color shall be compatible with adjacent wall finish. Switches to be as follows:

Manufacturer	Single Pole	3-Way
A & H	1991	1993
Hubbell	1221	1223
P & S	20AC1	20AC3
Leviton	1221	1223

B. Weatherproof light switches shall have lever switch covers of die cast construction with gasket and gray finish. Hinged flip-lids are not acceptable.

2.5 CONVENIENCE OUTLETS

A. Shall be “Specification” grade rated 15 amperes at 125 volts, duplex, composition base with slots to accommodate parallel plug caps with grounding peg. Contact shall grip both sides of plug prongs. Where only one receptacle is connected to a 20 ampere circuit, a 20 ampere receptacle shall be used. Outlet shall be UL listed. Receptacles to be Hubbell or equal.

1. 15 Amp: Hubbell 5262 series Heavy Duty Industrial Grade, 8200 series for Hospital Grade.
2. 20 Amp: Hubbell 5362 series Heavy Duty Industrial Grade, 8300 series for Hospital Grade.
3. Other designations as noted below:
    a. Ground Fault: GFR
    b. Tamper Resistant: TR
    c. Weather Resistant: WR
    d. Isolated Ground: IG
4. Leviton 5252, 5352, 8200, and 8300 series can be considered equal.
5. Pass & Seymour 5252, 5352, 8200, 8300 series can be considered equal.

B. Provide devices with matching plates. Isolated ground (IG) receptacles shall be orange with matching color plate. Hospital grade receptacles shall have a distinctive “green” dot. GFI receptacles shall have a visible (light) indicator. Controlled receptacles shall be permanently and visibly marked with the universal power symbol and the word “CONTROLLED”.

C. All 15 and 20 Amp, 125V and 250V non-locking receptacles (NEMA 5-15, 5-20, 6-15, 6-20) located outdoors and/or in damp or wet locations shall be listed weather-resistant type. Weather resistant receptacles shall be the same grade or class as 15A and 20A receptacles specified above.

D. Weatherproof covers for receptacles in wet locations shall be rated as weatherproof whether or not a plug is inserted (NEMA-3R), minimum 3.25” clearance from front of receptacle, metallic cast type with hinged lid and padlocking hasp, Leviton or equal. Weatherproof covers for receptacles in damp locations shall be rated as weatherproof when attachment plug is removed, with metallic cast cover and flip lids with padlocking hasp.

E. Provide a separate GFI duplex receptacle at each location identified on the drawings and as specified. Through wiring is not acceptable. Receptacles located at the following locations shall be GFI type, whether indicated in the plans or not.

1. In elevator control rooms.
2. In elevator pits/shafts.
3. In bathrooms or restrooms.
4. Outdoors, on the exterior of the building, and on/above the roof.
5. In commercial and institutional kitchens, unless dedicated to specific equipment.
6. Within 72” from any sink or basin such as in a small kitchen, lunch/break room, and the like.

F. Provide an equipment grounding jumper (pigtail) connecting the grounding terminal of the receptacle to the grounded box.

2.6 PANELBOARDS

A. Panelboards shall meet NEMA AB-1, PB-1, PB1.1, PB1.2. Panelboards shall be type NQOD, NEHB, I-Line, Power-R-Line, A-Series, and CCB as specified for secondary utilization voltage and phase. As manufactured by Cutler-Hammer/Eaton, General Electric, or approved equal. Busses shall be copper. Provide with neutral buss (200% for 120/208 volts panels) and copper ground buss. Series rated equipment are not acceptable. Panels shall have full height fully rated bussing. UBC/CBC Seismic Rated.

B. Circuit breakers shall be bolt-on type thermal magnetic, single-pole and multi-pole for branch circuit control with trip-rating permanently marked on the handle. Where trip-rating is not marked on the handle, provide engraved label adjacent to the breaker indicating amperage rating. Multi-pole breakers shall be common trip type with single handle. Factory assembled and listed multi-pole breakers with handle ties shall be acceptable. Bails will not be accepted except where used with multi-wire branch circuits through fluorescent lighting fixtures. All circuit breaker handles shall be equipped with padlocking tabs, “lock-off” device. All circuit breakers shall be fully rated to withstand the available short circuit current as designated on the drawings. Series rated equipment will not be acceptable.

1. Circuit breaker trip settings 300 amps and higher shall have Long-Time setting, STPU, STD, GFPU, Inst. PU settings. Breakers shall be solid state with field adjustable and replaceable trip rating plugs, or of the electronic type.
2. Circuit breakers with trip settings 1200 amps and higher shall be solid state electronic type with full function trip units including: LTPU, LTD, STPU, STD, Inst PU, Inst OFF, GFPU, GFD.

C. Enclosures shall be code gauge, galvanized metal with front trim and hinged door with lock masterkeyed. Front trim shall be equipped with concealed trim clamps and concealed door hinges. Enclosures shall be rated NEMA-1 at dry indoor locations, and NEMA-3R where located outdoors in damp or wet locations. Lighting and appliance branch circuit Panelboards shall be maximum 20” wide and 6” deep. Panel trim and cabinet shall be finished ANSI-49 or ANSI-61 gray, except panel cabinets to be recessed are not required to be painted. Surface cabinets shall be without knockouts. Inside door shall have frame for circuit identification card. Fill out card, typewritten, with list of circuits corresponding with the circuit number. Identification shall be specific with room designation, type of load, etc, (i.e., “Classroom 214 receptacles”). For distribution panels, provide engraved laminated labels for load served where identification card is not provided.

D. Panelboard submissions shall include a ladder diagram, physical and electrical data, numbering and trip rating of each circuit breaker. Panelboard shall bear the UL label of approval.

E. Panelboard types as indicated on the drawings shall be the minimum size and type. Provide a larger size and type of panelboard as necessary for the breakers and features/accessories as indicated.

F. Circuit breaker arrangement shall be per the panel schedule.

G. Panel nameplate label shall identify panel, minimum AIC rating, and equipment it is fed from, example as follows, “PANEL-XXX, MAX. 22,000 AIC, FED FROM YYY”. Where fed via a transformer, it shall read, “PANEL-XXX, MAX. 14,000 AIC, FED FROM YYY THRU TRANSF-ZZZ”. Label shall be engraved plastic per section 26 00 00. ½ inch letters for panel identification.

H. Panelboards used for disaggregation of loads where more than one load type is in the panel shall have these additional requirements.

1. Comply with CA Title-24 Part-6 for Disaggregation of Electric Circuits.
2. Common buss.
3. Disaggregated loads by Breaker Blocks, each sized from 6 to 42 circuits.
4. Additive/Subtractive metering option per breaker blocks.
5. 100 Amp maximum branch circuit breakers.
6. Future space for CT's for each breaker block.
7. Space for main metering including main metering CT's.
8. UL 67, UL50 Listed.
9. UBC/CBC seismic rated.

2.7 SAFETY/DISCONNECT SWITCHES

A. Type "HD" Heavy Duty safety switches with externally operated handle. Switches shall be manufactured by Westinghouse, General Electric, or approved equal. Switches shall be rated 250 and 600 volts, A.C., of size and poles as shown on Drawings and as required. Disconnects used outdoor shall be in NEMA-3R. Provide fused switches with proper sized fuses where required by equipment manufacturer. All switches shall have pad-locking cover with interlocking cover. Switches shall be capable of be pad-lockable in the ON or OFF position. Label switch with circuit identification per section 26 00 00, example "AC-1, HD1-24".

2.8 INDIVIDUAL CIRCUIT BREAKERS

A. Circuit breakers shall be molded case thermal magnetic type with trip rating as scheduled on drawings.

1. Circuit breaker trip settings 300 amps and higher shall have Long-Time setting, STPU, STD, GFPU, Inst. PU settings. Breaker shall be solid state with field adjustable and replaceable trip rating plugs, or of the electronic type.
2. Circuit breakers with trip settings 1200 amps and higher shall be solid state electronic type with full function trip units including: LTPU, LTD, STPU, STD, Inst PU, Inst OFF, GFPU, GFD.

B. Circuit breakers shall be quick-make, quick-break, trip free operation. The trip-free mechanism shall be independent of manual handle control. All circuit breakers shall be fully rated to withstand the available short circuit current as designated on the drawings. Series rated equipment will not be acceptable.

C. Breakers to be in NEMA-1 (indoor) or NEMA-3R (damp, wet, and outdoor) enclosures. NEMA-3R enclosures shall have the handle concealed behind the cover, and the hinged cover shall be provided with padlocking tabs. Each circuit breaker shall be identified with an engraved, laminated phenolic plate showing the load served or the function of the circuit breaker and trip rating. The nameplate shall be attached with oval head machine screws tapped into the front of the board. Equip breaker handles with padlocking "lock-off" devices.

2.9 PULL LINE

A. Furnish and install pull line in all unused (empty) raceways. Pull lines shall not rot or mildew.

1. Conduits up to 1.5": 1/8" diameter braided line of polypropylene with 200 lbs. tensile strength, IDEAL, Jet-Line #232, or equal.
2. Conduits 2" or Larger: 3/16" polypropylene pull rope with 800 lbs. tensile strength, IDEAL Pro-Pull or equal.

B. Provide pull line in conduits for utility company systems, size and type per their requirements.

2.10 ACCESS DOORS

A. Milcor, Newman or equal with concealed hinges, screwdriver locks, prime coated with rust inhibitive paint, and style of door to suit ceiling or wall construction, including fire rating. Access doors in acoustical tile ceilings shall be Hi-Hatch with tile recess. Doors shall be 14 gage C.R. steel and shall be 22” x 30”; 24” x 24” in tile ceilings, unless otherwise noted or required.

2.11 PRECAST CONCRETE PULLBOXES/HANDHOLES

A. Boxes shall be size as indicated on the drawings. Design loads shall consist of live, dead, impact, hydrostatic, and other loads. Live loads shall be for H-20 and/or H-20-S16-44, or as required, per A.A.S.H.O. standard specifications for highway bridges with revisions. Design loads shall be sixteen KIPS. Concrete shall be per ASTM-C-33-64. Lightweight concrete shall conform to ASTM-C-33-64T. Cement shall be Portland Cement meeting ASTM-C-150 Type II standards. Compressive strength shall be minimum 4,000 psi at 28 days.

B. Larger Boxes (48” x 30” or larger): Precast high-density reinforced concrete with end and side knockouts, pulling-in irons. Minimum 4” wall thickness. Coordinate size of thinwall knockouts with manufacturer for conduit entry. Acceptable manufacturers shall be Forni, Christy or equal.

C. Smaller Boxes (smaller than 48” x 30”): Precast high-density reinforced concrete with end and side knockouts, and extension as required. Minimum 1.5” wall thickness. Acceptable manufacturers shall be Forni, Christy or equal.

D. Covers: Larger box covers, in other than concrete paving areas, shall be one or multi piece as required, steel checker plate, galvanized with anti-slip surface rated for parkway loading, with hold-down bolts. All other box covers shall be reinforcing concrete with hold down bolts. Where susceptible to vehicular traffic, use H-20 rated traffic cover. All covers shall be factory marked, see drawings for marking/label required. If not noted, use the following markings:

SYSTEM	MARKING
Power 600 volts or less	Electrical
Power over 600 volts	Danger High Voltage-Keep Out
Telephone	Telephone
Clock, Unified Signal, etc.	Signal
Fire Alarm	Fire Alarm
Television	T.V.
Lighting	Lighting
Grounding	Ground

E. Installation:

1. Excavate around area to accept box, a minimum of 4” around all sides for ease of installation. Provide 12” of compacted pea gravel for bedding and/or to facilitate drainage.
2. Backfill shall consist of sand or fine earth, compacted. Saturated soil or large rocks shall not be used. No voids shall remain between walls and native soil.
3. Grout and seal conduits at box entry with cement. Provide with conduit end bells.

F. Utility Co. boxes shall be per their requirements. Provide with ground rod as required.

G. The metal covers of pull boxes with power or lighting conductors shall be ground bonded to the feeder or branch circuit equipment grounding conductor(s) in the pull box.

1. All of the equipment grounding conductors in the pullbox shall be ground bonded together using the largest grounding conductor in the box or grounding terminal.
2. Ground bond the metal cover to the other ground conductors using the largest ground conductor in the pullbox.
3. Other grounding methods are allowed where submitted and approved.

2.12 BACKBOARDS

A. Backboards shall be ¾" plywood, type A-C grade fire treated for interior use, and type Exterior Grade for outdoor use. Backboards located outdoors shall be provided with one coat primer and two coats of exterior paint. Backboards in terminal cabinets shall be same as for interior use.

2.13 TERMINAL CABINETS

A. Terminal, relay, and contactor cabinets shall be code gauge, size as indicated with appropriate trim for mounting as indicated, with hinged door and cylinder type locks. NEMA-1 for indoor use in dry areas and NEMA-3R for outdoor use or in wet locations. Surface mounted cabinets shall not have knockouts. Provide backing plate/board for mounting equipment. Circle A-W or equal.

B. Provide engraved plastic label per section 26 00 00. Label shall identify the type of cabinet and designation, example "FIRE ALARM - FCA" and "EXTERIOR LIGHTING - RA".

2.14 GROUND RODS

A. Ground rods shall be ¾ in dia. x 10 ft. copper clad steel.

2.15 SURGE PROTECTIVE DEVICE (SPD) (Transient Voltage Surge Protector TVSS)

A. Main service entrance, provide internally mounted SPD, Eaton Cutler-Hammer, G.E. or equal. Where internal mounting is not practical provide externally mounted with close nipple connection, Leviton 57000 Series or equal.

1. Minimum Surge Current Rating: 160 kA per phase.
2. Clamping Performance Rating per UL1449 3rd Edition:

Mode	120/208V	480/277V
L-N	400V	800V
L-G	400V	800V
N-G	400V	800V

B. All 120/208 volts panels, provide internally mounted SPD, Eaton Cutler-Hammer, G.E. or equal. Where internal mounting is not practical provide externally mounted with close nipple connection, Leviton 52000 Series or equal.

1. Minimum Surge Current Rating: 100 kA per phase.
2. Clamping Performance Rating per UL 1449 3rd Edition:

Mode	120/208V	480/277V
L-N	400V	800V
L-G	400V	800V
N-G	400V	800V

C. SPD devices shall be Listed and Component Recognized in accordance with:

1. UL 1449 Third Edition.

2. UL 1283.
3. NEMA LS-1 (1992) Low Voltage Surge Protective Devices.
4. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits, Category-C.
5. ANSI/IEEE C62.45, Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
6. Comply with CEC Article 285.

D. The SPD shall be rated to withstand the available fault current.

E. Noise rejection at 50 Ohms, 5K - 100 MHz dB = -20 to -40.

F. Maximum Continuous Operating Voltage (MCOV) shall be at least 115% of the nominal voltage. MOV's to be minimum 34mm diameter.

G. Features shall include clamping envelope tracking, parallel-operated, built-in redundancy provides complete protection on all phases, modular design allowing replacement of modules, normal mode and common mode protection for WYE-configured 3-phase systems, fuse protection for each module. Limited 5-year warranty.

H. The preferred method is to have the SPD unit internally mounted, which is either mounted directly to switchboard/panel bussing or within its enclosed compartment. Where external mounted unit is used, provide metal enclosure with hinged metal cover. External units shall be installed directly adjacent to panel it is protecting using close nipple connection. Provide in NEMA-3R cabinet where installed outdoors. Approx. size of 15.1"H x 13.1"W x 5.2"D.

2.16 SURFACE METALLIC AND NONMETALLIC RACEWAYS

A. The surface raceway system for branch circuit wiring and/or data network, voice, video and other low-voltage wiring shall be manufactured by the Wiremold Company, or equal. Raceway series as indicated on the plans. The raceway and all system components must be UL listed and exhibit non-flammable self-extinguishing characteristics. The raceway shall be a two-piece design with a base and a snap-on cover.

1. The nonmetallic raceway base and cover shall be manufactured of rigid PVC compound, available in ivory color. Exposed cuts shall be covered with cover clips.
2. The metal raceway base and cover shall be manufactured of galvanized steel, ivory finish and suitable for field painting.

B. A full complement of fittings must be available including, but not limited to flat, internal and external elbows, tees, entrance fittings, boxes, covers, adapters, cover clips, and end caps. The fittings shall match the base and cover, and be of matching colors. All fittings shall be supplied with a base where applicable to eliminate mitering. A transition fitting shall be available to adapt to other Wiremold series raceways. Field cuts shall be clean, straight, and true with no rough edges.

C. For multicompartment raceways, device brackets shall be available for mounting standard devices in-line or offset from the raceway. A device bracket shall be available for mounting up to four devices at one location. Faceplates shall match and fit flush in the device plate and shall overlay the cover and base to hide uneven cuts. They shall match the raceway base and cover. The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP (i.e. data jacks), STP (150 ohm), Fiber Optic, Coaxial and other cabling types with face plates and bezels to facilitate mounting.

D. Work shall include furnishing all raceway and appropriate fittings and device plates to install a nonmetallic surface raceway system. Installer shall comply with detailed manufacturer's

instruction sheets, which accompany system components as well as system instruction sheets.

E. Non-metallic raceway systems shall not be used in Assembly areas and other areas where the system is not rated for the installation. Assembly areas include but not limited to; gymnasiums, multipurpose rooms, auditoriums, conference rooms, etc.

2.17 COVER PLATES

A. Switch and receptacle cover plates shall be smooth nylon type. Cover plates for other devices/outlets such as data, telephone, television, etc. shall be nylon. Cover plate color shall be ivory, matching all systems.

B. For multi-purpose rooms, gymnasiums, kitchens, locker rooms, toilet/restrooms, and walls such as CMU, brick, concrete block, and concrete walls, device plates shall be smooth stainless steel with beveled edges.

C. Each receptacle shall have its circuit identification on the cover plate (i.e., “LA1-12”). Use typewritten “clear tape”. Use black letters/numbers for light colored (white, almond, tan, beige, etc.) cover plates. For darker colored cover plates (black, brown, gray, red, etc.), tape to be white with black letters/numbers. Tape shall be located at the lower portion of the cover plate. Clean surface before adhesive tape is applied, and wrap tape (approx. 1”) at each end around back side of each cover plate.

1. For floor boxes, plates shall be engraved with circuit identification.
2. For light switches, use same circuit identification method as for receptacles.

PART 3 EXECUTION

3.1 CONDUITS & CIRCUITS

A. All conduits shall be rigid steel or IMC except EMT may be used at following locations:

1. In dry locations in concealed furred spaces.
2. In partitions other than concrete, concrete block, or solid masonry.
3. For exposed work indoors and outdoors above 10 ft except:
   a. In special locations prohibited by Code, such as hazardous locations, rigid steel shall be used.
   b. Conduits exposed on/above the roof shall be rigid steel up to 10 ft above roof surface.
   c. Conduits exposed in Gymnasiums and Multi-Purpose Rooms shall be rigid steel up to 25 ft.
4. Concealed above suspended ceilings or ceilings directly attached to structure above.

B. Flexible Conduit: Shall be used to provide flexible connections of short length (3 ft or less) to equipment subject to vibration or movement and to all motors. Up to 6 ft is allowed where additional flexibility is needed. Provide a separate bonding conductor in all flexible connections/conduit. Flexible conduit shall be one continuous length without couplings.

1. Secure flex conduit within 12” of each box, cabinet, conduit body, or other termination, and maximum 4.5 ft on center. Refer to the CEC for other secure lengths where flexibility is required or in other specific instances.

C. Run conduit concealed in areas having finished ceilings and in walls. Run all cross conduits and vertical risers or drops concealed in wall and/or partitions. Should it be necessary to

notch any framing members, make such notching only at locations and in a manner as approved by the Architects. Where concealing conduit is not possible or practical, conduit may be run exposed in areas only where so permitted by the Architect. Install exposed conduit run neatly, parallel to or at right angles to structural members. Maintain a minimum of 6" clearance from steam or hot water pipes.

D. Support conduit with straps and secure to wood structure by means of bolts or lag screws, to concrete by means of insert or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry by means of toggle bolts. Expanders and shields shall be steel or malleable iron.

E. Do not install in concrete slabs.

F. Conduits installed in contact with ground shall be PVC-40 conduit.

1. Provide a minimum 2" of sand bedding at the bottom of the trench before laying conduits. Maintain 2" separation between conduits. Maintain 12" separation between power conduits (120 Volts and greater) and low voltage signal conduits.
2. Backfill shall be sand, from bottom to 12" below finished grade. Fine earth native backfill to be used for the last 12".
3. Risers, including elbows, shall be double-wrapped rigid steel or PVC coated rigid steel conduit; except that risers, including elbows and bends, at in-ground pull box locations shall be PVC-40 terminated with endbells.
4. When installing underground conduits to specified depth, depth shall be taken from the top of the conduit to the finished grade level. Unless otherwise specified, underground conduits outside of foundation line shall be installed with top side not less than 24" below finished grade.
    a. Conduits 1.5" and larger inside foundation line shall be below subgrade.
    b. Conduits 1.25" and smaller inside foundation line shall be installed on the subgrade, only one conduit high. Conduits shall cross under subgrade. Secure conduit to subgrade to prevent "floating".
    c. Backfill material within foundation line shall be sand.
5. Utility Company (electric, telephone, cable TV, etc.) conduits shall be installed per their depth and backfill requirements. Minimum depth shall be 24" below finished grade. Minimum conduit shall be PVC-40. Where the utility company allows use of a "lesser" grade conduit, i.e. DB120, PVC-40 shall be used.
6. The minimum size of conduits outside the foundation line shall be 1", ¾" inside the foundation line.
7. Bends shall be wide sweeping type with minimum 24 inch radius bends.
8. Manufactured elbows are required to be used for all 22.5 and 45 degree bends, and 90 degree elbows, and combinations thereof. Field bends may be used for other bends with approved field benders specifically for such purpose and such bends shall not compromise the integrity and nominal thickness of the conduit wall.
9. For all trenches, provide a 6" wide non-biodegradable metal-detectable polyethylene tape at 12" below grade, 5-mil thick, labeled " CAUTION ELECTRIC LINE BURIED BELOW". Fluorescent red for electric power conduits and fluorescent orange "TELECOMMUNICATIONS" for telephone and signal conduits. Use Fluorescent red for common trenches. Tape shall be continuous for full length of trench.

G. Support individual conduits with 2-hole steel straps. 1-hole steel straps may be used for conduits 1" and smaller concealed in wall or above ceilings.

H. Galvanized iron hanger rods sizes ¼" diameter and larger with spring steel fasteners, clips or clamps specifically designed for purpose for conduits up to 1" size may be used.

I. Individual conduits ¾" and smaller run above wire suspended ceilings may be supported from independent hanger wires with approved spring steel clips. Wire ties will not be acceptable. Wire shall be taut and secured to ceiling and structure above.

J. Support multi-parallel horizontal conduit runs with trapeze type hangers consisting of two or more steel hanger rods, cross channels, J-bolts, clamps, etc.

K. Sizes of rods and cross channels shall be designed to support four times actual load. Hanger rods shall have safety factor of 5 based on ultimate strength of material used.

L. Conduits for data, telecommunications, signal, video, TV, and/or containing fiber optic, coaxial, or OSP (outside plant) multi-pair cables shall have a minimum inside bend radius per CEC Table 346-10 (do not use exception); except that conduits 2" to 4" shall be minimum 24" radius bends.

M. After installation of conductors, all conduits routed below grade shall be sealed at each opening, including risers and in pull boxes, to prevent the entrance of water and debris.

N. Relocatable (Portable) Buildings:

1. Where building is not secured to a permanent foundation, conduits connecting to Portable Buildings, shall be installed so as to allow 12 inches of building movement in all directions. Conduit riser shall extend to approximately 4 inches above ground 12 inches from the building, continuing with a flexible conduit connection to the panel, cabinet, junction box, etc.
2. For ease of disconnection for interior conduits, provide flexible conduit connection through junction box between building modules.

O. Conduit Stubs: Conduits not terminated into a box or cabinet, such as stubbed to a backboard or above ceiling, shall be terminated with an insulated bushing. Bushings for metallic conduits shall be metallic type secured by set screw, compression, or threaded type. Bushings for PVC conduits shall be glued in place. Stubs above ceiling shall be turned 90-deg so the end is horizontal facing to prevent the entry of debris.

P. Although circuiting is shown as diagrammatic, their point-to-point destinations and their indication of above/below ground route shall be followed as much as possible. Where site conditions dictate that an alternate means of routing will alleviate conflicts, the alternate means will be considered with prior approval by the Engineer.

Q. Where cinder fill is encountered in Block walls, conduit shall be PVC-40 where in contact with cinder fill. Boxes shall be PVC type where in contact with cinder fill.

R. EMT conduit circuits installed on the roof, if allowed by the Engineer, shall have a ground conductor routed with the circuit conductors sized per the circuit protective device.

S. Horizontal runs of conduit above suspended wire lay-in ceilings shall not be less than 12" above the ceiling.

T. Maintain 12 inch separation between power circuits (>120V) and all signal circuits (data, telephone, speaker, clock, etc.) to prevent interference.

U. Feeder conduits connected to panels/switchboard shall have ground lug bushing connected to equipment ground buss with ground wire same size as largest ground wire in the panel/switchboard.

V. Conduits penetrating through the roof shall be secured within 12” below roof and supported within 12” of the penetration on the roof.

W. Where conduits cross building expansion/seismic joints provide a short length of flexible conduit (do not exceed 6 ft.) and fittings listed as a grounding means, or in locations where flex conduit cannot be used provide UL listed expansion/seismic fittings.

X. Conduits concealed in any masonry shall be routed in a conduit sleeve. Such sleeves shall not be placed closer than 3 diameters, center to center.

Y. Conduits to air conditioning (AC) equipment, fans, or other roof mounted equipment shall rise up from the ceiling below through the equipment curb or conduit window within the equipment, if allowed by equipment manufacturer, to prevent additional roof penetrations.

Z. Where conduit passes through finished walls or ceilings, provide steel escutcheon plates, chrome or painted as directed. Conduit which penetrate floor slabs, concrete or masonry walls shall be grouted and sealed watertight at penetrations.

AA. For 20-amp 120 or 277 Volt circuits using 90-deg C wires:

1. Do not install more than three(3) circuits in any conduit.
2. Do not install more than six(6) current carrying conductors in any conduit.
3. Where using #10 AWG wires to allow for conductor derating:
    a. Do not install more than six(6) circuits in any conduit.
    b. Do not install more than twelve(12) current carrying conductors in any conduit.

BB. Cables and Raceways installed under metal-corrugated sheet roof decking shall maintain a minimum 1.5” from the nearest surface of the roof decking per CEC. This shall not apply to RMC or IMC.

CC. Where switches control lighting loads supplied by a grounded branch circuit, the grounded conductor for the controlled lighting circuit shall be provided at the switch location. The grounded circuit conductor can be omitted where exceptions 1 & 2 apply. (CEC 404.2©)

3.2 CAPPING

A. Cap conduits during construction with manufactured seals. Swab out conduits before wires are pulled in.

B. Cap all empty conduits below grade and in pull boxes with manufacturer’s caps to prevent entrance of water and debris, attach pull string to cap.

3.3 FLASHING

A. Make conduit projecting through roof watertight by proper flashing. Secure a sheet lead cap with a tightening bend to conduit. Use two collars for tar or asphalt composition roofings. Set one collar directly on roof deck and second collar set over on top of roofing felts. Lead sheet flashing shall be made of 4 lb. sheet lead. Use Stoneman #1100-4 series for individual conduits and #910/915 multi-flash for more than on conduit penetration, or equal.

3.4 PENETRATIONS OF FIRE RESISTIVE WALLS AND PARTITIONS

A. Penetrations of protected openings (fire rated walls, ceilings, floor-ceilings, roofs, etc.) shall be protected in accordance with the California Building Code, Part 2, Chapter 7, Title 24. Penetrations shall apply to conduits (raceways), cable trays, boxes, cabinets, panels, cables, etc.

B. Fire stopping shall be provided at penetrations of fire resistive walls, floors, ceilings, floor-ceiling assemblies, and roofs. Fire-stopping shall have a “F” and/or “T” rating as determined by tests conducted in accordance with ASTM E 814 or UL-1479. Fire stopping system/materials shall be UL Listed.

3.5 ACCESS DOORS

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of electrical systems; for example, inaccessible areas and attics containing heat detectors, junction boxes, etc. Access doors shall provide for complete removal and replacement of equipment. Provide fire rated access doors where located in fire rated partitions.

3.6 BOXES

A. Nails shall not be used to support outlet boxes. Boxes must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers. For metal stud construction, use metal box hangers only. Box hangers shall be securely tied or welded (where permitted) or screwed to metal studs. Paint weld with rust inhibitor. Boxes installed in masonry tile or concrete block construction shall be secured with auxiliary plates, bars or clips and be grouted in place.

1. Outlet Boxes with Receptacles or Switches: Provide a solid pigtail (green) ground wire grounded to the metallic outlet box. Pigtail shall also ground device and separate ground conductor if available. Size of ground wire to match overcurrent protection.

B. Locate outlets at the following heights above floor to the center of the device or handle unless otherwise noted on Drawings or in Specifications.

1. The top of the outlet box shall not be higher than 48” above finished floor, and the bottom of the outlet box shall not be less than 15” above finished floor. For forward or side approach over counter, maximum 44” and 46” respectively to top of box.
2. Convenience Outlets: 18” (4” above counter or splash).
3. Local Switches: 45”.
4. Telephone Outlets: 18” (45” for wall phone).
5. Data, TV Outlets: 18”.
6. Where devices are shown at counter locations, they shall be located approximately 4” above counter, clearing back-splash where applicable.
7. Refer to elevations and details on Architectural Drawings for exact heights and locations of all electrical outlets for switches, receptacles, special equipment, etc. Where above heights do not suit building construction or finish, consult Architect.

C. Install pull boxes or junction boxes as required in accessible spaces but do not install in finished areas unless approved by Architect.

D. Where fire rated construction is required (refer to Architectural Drawings), do not locate electrical outlet boxes back-to-back. Provide a minimum of 24” horizontal separation between outlet boxes on opposite side of the same wall. Where such restrictions cannot be met, provide fire-stopping around box such as 3M Moldable Putty Pads or equal.

E. Boxes up to 100 cubic inches located in suspended wire ceilings may be supported through an independent hanger wire with approved tension clips. Wire shall be taut. Secure wire to the structure above and the ceiling below.

3.7 CONDUCTORS

A. Splices and joints for #10 AWG or smaller wiring shall be twisted together electrically and mechanically strong and insulated with approved type insulated electrical spring connectors, Scotchlok or Ideal. Joints and connections for #8 AWG or larger shall be made with Burndy, T & B, or approved equal, solderless tool applied pressure lugs and connectors. Uninsulated lugs and wire ends shall be insulated with layers of plastic tape equal to insulation of wire and with all irregular surfaces properly padded with “Scotchfil” putty prior to application of tape. Tape shall be equal to Scotch #33, General Electric #AW-1, or approved equal. Feeder splicing is not permitted.

1. In special instances where feeder splicing is allowed by the Engineer, it shall be made with high compression sleeve type connector followed by manufactured splicing kit utilizing as insulators, resins poured into a ready-to-use plastic mold to provide a uniform, moisture-proof tough, impact-resistant insulation.
2. Conductor splices below grade shall meet ANSI C119.1-1986 and UL 486D Standards. Raychem WCSM or FCSM heavy wall heat shrink tubing; or RVS or RVC series if use of flame heat is prohibited. Conductors to be joined with compression sleeve connectors.

B. Use only UL approved wire pulling compound as lubricant.

C. Lace conductors together with waxed linen lacing cord, T & B “Ty-Rap”, Holub “Quik-Wrap” or equal, in a neat and workmanlike manner in panelboards, wireways, raceways, pull boxes and similar locations.

D. #12 AWG wire shall be minimum size wire used for lighting and power circuits. Motor control circuits may be #14 except as marked on Drawings, unless shown.

E. Provide cable supports in risers by means of a clamping device with insulated wedges or “Kellem” grips.

F. All conductors shall be in conduit unless otherwise indicated.

G. Conduit sizes shall be based on code fill table for THW insulated wires to accommodate the number, size, and type of wires shown or specified.

H. Wiring installed in pull boxes or junction boxes, where wire is pulled through without terminations (except splices), shall have a service loop around the interior of the box for 360 degrees utilizing the largest circumference.

I. Use #10 AWG conductor for 20 Amp 120 Volt circuit home runs longer than 75 feet, and for 20 Amp 277 Volt circuit homeruns longer than 200 feet.

J. Where conductors are increased in size and number (such as for voltage drop reasons), such that conductors will not fit the standard breaker or panel lugs, terminate conductors in one of the following means:

1. Provide larger breaker frame or panelboard.
2. Provide oversized lugs.
3. Last option only with approval from Engineer: Terminate wires in multiport connector and provide pigtail. Splice to be made in panel or switchboard if space is available, or in separate splice box. This option will not be normally granted.

3.8 PANELS AND CABINETS

A. Recessed enclosures (panelboards, terminal cabinets, cabinets, control cabinets, etc.) shall be provided with a minimum of three ¾" empty conduits stubbed into accessible space above the ceiling. Drawings may require additional conduits.

3.9 GROUNDING

A. Grounding and ground bonding of the electrical installation shall be in accordance with CEC Article 250, and any applicable codes. Ground fittings shall be approved manufactured type, installed and connected to conform with Code requirements.

B. Neutral conductors and noncurrent-carrying parts of equipment at each installation shall be grounded in accordance with applicable code. Ground conductor shall be copper having a current capacity sized in accordance with CEC.

C. All equipment cases, motor frames, etc., shall be completely grounded to satisfy requirements of CEC. Install bond wire in flexible conduit. Install copper bond wire, sized in accordance with CEC, in all nonmetallic raceways and bond to all metallic parts using approved fittings.

D. Service ground conductor shall be connected to a "Ufer" encased ground and bonded to the metallic cold water pipe system and to the metallic natural gas line.

E. Interior metallic cold water pipe system and other interior metallic piping systems shall be ground bonded to the building grounding system.

F. Each building shall be provided with a grounding electrode connected to the metallic enclosure of the building disconnecting means. Grounding electrode conductor shall be sized per CEC table 250-66.

G. Total ground resistance shall not exceed 25 ohms.

H. All connections shall be made with solderless connectors or molded fusion-welding process.

I. Equipment grounding conductors shall be insulated with a continuous green outer finish along its entire length. Conductors size #4 AWG and larger may be identified (with green electrical tape applied half-lapped) at each end and at every point where the conductor is accessible. Tape shall be applied from its point of entry to point of exit or termination.

J. Insulated grounded (neutral) conductors shall be identified with a continuous white outer finish along its entire length. Neutral conductors #4 AWG or larger can be identified by a distinctive white marking (applied half-lapped with white electrical tape) for the last 12 inches at each end.

K. Where equipment is 1000 Volts or above, fence grounding shall be provided per CEC.

1. Provide a ground rod at each corner fence post and at line posts at least every 40 ft. Ground rods to be 5/8" x 8 ft buried below grade.
2. All ground conductors to be minimum #2 bare copper. Ground conductor to be buried 30" below grade following outside fenced enclosure. Provide ground connections between ground rods, at fence posts, at gate posts, to equipment, etc. for a complete looped system.
3. Each gate post shall be grounded and provide flexible braided copper strap ground connection to gate. Corner gate post shall have a ground rod.
4. Ground equipment rated 1000V or higher to ground conductor.

5. Connections to be exothermic welds or ground clamps rated for such use.
6. Each gate shall be bonded to its gatepost by flexible braided copper strap.

3.10 FIELD TESTS

A. General: Perform field test in the presence of the Owner's Representative except as otherwise specified. Provide required labor, materials, equipment and connections to perform tests. Document results and submit them to the Owner's Representative. Repair or replace all defective work.

B. Perform Insulation Resistance (IR) "Megger" Testing per NETA Standards. Submit test results. Provide testing for:

1. All feeders 100 Amps and higher.
2. Branch circuits 100 Amps and higher.

C. Verify operation of starters and install overload protection devices sized in accordance with the motor full load current.

D. Each ground rod shall be tested. A ground rod which does not have a resistance to ground of 25 ohms or less shall be augmented by one additional ground rod at no less than 8 feet from each other.

3.11 CIRCUIT BREAKER COORDINATION

A. Provide protective device (fuses and breakers) coordination study on the distribution system to determine circuit breaker settings for electronic breakers and other breakers with adjustable tripping characteristics, and all protective devices 300 amps or more. The coordination shall be with the immediate downstream and upstream protective device(s).

B. Plot time-current characteristics of the specified protective devices using log-log paper. Include the following minimum information, as pertinent to system, on plots:

1. Complete titles.
2. Representation One Line Diagram and legends.
3. Power company's relays or fuse characteristics.
4. Complete operating bands of low voltage circuit breaker trip curves.
5. Fuse curves.
6. Protective relay type selected and curves.
7. Maintain reasonable coordination intervals and separation of characteristic curves on plots. Provide sufficient curves to clearly indicate the coordination achieved to the main breaker, feeder breakers and load protective devices rated 300 amperes or more.

C. Summarized the results of the power system study in a bound final report. Organize the report using the following sections:

1. Description, purpose, basis, written scope, and a single-line diagram of the portion of the power system which is included within the scope of study.
2. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
3. Provide a separate tabulated list for the selection and settings of the protective devices. Include the following minimum information:
   a. Circuit identification.
   b. IEEE device number.(Where applicable)

c. Manufacturer, device type and range of adjustment.

d. Recommended settings.

3.12 GROUND FAULT PROTECTION AND TESTING

A. Where indicated on the plans, provide circuit breaker with ground fault protection. The ground fault system shall include a memory circuit for positive tripping action despite intermittent arcing ground faults.

B. Provide an integral means of testing the ground fault system to meet the on-site requirements of CEC Articles 230 and 517.

C. Provide acceptance testing per InterNational Electrical Testing Association Inc. (NETA) specifications and standards. Submit test results.

3.13 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Performed in stages if directed.

B. Clean and repair soiled or damaged painted exposed work and match adjoining work before final acceptance.

C. Remove debris from inside and outside of material, equipment and structures.

3.14 WARRANTY

A. All materials and installation shall be provided with a one (1) year warranty which shall include replacement parts, labor, retesting, and travel to and from the job site. The warranty period shall begin after final acceptance of the project.

END OF SECTION 26 05 00

SECTION 26 07 00 - COMMISSIONING OF ELECTRICAL

PART 1 GENERAL

1.1 SUMMARY

A. See Section 01 91 13 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 01 91 13.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The entire electrical system is to be commissioned, including commissioning activities for the following specific items:

1. Sensor placement and orientation for all sensor types.
2. Occupancy sensor function, sensitivity, and time delays.
3. Daylight harvesting sensor calibration.
4. Automated shade operation.
5. Manual control placement and operation.
6. Automated control operation, including scheduled on/off functions and dimming trims and presets.
7. Override operation, access, and functionality.
8. Centralized control interfaces and operation.
9. Client education of operations.
10. Documentation archived to client.
11. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.2 RELATED REQUIREMENTS

A. Section 01 77 00 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

B. Section 01 91 13 - Commissioning: Commissioning requirements that apply to all types of work.

C. Section 26 09 43 – Network Lighting Controls.

D. Section 26 08 00 – Electrical Acceptance Tests.

1.3 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. DRAFT Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:

   1. System name.
   2. List of devices.
   3. Step-by-step procedures for testing each controller after installation, including:
      a. Process of verifying proper hardware and wiring installation.
      b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
      c. Process of performing operational checks of each controlled component.
      d. Plan and process for calibrating all sensors.
      e. Description of the expected field adjustments for controllers and sensors should control responses falling outside of expected values.
   4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has “passed” and is operating within the contract parameters.
   5. Description of the instrumentation required for testing.

C. Startup Reports and Prefunctional Checklists: Submit for approval of Commissioning Authority.

D. Electrical System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:

   1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
   2. Full as-built set of control drawings.
   3. Full as-built sequence of operations for each piece of equipment.
   4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
      a. Floor.
      b. Room number.
      c. Room name.
      d. Sensor ID.
      e. Reference drawing number.
      f. Control device ID.
      g. Controlled components address.
   5. Full print out of all schedules and set points after testing and acceptance of the system.
   6. Full as-built print out of software program.
   7. Electronic copy on disk of the entire program for this facility.
   8. Marking of all system sensors and thermostats on the as-built floor plan and electrical drawings with their control system designations.
   9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
   10. Control equipment component submittals, parts lists, etc.
   11. Warranty requirements.
   12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
   13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
      a. Sequences of operation.

b. Control drawings.
c. Points lists.
d. Controller and/or module data.
e. Sensors and DP switches.
f. Program setups (software program printouts).

E. Project Record Documents: See Section 01 78 00 for additional requirements.

1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
2. Show actual locations of all sensors and control devices on project record drawings.

F. Training Manuals: See Section 01 79 00 for additional requirements.

1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

PART 3 EXECUTION

3.1 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.

B. Furnish additional information requested by the Commissioning Authority.

C. Prepare a preliminary schedule for equipment start-up and testing, adjusting, and completion for use by the Commissioning Authority; update the schedule as appropriate.

D. Notify the Commissioning Authority when system testing, startup and adjusting will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.

E. Put all electrical systems into operation and continue operation during each working day of testing, adjusting, and commissioning, as required.

3.2 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.

B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.

C. Provide two-way radios for use during the testing.

3.3 OPERATION AND MAINTENANCE MANUALS

A. See Section 07 78 23 for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.4 DEMONSTRATION AND TRAINING

A. See Section 01 79 00 for additional requirements.

B. Demonstrate operation and maintenance of electrical system to Owner' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.

C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.

D. Provide the services of manufacturer representatives to assist instructors where necessary.

END OF SECTION 26 07 00

SECTION 26 22 00 - DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Dry type ventilated two winding single-phase and three-phase transformers with primary and secondary voltages of 600 Volts and less, and capacity ratings up to 1000 kVA.

B. Transformers shall comply with DOE 2016 Efficiencies.

1.2 REFERENCES, QUALITY ASSURANCE

A. ANSI/IEEE C57.96, Distribution and Power Transformers, Guide for Loading Dry-Type appendix to ANSI C57.12 Standards.

B. ANSI/IEEE C89.2 - Dry Type Transformers for General Applications

C. California Electrical Code, CA Title-24 Part-3

D. IEEE C57.12.01, General Requirements for Dry-Type Distribution and Power Transformers including those with Solid Cast and/or Resin-Encapsulated Windings

E. IEEE C57.12.91, Test Code for Dry Type Distribution and Power Transformers

F. NEMA ST20 - Dry Type Transformers for General Applications.

G. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.

H. NEMA TP-3, Standard for the Labeling of Distribution Transformer Efficiency.

I. UL 506, Specialty Transformers

J. UL 1561, Standard for Dry-Type General Purpose and Power Transformers

K. Meet DOE 2016 Efficiency

L. The equipment and major components shall be certified to the seismic requirements of IBC and IEEE-693. For OSHPD projects, equipment shall have Special Seismic Certification Preapproval with an OSP designation.

1.3 SUBMITTALS

A. Submit manufacturer's product and specification sheets to include dimensions, outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, % impedance, loss data, sound level, tap configurations, insulation system class/type, rated temperature rise, wiring diagram, and installation instructions. Submit OSP designation for OSHPD projects.

B. Submit per Section 26 00 00.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

B. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. General Electric, Square D, Eaton, or equal.

2.2 DRY TYPE TWO WINDING TRANSFORMERS

A. Transformers shall be K-13 rated.

B. Operate continuously at 100% nameplate rating at ambient temperature not exceeding 40 degrees-C. Maximum temperature at top of enclosure shall not exceed 50 degrees-C rise above 40 degrees-C ambient.

C. Insulation system and average winding temperature rise for rated KVA as follows:

Rating	Insulation (Degree C)	Rise Above 40° Ambient (Degree C)
3-15	185	115
15-500	220	150

D. Case temperature shall not exceed 50 degrees C rise above ambient at its warmest point.

E. Transformers shall have the following High Voltage Load Taps:

1. 3 through 25 kVA: (4) 2.5% taps consisting of 2-above and 2-below nominal voltage.
2. 26 through 500 kVA: (6) 2.5% taps consisting of 2-above and 4-below nominal voltage.
3. 750 kVA: (4) 3.1% taps consisting of 2-above and 2-below nominal voltage.
4. 1000 kVA: (2) 3.6% taps consisting of 1-above and 1-below nominal voltage.

F. Sound Levels: Maximum sound levels shall be as follows, measured per ANSI C89.2:

KVA Rating	Sound Level
0-9	40 dB
10-50	45 dB
51-150	50 dB
151-300	55 dB
300-500	60 dB
750	64 dB

G. Basic Impulse Level: 10 kV.

H. Transformer impedances shall have a minimum nominal value as noted below. Minimum value indicated takes into account a 7.5% tolerance. Transformers rated 150 kVA and lower with a 120/208 Volt secondary shall have a minimum impedance level so as not to exceed a 10,000 short circuit let-thru based on an unlimited source.

1. 500 kVA: 5.0% (minimum 4.7%)
2. 300 kVA: 5.0% (minimum 4.7%)
3. 225 kVA: 5.0% (minimum 4.7%)
4. 150 kVA: 4.5% (minimum 4.2%)

5. 112 kVA: 3.4% (minimum 3.2%)
6. 75 kVA and Lower: 2.3% (minimum 2.1%)

I. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

J. Mounting: Transformers 30 KVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 30 KVA shall be suitable for floor or trapeze mounting.

K. Coils: Aluminum or copper, continuous windings with termination brazed or welded.

L. Enclosure: Constructed of heavy gauge steel, corrosion resistant. Finish shall consist of degreasing, phosphate cleaning, and an electrodeposit ANSI 61 gray enamel paint. ANSI/NEMA ST 20 Type 3R with weathershield and rodent screen at outdoor locations.

M. Isolate core and coil from enclosure using vibration-absorbing mounts.

N. Nameplate: Include transformer connection data. Label per section 26 00 00 with engraved laminated plastic labels secured with screws, "TRANSFORMER-XXX FED BY PANEL-YYY".

O. K-Rated Transformers.

1. Minimum "K" rating of 13. Where this does not constitute a standard size, the next higher size shall be used.
2. Transformer shall incorporate an electrostatic shield grounded to the transformer core.
3. Impedance range, 3% minimum to 5% maximum.
4. Neutral bus shall be sized for a minimum of 200% of rated secondary current.
5. Coils shall be continuous wound construction.
6. Cores shall be copper, common core construction having low hysterisis and eddy current losses. The core flux density shall be below the saturation point to prevent overheating caused by harmonic distortion.

2.3 SECONDARY BREAKER

A. Provide a single secondary main breaker within 10 conductor feet of the transformer in a NEMA-1 (NEMA-3R for outdoor and wet/damp locations) enclosure. The secondary breaker may be installed in the loadside panel the transformer is feeding if the distance limitation is met.

PART 3 EXECUTION

3.1 INSTALLATION

A. Set transformer plumb and level.

B. Use flexible conduit, 2 ft. (0.6M) minimum length, for connections to transformer case.

C. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure. Provide seismic restraints as needed. Provide and install on reinforced concrete pad for outdoor ground level installations.

D. Transformers installed outdoors shall be listed for outdoor use. The use of a weathershield shall be acceptable.

3.2 FIELD QUALITY CONTROL

A. Check for damage and tight connections prior to energizing transformer.

B. Measure primary and secondary voltages and make appropriate tap adjustments.

3.3 WARRANTY

A. All materials and installation shall be provided with a one (1) year warranty which shall include replacement parts, labor, retesting, and travel to and from the job site. The warranty period shall begin after final acceptance of the project.

END OF SECTION 26 22 00

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society.

B. IES LM-80 - Approved Method: Measuring Lumen Maintenance of LED Light Sources; Illuminating Engineering Society.

C. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 101 - Life Safety Code; National Fire Protection Association.

F. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

G. UL 1598 - Luminaires; Current Edition, Including All Revisions.

H. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.02 SUMMARY

A. This section describes requirements for lighting fixtures, lamps, ballasts and accessories.

B. Provide lighting equipment, installation and testing.

1.03 DESCRIPTION

A. Provide all equipment and materials for a complete lighting system as described herein and as shown on the plans.

1.04 SUBMITTALS

A. Procedure: Submit under provisions of Section 01 33 00 - Administrative Requirements and Section 01 60 00 - Product Requirements.

B. Provide submittals for item listed documenting compliance with specification requirements.

C. Product Data:

1. Lighting Fixtures: Manufacturer's current published catalog sheets, including photometric information, size, weight, finishes and accessories.

D. Warranties: Manufacturer's certified warranty documentation.

E. Shop Drawings:

1. Lighting Fixtures.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products that comply with requirements of NFPA 70 and NFPA 101.

D. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. Recessed Luminaires:

1. Ceiling Compatibility: Comply with NEMA LE 4.

2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

I. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:

1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 FIXTURE TYPES

A. All fixtures with LED lighting sources, and integral driver.

2.05 EXIT SIGNS

A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

1. Number of Faces: Single or double as indicated or as required for the installed location.

2. Directional Arrows: As indicated or as required for the installed location.

2.06 DRIVERS

A. Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.

2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.07 LIGHTING FIXTURES

A. General: Provide fixtures as indicated, factory wired, ready for field connection.

B. Provide recessed fixtures with complete mounting hardware and trims to suit the type of ceiling in which they are installed. Provide access to lamps and ballasts in recessed fixtures through the lensed door or fixture opening, without requiring removal of fixture.

C. For surface mounted fixtures provide all blocking, mounting channels required and hardware for mounting.

D. Provide fixtures Underwriters Laboratories, Inc. (UL) approved for installation against low density ceilings where applicable. Do not use spacers.

PART 3 EXECUTION

3.01 LIGHTING FIXTURES

A. Install lighting fixtures complete with lamps, ready for operation.

B. Secure fixtures to the structure by means of brackets, flanges another mounting hardware suited for the fixtures and type of installation.

C. Secure surface mounted fixtures with a minimum of (2) 1/4-inch bolts, or as detailed.

D. All recessed or drop-in light fixtures in gypsum board ceilings shall be supported directly by main runners or by supplemental framing which is supported by main runners and positively attached with screws or other approved connectors to resist a horizontal force equal to the weight of the fixture. A minimum of two attachments are required at each fixture. Light fixtures weighing greater than 20 lbs. must be independently supported by not less than two (2) taut #12 gauge wires where less than 56 pounds, and four (4) taut #12 gauge wires where greater than or equal to 56 pounds, and attached to the housing and to the structure above. The wires, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the fixture.

3.02 SEISMIC LIGHTING BRACING (Pendant-Mounted Light Fixtures)

A. Where pendant-mounted light fixtures are to be installed in areas with a suspended ceiling, the installation shall comply with DSA IR 16-9: Pendant-Mounted Light Fixtures

B. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two (2) times the weight of the fixture.

C. If a pendant-mounted light fixture is directly and independently braced below the ceiling (i.e., aircraft cables to walls), then a brace assembly is not required above the ceiling.

D. If a pendant-mounted light fixture is free to swing 45 degrees from vertical in all directions, and is not directly and independently braced below the ceiling, then a bracing assembly is only required to attach the pendant hanger to the bracing assembly to transmit the horizontal and vertical forces. Where the wight of the fixture is less than 20 lbs., the vertical component of the brace force need not be considered so no compression strut/post is required.

E. Rigid conduit shall not be used for attachment of the fixtures.

3.03 CLEANING

A. Clean lighting fixtures prior to final acceptance.

END OF SECTION

SECTION 27 00 00 – COMMUNICATIONS, PAGING, & SIGNAL CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to this Section.

1.2 SCOPE AND SUMMARY

A. Provide a fully operational IP platform for a district-wide internal and school Critical Communications System (CCS), incorporating school safety notifications and general communications including but not limited to the following:

1. The platform shall provide complete internal communications and employ state of the art IP Technology including the minimum functions listed.

a. Two-way internal intercommunications between staff locations and classrooms.

b. Scheduled bell events.

c. Emergency announcements that will override any pre-programmed audio, assuring that all Emergency/Lockdown etc., are heard at each speaker location.

d. Capability of prerecording emergency announcements that can be activated by a Soft Key on an administrative console, panic button, dial string, mobile app, or web browser.

e. Atomic Time Synchronization with Class Change Tones utilizing multiple, programmable schedules for each zone.

f. District-wide, Emergency, Group, All School and Zone live voice paging.

g. District-wide, Emergency, group, All School and Zone visual messaging.

h. District-wide, Emergency, Group, All School and Zone paging for pre-recorded audio – tones, music and voice.

i. Single sign on web-based user interface for multi-school functionality.

2. The system shall support a minimum of 1000 level priorities which shall be user-definable, allowing each end point to place a minimum of 5 different priority calls at the same time.

3. Any authorized administrator shall be able to call from outside the school into any classroom, zone, or entire school directly via the School District supplied SIP enabled Telephone Network. This shall allow remote monitoring, call-in annunciation, and two-way conversation from outside the facility as well as paging into the system. (Compliance with NEMA Standard SB-40 for emergency communications in K-12 Schools).

4. Authorized system users shall be able to create a minimum of 100 automated sequences with voice instructions, tones, emails, program distribution, and relay activations and replay them.

5. Automated message strings shall be manually initiated from a single-button access on the console, on a SIP connected telephone, panic button, mobile app, from the web-based user interface or via interface with third party systems.

6. Paging and two-way intercom features shall be accessible from any system console or SIP connected telephone for each campus.

7. The platform shall synchronize its system time to the network timeserver or a web-based time server.

8. Each single campus installation shall be locally survivable for intercom, paging, bells, and emergencies such as lockdown, even when the district connection is unavailable.

9. This specification establishes a minimum level of quality, features, and performance for individual components as well as the integrated system.

10. Systems that do not comply with the feature-sets highlighted in this Specification will not be considered.

11. Included in the emergency procedures is the ability to send specific messages and or instructions. These features can be added to the emergency sequences.

12. The ability to require an access code to initiate or clear an emergency from the administrative console.

13. An app that can run on either Android or Apple phones. This app shall give the user the ability to initiate one of 18 emergency procedures programmed into the app. This app shall also allow you to view all classrooms check in status. This process will update during the emergency to make sure all information is current.

14. Any system that requires more than one Cat 6 drop to a classroom to control an IP speaker and a call switch will not be considered equal to the specified system.

B. The new Critical Communication System (CCS) will replace an existing intercom system. During construction, the existing system shall remain operational when students are in attendance at the school. After the new CCS is operational throughout the school, the existing system shall be disconnected and removed from the school. The contractor shall return existing parts and pieces to the Owner and remove existing wiring back to the source.

1.3 MANUFACTURER

A. The contractor shall furnish and install all equipment, accessories, and materials necessary for a complete operating system in accordance with the specification and applicable drawings.

B. The equipment furnished under this specification shall be the standard product of one manufacturer and shall be equal in performance and quality to that manufactured by **Rauland or CareHawk Safety Communications** or equal. Products having less than 5 years field service will not be acceptable.

C. The contractor shall guarantee availability of local service (within 50 miles) by factory-trained personnel from an authorized distributor of the equipment manufacturer. The distributor shall have available stock of the manufacturer's standard parts. On-the-premises maintenance shall be provided for a period of twelve (12) months from date of project completion.

D. On-the-premises demand service at other than normal working hours shall also be available and may be charged for by the manufacturer's distributor at the prevailing labor rates.

E. Approved manufactures representative shall provide on-site training for site and maintenance personal, as well as furnish District with complete as-built drawings.

1.4 SUBMITTALS AND SUBSTITUTIONS

A. Within thirty-five (35) calendar days after the date of the award of the contract, the Contractor shall submit to the Owner for review an electronic copy submittal. The submittal shall consist of five (5) major sections with each section separated with insertable index tabs. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Engineer and Owner. Each page in the submittal shall be numbered chronologically and shall be

summarized in the index. The second section shall include a copy of the authorized distributor's valid C-61 California State Contractor's License, letters of factory authorization and guaranteed service, list of projects of equal scope and a list of proposed instrumentation to be used by the Contractor. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment in the specifications. The fourth section shall contain a wiring destination schedule for each circuit leaving each piece of equipment. The fifth section shall include a complete drawing with devices and wire type and quantity.

B. For purposes of determining equality, all mechanical, electrical and general information set forth on the respective data sheets for each specified item shall be considered as part of these specifications and binding herein. Any proposed equal item offered shall be substantiated fully to prove equality. The Owner reserves the right to require a complete sample of any proposed equal item and may, if necessary, request a sample tested by an independent testing laboratory to prove equality. The decision of the Owner regarding equality of proposed equal items will be final.

C. Submit equipment prints, inter-panel and intra-panel, full electronic wiring diagrams and specification sheets for each item specified herein. Provide a tabulation of the specification clearly comparing the submitted item with the specified item, being able to refer to all written expressed functions and capabilities. Specification Sheets shall be submitted on all items including cable types.

D. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, location of each field connection, and a complete schedule of all equipment and materials with associated manufacturer’s cuts sheets which are to be used.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.

2. Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.

3. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor’s name in the title block.

4. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

F. The Contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the Contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of one (1) year after final acceptance of the project by the Owner.

G. Operating and Service Manuals: The Contractor shall provide two (2) printed copies and one (1) matching PDF copy of an “Operating and Serving Manual” for the system. The printed manuals shall be bound in flexible binders. All data shall be on printed material. Each manual shall include the following:

1. Record of Owners equipment-programming option decisions.
2. All instructions necessary for proper operation and manufacturer's instructions.
3. Complete as-built installation drawings (Record Drawings) of the system.
4. A wiring destination schedule for each circuit leaving each piece of equipment.
5. Schematic diagram of each amplifies and other major components with transistor complements and replacement number.
6. "Proof of Performance" information.
7. Manufacturer's maintenance information.
8. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

H. Record Drawings: Prior to final acceptance, provide three (3) complete sets of printed drawings and one (1) matching PDF copy of the drawings that indicate all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing".

I. System Training: Submit the following information describing the training programs and system trainers as outlined in **Paragraph 1.6** of this specification and in accordance with Division 1 specifications.

1. Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner's representative.
2. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
3. Include with the submittal a current copy of trainer's needs assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
4. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

J. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

1.5 QUALITY ASSURANCE

A. All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

B. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least five years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.

C. The contractor shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.

E. Comply with UL 60950.

F. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 “National Electrical Code” including, but not limited to:

1. Article 250, Grounding
2. Article 300, Part A. Wiring Method
3. Article 310, Conductors for General Wiring
4. Article 725, Remote Control, Signaling Circuits
5. Article 800, Communication Systems

G. EIA Compliance: Comply with the following Electronics Industries Association Standards:

1. Sound Systems, EIA-160
2. Loudspeakers, Dynamic Magnetic Structures and Impedance, EIA-299-A
3. Racks, panels and Associated Equipment, EIA-310-A
4. Amplifiers for Sound Equipment, SE-101-A
5. Speakers for Sound Equipment, SE-103

H. EQUIPMENT MANUFACTURER'S REPRESENTATIVE

1. Installation and startup of all systems shall be under the direct supervision of a local agency (Equipment Manufacturer’s Representative) regularly engaged in installation, repair and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturers and be prepared to offer a service contract for system maintenance on completion of the guarantee period and to provide the names, locations and size of ten (10) recent successful installations in the area.
2. As further qualification for bidding and participating in the work under this specification the manufacturer's representative shall hold a valid C-61 Contractor's State License Board of California. The manufacturer's representative shall have completed at least ten (10) projects of equal scope, giving satisfactory performance and has been in the business of furnishing and installing sound systems of this type for at least five (5) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.
3. The manufacturer's representative shall provide a letter with the submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.

I. The contractor shall guarantee availability of local service by factory-trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On-the-premise maintenance shall be provided at no cost to the purchaser for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect or accident. Additionally, all **Rauland or CareHawk Safety Communications** manufactured products shall be covered by a five (5) year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of acceptance by the owner/engineer.

J. The contractor shall, at the owner’s request, make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

K. The supplier shall visit the sites and familiarize himself with the existing conditions and field requirements prior to submitting a proposal.

1.6 IN-SERVICE TRAINING

A. The contractor shall provide and implement a complete and comprehensive staff training program for all administrators, facility staff members, and teachers. This mandatory training program will provide school staff a complete understanding of how to utilize and properly operate all functions.

B. The training program shall be implemented by a staff member/trainer employed by the contractor. The trainer must be factory certified to provide training on their product.

C. All staff development training is to be coordinated through the owner's designated representative. As training sessions are completed, the trainer will provide the school's administrative staff and school district's staff a document listing all the staff and faculty members who attended, received, and completed the training program.

1.7 WARRANTY

A. Provide a manufacturer's five-year warranty of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic system components. Additional warranties cover clocks, speakers, and call in switches. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one-year warranty shall be provided for labor.

B. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary. The standard five-year warranty is an important element in establishing a standard in quality. Manufacturers who circumvent the five-year warranty by offering special "extended warranties" that are not part of their normal published warranty will not be accepted.

C. Contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the contractor shall provide "loaner" equipment to the facility at no charge.

D. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. The platform shall utilize state of the art IP Technology for Emergency automation, Call-in Notification, School Safety Paging and Evacuation tones, Class Change Tones utilizing multiple, programmable schedules for each zone, two-way hands-free everyday internal communications and paging, visual messaging, and program distribution. The system shall be easy to learn and operate. All standard programming shall be web-based, district-wide and user friendly to allow the system administrator the ability to easily program system features.

B. Provide complete and satisfactorily operating district/school communications and district/school safety as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

C. The platform shall be a single electronic system consisting of a minimum of 10 audio channels for each campus, (classroom) IP Speaker Modules and call switches, IP Zone Modules connecting corridor speakers, inside and outside horns, IP Administrative Consoles, SIP enabled PBX integration and district-wide integration for paging, emergency notifications, calendar scheduling and configuration.

D. Each Classroom shall be provided with a Speaker Module interface, a speaker, and a call switch.

E. Call-ins may automatically annunciate (display of priority and location) to administrative consoles, SIP enabled phones, and outside phones.

F. Call-ins shall be programmed to automatically change priority and annunciation route based on age of call-in and original priority.

G. Call-ins may have priority (and annunciation route) changed by user action from a console or SIP enabled phone.

H. Call-in annunciation route shall include playing pre-recorded audio over speakers, sending a pre-configured email, and activating relays.

I. The platform shall lend itself to expansion by simple addition of hardware modules.

J. The platform shall connect directly to an existing, standard protocol WAN/LAN network, without the need for a separate server at each school location. Configuration, including bell schedules, calendars, and emergency sequences can be remotely created, changed, stored and downloaded to the system by an authorized user from a web-based user interface. The platform shall utilize two spare strands of the 12-strand single mode fiber optic cabling provided between the MDF and the IDFs on the school campus. The two strands utilized shall be clearly labeled at the MDF and the IDFs.

K. The platform shall provide the ability to initiate school safety paging announcements, evacuation tones and take cover tones from any telephone or connected web browser within the facility or outside the facility to any other location within the facility or district.

L. The platform shall provide the ability to selectively communicate or monitor individual classrooms in emergency situations from any telephone within the facility or outside the facility to any other location within the facility; all communication within the classroom shall be hands-free and will not require any interaction by the classroom user.

M. The platform shall provide classroom users the ability to confirm that they have safely secured their classrooms during an emergency with a single button press. The front office administrator will receive confirmation that the classroom is safely secured via an administrative console and web-based user interface. The front office administrator can view classrooms that are not safely secured via the administrative console. The front office administrator can view classrooms that are not safely secured via the web-based user interface. The front office administrator shall be able to initiate two-way communication, without a pre-announcement tone, to the classroom during an emergency via the administrative console. Web-based user interface will still identify that a school is in an emergency, even if all classrooms are safely secured. Individual classroom check-in and school emergency status shall be viewed from the web-based user interface, both on-site and remotely.

N. IP Addressable and POE powered Speaker Modules for individual rooms shall be system programmable and may be assigned any two, three, four, five- or six-digit Alpha Numeric designation as well as name and description. Any extension may be reassigned at any time. Coordinate and verify assigned room numbers with SUSD Facilities Planning.

O. IP-enabled two-way voice communication shall be available from any provided telephone or administrative console through any speaker in a campus. This shall allow hands free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is opened and a

supervisory tone shall continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation. Pre announce tone and supervisory tones shall be disabled during designated emergencies automatically.

P. The platform shall allow users to configure multiple schedules per school, with a minimum of 500 unique events per schedule, and automatic Daylight Savings time correction. Schedules can be programmed to occur once, daily, weekly, monthly, or in any combination of the preceding recurrences. Each school may have a minimum of 20 unique bell schedules, with a minimum of 5 active schedules on any given day for each campus. User shall be able to select from 25 standard included tones as well additional user created and uploaded audio files for class change signaling and messaging. In addition, scheduled events shall include relay actions, email notifications, visual messaging, status lights and paging exclusions as system configuration changes. The platform shall allow control of the bell schedules via the district WAN/LAN without the need for a separate server at each school location. Bell schedules can be remotely created, changed, stored and assigned to calendar days for the local school by an authorized user from a single web-based user interface, without logging into multiple systems.

Q. The platform shall be able to integrate with an existing PA system or operate as a fully independent IP solution. The platform shall be able to function in combination of said configurations and allow for seamless communication within a school or district-wide, regardless of the type of configuration used. The platform shall be scalable, with the ability to easily add, install, and configure additional equipment to a system.

R. The platform allows for customization of preprogrammed sequences, used for emergencies, events, and everyday communications. Preprogrammed sequences can be activated from the push of a relay button, soft key of an administrative console, a dial string of a SIP phone, or a web browser configured to the district network. Sequences can be initiated automatically as part of a schedule or on the fly. Preprogrammed sequences can be customized to utilize any combination of audio tones, emails, relays, tone exclusions, swings, delays, duples, SIP phone notifications, and program distribution. Audio tones can include customized audio files and voice messages, recorded in any language. Uploaded audio tones and messages can be preprogrammed to annunciate repeatedly or individually, as part of a scheduled sequence or on the fly. Each school in a district can have its own customized sequences, and can be activated individually, in groups, or district-wide.

S. The platform allows for emergencies to be initiated in a drill environment, separate from real emergencies. Drill emergencies can be initiated from panic buttons, consoles, SIP phones, or a web browser.

T. The platform shall provide status lights that will display the status of individual classrooms and school-wide status, including for emergencies, at the same time. Status lights will be customizable in color and flash rate based on event type and priority.

U. POE zone page amplifier module. This component will give the schools the ability to play audio to drive groups of speakers from a single device. Depending upon configuration you can have 14 or 35 watts of output. The module can be either wall or rack mounted.

V. First Responders Notification. This feature can be initiated so the status lights do not display the rooms that checked in until the first responders are on site. This will not influence any of the other check-in notifications. The App, console and computers can still display the rooms that checked in.

W. Emergency Initiation App. An app shall be available for installation on either Android or Apple devises. The app shall be capable of processing up to 18 different emergencies. The app shall update in real time, rooms that have checked in OK. It shall also display that a Fire emergency is in effect during an emergency.

2.2 EQUIPMENT AND MATERIAL

A. The Critical Communications System (CCS) shall be a **Rauland Telecenter U** or a **CareHawk Safety Communications CH1000(LT)** or an approved equal system.

B. Server Software

1. Provides district-wide paging, bell event scheduling, emergency notification and configuration for entire district.
2. Ability to configure system and initiate system features, per school and district-wide via web-based user interface.
3. The software can sync system time to the Atomic Clock Signal or to the school's or district's network time server.
4. The software will provide a web browser to deliver district-wide emergency paging, pre-recorded messages and tones from any authorized computer in the facility or the district. The software must be capable of automatically notifying district personnel via the WAN/LAN of an alarm condition.
5. The software can automatically broadcast emergency instructions via associated system hardware throughout an entire district when an alarm (e.g. lockdown, lockout, security, fire) is initiated via the web-based user interface. The emergency instructions are preprogrammed and require no user intervention. Bell tones can be halted during an emergency. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
6. The software allows for user-uploaded pre-recorded messages and tones. Software supports the upload of MP3 and WAV file types. User-uploaded pre-recorded messages and tones can be part of emergencies, sequences, and bell schedules.
7. The software can be installed in cloud, virtual or physical server environments.
8. The web-based user interface supports secure HTTP browsing.
9. The software supports encryption to ensure secure access.
10. The system shall monitor itself if devices go offline and system actions are not received. Specified users shall receive email notifications when devices go offline. The software shall be able to keep a log and report on system activity within a school or all schools district-wide for a minimum of one year. These reports can be exported to excel spreadsheets.
11. The system shall allow administrators to run reports on all system activities including emergencies, drills, paging, call-ins, check-ins and system trouble on a per school, multi-school and district-wide basis.
12. The software will support a minimum of 20 bell schedules per school, with 5 schedules assignable to a specific school day. Bell schedules can be programmed to annunciate tones, activate relays, send emails, activate program distribution, and notify SIP phones.
13. The system allows programmable end points to be automatically included or excluded for live paging, bell tones, or prerecorded audio, depending on the time or day or day of the week. These inclusions/exclusions can be applied manually or automatically depending on their schedule.
14. The software can automatically send an email, as part of a programmed sequence of events, to district administrators alerting them of an emergency within the district.

15. The software provides the ability to view schools that are in an emergency status, using any web browser on the district's network. The software shall identify the name of the school in an emergency as well the type of emergency that school is in.

16. The software provides the ability to view individual classrooms that are not checked-in during an emergency, using any web browser on the district's network. The software shall identify the name, extension, and description of the classroom that is not checked-in during the emergency.

17. The system has a minimum of 5 customizable emergencies, one of them being an All-Clear – with the ability to return the system from an emergency to normal status. Each emergency shall have a minimum of 500 unique events.

18. As a district-wide communications solution, the system shall be able to provide simultaneous communications to all schools or groups of schools within a district. The system shall allow a user to initiate district-wide communications to individual schools, all schools or groups of schools, from a web-based user interface. The system shall allow a user to initiate prerecorded audio, live paging, or programmed sequences to individual schools, all schools or groups of schools, from the web-based user interface. Programmed sequences shall be customizable per school, and the system shall be able to activate them simultaneously to individual schools, all schools or groups of schools, from the web-based user interface.

19. The communications software must allow upgrade from an individual school system to multiple schools, or an entire school district, using the same web-based user interface. The communications software from an individual school system must be identical in typical user operation to the multiple schools or entire school district communications system software.

20. The system allows for emergencies to be initiated as drills for practice. Drills may include all or some of the associated steps as its corresponding emergency sequence. Drills are recorded in the event history report.

21. The system provides the ability to export lists of bell schedule steps, emergency sequences, staff directory, users, peripherals, and zone targets.

C. Campus Controller

1. Provides call routing for paging and intercom for a single facility.

2. System shall connect to the district provided Telephone Network via a SIP connection.

3. Support a flexible numbering plan allowing two, three, four, five, or six-digit extensions.

4. SIP interface to a district provided Telephone Network shall be capable of allowing connected phones to display classroom call-ins, answer internal intercom call-ins, make pages and change priorities of call-ins in progress.

5. Direct dialing, two-way amplified voice intercom between any provided telephone or admin console and speaker without the use of a press to talk or talk listen switch.

6. Ability to upgrade priority level from individual call switch.

7. The ability to answer intercom call-ins registered at administrative consoles and pre-selected telephones.

8. The ability to automatically escalate incoming call-ins to an alternate telephone or group of telephones if they remain unanswered for a predetermined amount of time.
9. The ability to manually upgrade an intercom call-in to an alternate telephone or group of telephones.
10. The ability for classrooms to “check-in” via push button when they have successfully secured their location during emergency.
11. Administrative console shall display locations that have not checked in to confirm their secured location and provide hands-free audio monitoring and communication to unsecured locations.
12. The controller shall not need direct connection to any classroom via home run or distributed wiring. It shall communicate solely through the IP network.
13. Single button access from any console on the system to distribute emergency announcements within the facility to all or select locations equipped with speakers. Emergency announcements originating from any assigned administrative console shall have priority over all regular system functions.
14. Ability for administrative consoles and connected phones to selectively monitor audio at any two-way speaker during an emergency.
15. Stores a minimum of 48 hours’ worth of Bell Event Schedules, all emergency notification sequences as well as facility wide configuration.
16. System can sync system time to the Atomic Clock Signal or to the school’s or districts network time server.
17. System’s SIP Interface shall provide:
    a. Audio paging access from any telephone to any single intercom speaker, zone (group) of intercom/paging speakers, or all speakers/paging horns throughout the entire facility.
    b. Ability to answer a call-in directed to that SIP extension.
    c. Ability to upgrade a call-in directed to that SIP extension.
    d. Single button access from any telephone on the system to initiate alarm signals within the facility to all or select locations equipped with speakers. A minimum of 25 separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative telephone shall have priority over all regular system functions.
    e. Ability to initiate a school-wide emergency including lockdown and evacuate sequences.
    f. SIP device shall display call-in information from call in switch. Information will include a minimum of Classroom Name, Number, and Priority Level.
18. The system will have the ability to utilize a web browser and a USB microphone connected to the PC to deliver district-wide live emergency paging, pre-recorded messages and tones from any authorized computer in the facility or the district. The system must be capable of automatically notifying district personnel via the WAN of an alarm condition.
19. The system will have the ability to utilize a desktop microphone to deliver school-wide live emergency paging and zone paging throughout the facility.
20. The system can automatically broadcast emergency instructions throughout an entire campus when an alarm (e.g. lockdown, lockout, security, fire) is tripped or

manually activated. The emergency instructions are preprogrammed and require no user intervention. Bell tones can be halted during an emergency. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.

21. The system can integrate with emergency weather radios to generate live emergency broadcasts notification throughout a facility.

D. IP Addressable Modules:

1. System shall provide multiple IP Addressable Modules for intercom, paging and relay activation.
    a. All Modules are POE 802.3af compliant
    b. All Modules support DHCP.
    c. All Modules connect to network with a single RJ45 connector
2. IP Addressable Speaker Module
    a. Shall interface to school's data network, a classroom speaker, and multiple call switches.
    b. A minimum of 5 levels of call-in can be placed from an IP Speaker Module. The call-ins are routed to administrative consoles and select SIP connected telephones and can only be cleared from the system once answered. If a call-in is not answered within a preprogrammed time the call-in may reroute to other telephones, consoles, and speakers.
    c. An option for Privacy call in switches is supported. When the Privacy switch is activated it prevents administrative or classroom telephones from monitoring the specific classroom/location intercom speaker.
    d. The ability to belong to one or more of a minimum of 100 independent zones for zone paging, program/music distribution zones and class change tone zones; this assignment is a programmable function, changeable by time of day. Each IP Speaker Module's location shall be programmed in software to belong to any combination of software zones. IP Speaker Modules shall be designed to mount near ceiling and wall speakers and in the plenum space.
    e. Intercom and paging volume adjustable from Software interface.
    f. Module will support and power a status light that displays individual classroom information including call-ins placed, testing status and emergency check-in status.
3. IP Addressable Zone Paging Module
    a. Zone Paging Module shall connect multiple speakers for district all page, all page, zone paging, bells, audio events and, emergency notification.
    b. Zone Paging Modules shall be rack and wall mountable.
    c. Zone Paging Modules shall be able to belong to one or more of 100 independent zones for live paging, bells, pre-recorded audio and emergency notification.
4. IP Addressable Aux I/O Module
    a. Aux I/O Module shall have two input contacts and two output contacts.
    b. Input and output contacts are individually addressable.
    c. Aux I/O Module shall be wall and rack mountable.

d. User can program relays to be activated manually, through an event/bell schedule, or during emergency notification.

e. Aux I/O Module can perform school lockdown from a single press of a panic button.

5. IP Addressable Program Line Input Module

a. Program Line Input Module shall provide line level audio program distribution into system.

b. Program Line Input Module shall have a 3.5mm cable jack.

c. Program Line Input Module shall be configured via web-based user interface.

d. User can configure program distribution to be activated manually or automatically through an event/bell schedule.

e. Program Line Input Module will have a system priority level such that emergency communications override program distribution.

6. IP Addressable Microphone Input Module

a. The system shall support a minimum of five (5) Microphone Input Modules per school.

b. Microphone Input Module shall support dynamic and condenser style microphones.

c. Microphone Input Module shall support microphones with or without Push-To-Talk functionality.

d. Microphone Input Module shall support configurable paging priorities.

e. Microphone Input Module shall provide user feedback for paging activity.

f. Microphone Input Module shall have adjustable microphone gain levels.

g. Microphone Input Module shall be configurable from the web-based user interface.

h. Live pages from the Microphone Input Module can automatically increase audio priority during an emergency.

E. IP Addressable Analog Gateway

1. IP Addressable Gateway provides integration with existing analog wiring infrastructure – consisting of shielded two-pair classroom field wiring. The Gateway provides the ability to reuse speaker wiring, speakers, and punch blocks to integrate analog infrastructure with IP platform.

2. Each Gateway will have 5 watts of power per port and 25 watts total per device.

3. Supports 24 classrooms that utilize 25 Volt speakers and all current intercom system call switches for front office notification.

4. Supports reusing existing shielded two-pair classroom field wiring.

5. Classroom intercom volume adjustable from Software interface.

6. Classroom paging volume adjustable from Software interface.

7. Configured to the school network and can be used in conjunction with IP Addressable Modules.

F. IP Addressable Administrative Console

1. A full color screen with 64 soft keys, 3 line select, volume control, push to talk, speakerphone mode and left/right and up/down scrolling.
2. Audio paging access from any Console to any single intercom speaker, zone (group) of intercom/paging speakers, or all speakers/paging horns throughout the entire school.
3. Programmable soft key access from any console on the system to initiate alarm signals within the school to all or select locations equipped with speakers. A minimum of 25 separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative console shall have priority over all regular system functions.
4. Programmable soft key access from any console to automatically broadcast page emergency instructions throughout an entire school when an alarm (e.g. lockdown, lockout, security, fire) is tripped or manually activated. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
5. Ability to perform intercom to any single IP Addressable Speaker Module.
6. Ability to display 3 call-ins at a time on the screen while other call-ins are annunciating and the ability to scroll to view all call-ins.
7. Ability to upgrade a call-in via soft key.
8. Programmable soft key access from any console for activating relays, campus wide.
9. Ability to maintain, along with controller and other IP Modules system functions, including intercom, bells and paging for the local campus in the event of district-wide connection loss.
10. Classrooms that have not ‘checked-in’ during an emergency are listed on the Administrative Console’s screen.
11. The time duration of an emergency is shown on the screen of the administrative console. The check-in timer is shown on the screen of the administrative console.

G. Audio Paging/Program Amplifiers

1. Power amplifier(s) shall be provided to provide a minimum of 2 watts of power to all paging speakers, and 15 watts of power to all paging horns.
2. The maximum load on the paging/program amplifiers shall be 80% of the rated maximum output of the amplifiers.

H. Single Function Call Switch

1. Call Switches indicated on the drawings shall provide the following functions and features:
   a. Call switch that shall activate a call from single button activation. The button will route the call-in to any one or more Administrative Consoles for quick and easy response from an Administrative Console.

K. Zone Page Amplifier Module

1. Depending on configuration the amp output is either 14- or 35-watts output.
2. Can be wall or rack mounted.
3. Powered with either a wall wort or POE+

M. Equipment Racks

1. All equipment racks shall provide 44 spaces (77”) minimum for mounted system equipment.
2. All equipment racks shall be multi-rack format (“gangable”) style, bolted together, and open cavity.
3. All equipment racks will be provided with lockable rear doors.
4. Equipment rack(s) shall be in climate-controlled areas/rooms as shown on drawings.
5. All head-end, distribution, and source equipment, including data and power, shall be in racks configured as approved by the Engineer.
6. Rack mounted equipment shall be accessible from front and rear.
7. All unused rack spaces will be covered with appropriate blank/vent panels.

N. Interior Speakers

1. Provide Speaker Assembly consisting of 8 Ohm, 8” speaker with a power rating of 8 watts and mounted on a baffle with an integrated back box that covers the full area of the baffle. Transformer assembly shall be dual voltage multi-tap type suitable for 25 or 70-volt installations.
2. The speaker shall be connected by inserting an 8-pin RJ45 terminated Cat 6 cable.
3. Speakers shall be vandal resistant and white in color.

P. Exterior Wall Mounted Horns

1. Provide double re-entrant type horn loudspeakers with integral driver. The horn loudspeaker shall be impervious to weather and vandalism. Horn shall be constructed of heavy-duty ABS plastic. Horn loudspeaker drivers shall be rated at 15 watts with a frequency response of 480 Hz to 14 KHz. Sensitivity shall be 106 dB 1 watt, 1 meter. Transformer assembly shall be dual voltage multi-tap type suitable for 25 or 70-volt installations. Dispersion pattern shall be 180 degrees conical. The horn loudspeaker shall be constructed of treated heavy gauge aluminum, with all exposed parts potted and a sealed driver. Wiring terminal shall be fully enclosed. The speaker flange and mounting surface shall have a cork-rubber gasket. The horn loudspeakers finish shall be gray baked on enamel.
2. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The back box shall be 10-3/4”x10-3/4”x6” deep.
3. The baffle shall be vandal proof, the faceplate constructed of 14-gauge carbon steel with a minimum tensile strength of 55,000 PSI. A lattice grid sub-plate shall deny access to the horn but be acoustically transparent for sound projection. Provide tamper proof, stainless steel mounting hardware. The baffle shall a mar/scratch baked epoxy rust inhibitive finish.

Q. Uninterruptible Power Supplies (UPS)

1. UPS equipment provided for this system will include Power Conditioning to smooth current and voltage fluctuations.
2. UPS equipment will be sized in accordance with the system manufacturer’s recommendations.

3. Provide an individual UPS for EACH SYSTEM CONTROLLER (Gateway) furnished with the system.

4. Provide additional UPS(s) for protection of all other equipment furnished with the system and housed in the equipment racks.

5. All UPS equipment shall be rack mounted.

2.3 CONDUCTOR

A. All conductors shall be run in conduits/enclosed raceways. Refer to project manual section 27 20 00 “Data Cabling and Infrastructure” for types of cables.

B. All underground intercom wire between buildings shall be Aquaseal.

PART 3 - EXECUTION

3.1 DIVISION OF WORK

A. While all work included under this specification is the complete responsibility of the Contractor, the division of actual work listed following shall occur.

B. The conduit, outlets, etc., which form part of the rough-in work shall be furnished and installed complete by the Electrical Contractor. The balance of the system, including installation of speakers and equipment, making all connections, etc., shall be performed by the manufacturer's authorized representative, and the entire responsibility of the system, its operation, function, testing and complete maintenance for one (1) year after final acceptance of the project by the Owner, shall be the responsibility of this organization.

3.2 EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.

B. Furnish and install all material, devices, components and equipment for a complete operational system.

C. Impedance and Level Matching: Carefully match input and output impedance’s and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring: Install control circuits in accordance with NFPA 70 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.

E. All housings are to be located as indicated.

F. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

G. Plug Disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.

H. Protection of Cables: Cables within equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material ("cat-tract") shall be installed on edges of holes,

lips of ducts or any other point where cables or harnesses cross metallic edge. All wiring shall be in conduit. Conceal conduits in ceiling and walls whenever possible. Interior exposed conduits shall be "surface raceway" type installed parallel and at right angle to room dimensions. Surface raceway shall be installed tight against wall/ceiling and wall/wall room edges. Conduit/raceways shall be installed as per section 26 05 00 “Basic Material & Methods and 2019 CEC.

I. Cable Identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall be a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.

J. Shielding: Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

K. All cable and wires shall be labeled at IDF cabinets, speakers, call-in switches and at Campus Controller.

L. Nameplates: IDF cabinets and Junction boxes shall have plastic engraved nameplate to identify each with Drawings and Specifications. Nameplate letters or numbers shall be minimum 3/8" high.

M. Outlet Box Identification: All outlet boxes mounted in attic space shall be individually identified with waterproof market.

N. All cables shall be run in continuous lengths between IDF cabinets and equipment, no splicing permitted.

O. Contractor is responsible for performing underground survey of all areas to be trenched to locate all existing utilities. Contractor will repair any damaged underground utilities at no cost to the District.

P. All intercom Stations shall be labeled with the circuit feeding the system.

Q. Provide physical isolation from speaker microphone, telephone, line level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12-inch minimum separation between conductors to speaker microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.

R. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.

S. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.

3.4 GROUNDING

A. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

C. Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.

D. The contractor shall note in their system drawings, the type and location of these protection devices, as well as all wiring information.

E. The contractor shall furnish and install a dedicated, isolated earth ground from the central equipment rack and bond to the incoming electrical service ground buss bar.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Inspection: Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

C. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

3.6 FINAL ACCEPTANCE TESTING

A. The Final Acceptance Testing shall be provided to the Owner or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.

B. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner’s Representative establishing the “In Warranty” date. The warranty period will not commence until the Final Acceptance Test is completed.

C. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.7 COMMISSIONING

A. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be in accordance with the training as outlined in **Paragraph 1.6** of these specifications. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.

B. Schedule training with Owner through the owner’s representative, with at least seven days advance notice.

3.8 OCCUPANCY ADJUSTMENTS

A. The contractor shall provide Occupancy Adjustments in accordance with Section 1.6 of these specifications. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.

3.9 CLEANING AND PROTECTION

A. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets will be covered with blank panels. Top and side panels, and all cabinet doors will be installed. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up. No cabinets will be left unlocked and all cabinet keys will be turned over to the owner or designated owner’s representative.

END OF SECTION

SECTION 27 05 28 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Work included: Provision of materials, installation and testing of:

1. Raceways
2. Rigid Metal Conduit and Fittings
3. Electrical Metallic Tubing and Fittings
4. Conduit Accessories
5. Penetration Sealing Systems
6. Telecommunications Outlet Boxes
7. Pull Boxes
8. Innerduct
9. Innerduct Fittings
10. Wire Basket Runway

1.2 RELATED SECTIONS

A. Contents of Division 26 and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26 00 00 and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Section 26 00 00 and Division 01, General Requirements.

B. In addition, provide:

1. Plan drawings showing completions and as-built corrections which indicate type, size, placement, routing, and/or length for raceway and cable tray components; e.g., manholes, handholes, conduit, wireway, boxes, enclosures, etc.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 26 00 00 and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00 and Division 01, General Requirements.

1.7 DEFINITIONS

A. Cabinet: A freestanding floor-mounted modular enclosure designed to house and protect rack-mounted electronic equipment.

B. Conduit: Round raceway.

C. Conduit Body: Separate portion of a conduit or tubing system that provides access through removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

D. Pull Box Enclosure: Box with a cover installed in one or more runs of raceway to facilitate pulling conductors through the raceway system. There are no openings in the cover.

E. Raceway: Enclosed channel designed expressly for holding wires or cables. Metal or insulating material, and the term includes conduit, tubing, wireways, underfloor raceways, and surface raceways; does not include cable tray.

F. Surface Raceway: Surface-mounted metal channel or plastic duct with snap-in removable covers for housing and protecting electrical wires and cables. Raceway and fittings are designed so sections can be electrically and mechanically coupled together without subjecting cables to abrasion.

G. Wireway: Sheet metal or nonmetallic troughs with hinged or removable covers for housing and protecting electrical wires and cables and in which conductors are laid in place after the wireway has been installed as a complete system.

H. Wire Basket Runway Systems: Includes, but are not limited to straight sections of type wire basket runway cable trays, bends, tees, elbows, drop-outs, supports and accessories.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers as specified in specific article below.

2.2 RACEWAYS

A. Raceways: Labeled and/or listed as acceptable to the Authority Having Jurisdiction (AHJ) as suitable for the use intended.

Table 1 -Product Identification

Product Designation	**Product Type**
RGS	Rigid galvanized steel.
CRS	PVC externally coated RGS.
EMT	Galvanized steel tubing.
PVC	Polyvinylchloride conduit.
ENT	Electrical nonmetallic tubing.
LMC	Liquidtight metal conduit.
LNC	Liquidtight nonmetal conduit.

B. The product identification codes used for the Communications Raceways and Boxes in Part 2, Products, are summarized in Table 1.

C. Manufacturers:

1. Koppers Bitumastic.
2. Scotchwrap.

D. Bitumastic material or plastic tape.

2.3 RIGID METAL CONDUIT AND FITTINGS

A. Conduit:

1. Type RGS: Rigid galvanized steel.

2. Type CRS: PVC externally coated conduit; rigid steel conduit with external PVC coating and internal galvanized surface.

B. Fittings and Conduit Bodies: In-line straight-through, threaded, galvanized steel fittings and Type C conduit bodies only; do not use bends or tees, e.g., Lbs.

1. Bonding and Grounding Locknuts and Wedges: Malleable iron with set screws and lug screws.
2. Insulated Bushing: Malleable iron with integral insulated throat, rated for 150C.
3. Bonding and Grounding Bushing: Malleable iron with integral insulated throat, rated for 150C, with solderless lugs or lug screws.
4. Sealing Fittings: Threaded type conduit seal fittings and sealing compound suitable for hazardous location installations in accordance with CEC:

a. Crouse-Hinds retrofit sealing fitting EYSR.
b. Crouse-Hind CHICO A sealing compound.

2.4 ELECTRICAL METALLIC TUBING AND FITTINGS

A. Type EMT: Electrogalvanized steel tubing.

B. Fittings and Conduit Bodies:

1. General: In-line straight-through steel or malleable iron fittings and Type C conduit bodies only; do not use bends or tees, e.g. Lbs.
2. Wet Areas: Steel compression-type couplings and nipples.
3. Dry Areas: Set screw-type couplings and nipples.
4. Bonding Locknuts: Malleable iron with set screws and lug screws.

a. Insulated Bushing: Malleable iron with integral insulated throat, rated for 150C.
b. Bonding and Grounding Bushing: Malleable iron with integral insulated throat, rated for 150C, with solderless lugs or lug screws.

2.5 CONDUIT ACCESSORIES

A. Duct Spacers: Nonmetallic base and intermediate duct spacers with locking keyways designed specifically for use with nonmetallic conduit; e.g., Carlon SNAP-LOC duct spacers for 4-inch diameter conduit with 1-1/2-inch separation.

1. Base Spacer: S288NHN.
2. Intermediate Spacer: S289NHN.

B. Expansion/Deflection Fittings: Similar to Crouse-Hinds XD expansion/deflection coupling or Appleton DF Series deflection and expansion coupling.

C. Pulltape: Measuring and pulling tape constructed of synthetic fiber with plastic jacket, printed with accurate sequential footage marks; e.g., George-Ingraham 1/2-inch tape 9216-JK.

D. Duct Plugs:

1. Aboveground Conduit Openings: Tapered PVC plugs with tab for pulltape; e.g., Carlon 4-inch PVC plugs with pull tab, P258NT.

2. Underground or Underslab Conduit Openings: Removable screwtight compression type duct plugs with wing-nut and corrosion resistant hardware; e.g., Pacific Plastics No. 5900514, George-Ingraham 0605, or Vikimatic P4000WT.

2.6 PENETRATION SEALING SYSTEMS

A. Firestopping: Provide fire barrier penetration sealing materials as specified in Division 07, Firestopping section.

B. Duct Water Seal: Products suitable for closing underground and entrance duct openings, where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure; e.g., SEMCO PR 851.

2.7 TELECOMMUNICATIONS OUTLET BOXES

A. Sheet Metal Outlet Boxes: Minimum 4-inch square by 2-1/8-inch deep, galvanized steel for use with single-gang plaster rings.

B. Five Square Outlet Boxes: Minimum 5-inch square by 2-7/8-inch deep with built-in cable management for use with single-or double-gang plaster rings. Randl P/N T-55017 approved.

C. Nonmetallic Outlet Boxes: Minimum 4-inch square by 2-1/2-inch-deep. Provide gasketed, watertight single-gang cover.

D. Cast Boxes: 4-inch square by 2-1/8-inch deep cast Feralloy, gasketed single-gang cover, threaded hubs.

E. Floor Boxes for Installation in Cast-In-Place Concrete Floors: Flush mounted and fully adjustable formed steel as shown on the Drawings. Floor boxes provided by Division 26.

F. Plaster Rings: Single-gang as shown on the Drawings.

2.8 PULL BOXES

A. Construction: NEMA Standard No. 250. Type 1 galvanized steel enclosures designed for use as junction boxes and pull boxes with flat screw-applied covers, with or without knockouts, and gray enamel finish.

2.9 INNERDUCT

A. Outdoor Innerduct: 1-inch inside diameter corrugated, ribbed, or smooth walled, semi rigid PVC or heavy-wall polyethylene tubing.

B. Indoor Innerduct: 1-inch inside diameter corrugated, ribbed, or smooth walled, semi rigid nonflammable PVC tubing, which meets UL94V-O vertical flame test for general applications.

C. Plenum-Listed Indoor Innerduct: 1-inch inside diameter corrugated walled innerduct for use in plenum air handling spaces.

D. Indoor plenum-rated fabric innerduct with pull string. Maxcell or approved equivalent.

2.10 INNERDUCT FITTINGS

A. Couplings: Metallic or nonmetallic quick-connect, reverse threaded, and Schedule 40 couplings for connecting sections of installed innerduct.

B. Conduit Plugs: Compression-type conduit plugs with locking nuts for sealing and securing the outside walls of one or more innerduct ends to the inside wall of 4-inch inside diameter conduits, e.g.:

1. Four 1-inch innerduct configuration.
2. Three 1-1/4-inch innerduct configuration.

C. Innerduct Plugs: 1-inch and 1-1/4-inch compression-type innerduct plugs for sealing innerducts, with wing nut for hand tightening and eyebolt for securing pulltape.

D. Innerduct Caps: Removable push-in caps for plugging 1-inch and 1-1/4-inch innerduct.

2.11 WIRE BASKET RUNWAY

A. Tray sizes have 4-inch side height.

B. Supply straight sections in standard 120-inches, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on Drawings.

C. Tray Widths: 12-inches.

D. Make splice plates the fast splice type as indicated below for each tray type.

1. Make splice plates of yellow zinc dichromate steel.
2. Furnish splice plates with straight sections and fittings as required by manufacturer.
3. Finish: Electro zinc.

E. Wire Basket Runway Supports: Trapeze style supports.

F. Materials and Finish: Continuous steel welded and formed wire mesh, electro zinc finish.

G. Loading Capacities: Wire basket runways to meet NEMA Class Designations.

H. Manufacturers: Subject to compliance with these Specifications, install wire basket runway.

I. Cablofil, B-Line, Wiremaid, MonoSystems or approved equivalent.

PART 3 EXECUTION

3.1 WORKMANSHIP

A. Provide, condition, apply, install, connect, and test manufactured products, materials, equipment, and components in accordance with the manufacturer's specifications and printed instructions.

B. The installation of system components to be carried out under the direction of qualified personnel. Appearance to be considered as important as mechanical and electrical efficiency.

C. Workmanship to meet or exceed industry standards.

D. Place support for framing, raceways, cable trays, backboards, equipment racks, and cabinets.

3.2 PROTECTION DURING CONSTRUCTION

A. Protect products from the effects of moisture, corrosion, and physical damage during construction. Except during installation activity in a section, keep openings in conduit, tubing, and wireway capped with manufactured seals during construction.

3.3 MINIMUM CONDUIT SIZE

A. 4-inch for underground applications unless otherwise indicated on the Drawings.

B. Size recessed conduits to surface raceway serving multiple data outlets as follows. Sizing is based on TIA/EIA 569-B for 28 percent conduit fill, assuming Category 5e cables (nominal

outer diameter 0.24-inch) to each data outlet. Provide recessed backbox between surface raceway and recessed conduit sized for conduit.

1 to 6 cables	1-inch conduit
7 to 10 cables	1-1/4-inch conduit
11 to 15 cables	1-1/2-inch conduit
16 to 20 cables	2-inch conduit

Above 20 cables: Use multiple runs of conduit from surface raceway based on above table

3.4 MINIMUM BACKBONE CONDUIT REQUIREMENTS

A. Install three 4-inch conduits from MER to each TR, unless otherwise noted on Drawings.

3.5 CONDUIT TYPE TO BE USED

A. Install the following types of circular communications raceway in the locations listed unless otherwise indicated on the Drawings.

1. Interior Dry Locations, Exposed: EMT with set screw fittings.

2. Interior Dry Locations, Concealed (Not Embedded in Concrete): EMT with set screw fittings.

3. Interior Wet Locations: EMT with compression fittings.

4. Exterior, Exposed Including Roof: Rigid steel conduit.

5. Exterior, Underground: PVC Schedule 40 Conduit.

6. Concrete-Encased Duct Banks:

a. PVC Schedule 40 conduit.
b. Rigid steel conduit when additional protection is required.
c. Flexible Conduit (Interior Exposed):
d. Liquidtight flexible metal conduit for use with copper cable.
e. Liquidtight flexible nonmetallic conduit for use with fiber optic cable.

3.6 CONDUIT BENDS AND SWEEPS

A. Make changes in direction of communications conduit runs with sweeps of the longest possible radius.

B. Make sweeps in parallel or banked runs of conduits, 2-inches and larger in diameter, from the same center or centerline so that sweeps are parallel and of neat appearance.

C. Field-Made Bends and Sweeps:

1. Use an acceptable hickey or conduit-bending machine.

2. Do not heat metal raceways to facilitate bending.

3. Before installing 4-inch field-made sweeps in duct banks, pull a 3-1/2-inch diameter by 12-inch long mandrel through duct sections to verify circularity and sweep radius.

D. The angular sum of the bends between pull points and/or pull boxes to not exceed 180 degrees.

E. Minimum Inside Bend Radius for Communications Conduit Bends, Sweeps, Boxes, and Fittings:

1. Underground or Underslab 4-inch Conduit: 60-inches.

2. Other Conduit Runs:

a. One-inch conduit, 11-inches.
b. Two-inch conduit, 21-inches.
c. Three-inch conduit, 31-inches.
d. Four-inch conduit, 40-inches.
e. Other sizes, 10 times the inside diameter of the conduit.

F. Do not install boxes, bends, elbows, tees, conduit bodies, and other conduit fittings, which do not provide for the minimum inside cable bend radius specified in paragraph E above.

1. Conduit Bodies: In-line straight-through Type C condulet fittings can be used as pull boxes for conduit up to a maximum of 2-inches ID. Other conduit fittings, which include direction changes such as E, L, LB, LR, LL, LRT, TA, TB, and X, are not allowed.

2. Refer design or installation conflicts with these requirements to the Architect.

3.7 PENETRATIONS

A. Seal conduit entering structures at the first box or outlet to prevent the entrance of gases, liquids, or rodents into the structure.

1. Empty Conduits: Removable screwtight duct plugs.

2. Innerduct Installed: Suitable duct water seal between conduit and innerduct. Manufactured seals in empty innerduct.

3. Cable Installed: Suitable duct water seal between conduit and cable, or between innerduct and cable.

B. Concrete Sleeves: Conduits routed perpendicular through floors, walls, or other concrete structures to pass through cast-in-place conduit sleeve openings wherever possible, or appropriate size holes to be bored to accommodate the installation of conduit sleeves. The size and location of the holes to not impair the structure's integrity.

1. Concrete Boring: Bore a hole in the concrete with a diameter of 1/2 to 1-inch larger than the conduit sleeve to be installed. Grout around the conduit sleeve and finish to match existing surroundings.

2. Conduits that rise vertically through a slab to be stubbed 6-inches above the floor and capped pending future use.

C. Drywall/Gypsum Board Sleeves: Install insulating throat bushings on both ends of conduit sleeves placed in fire-rated walls using drywall construction.

D. Where conduit enters a structure through a concrete roof or membrane waterproofed wall or floor:

1. Provide a watertight seal.

2. With Concrete Encasement: Install watertight entrance seal device on the accessible side.

3. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.

4. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.

E. Provide continuous sleeving through walls, floors and ceilings separating each data outlet from its respective MER/TR room, using sleeve conduit size as required on Drawings. Restore penetrations through rated assemblies to original fire rating per NFPA and local codes.

F. Locate sleeves as shown on Drawings. Where sleeves are not shown on Drawings, install sleeves above suspended ceilings, and locate to minimize length of pathway for future cable from data outlet to MER/TR rooms.

G. Where sleeves are routed between rooms with floating ceilings, extend conduits horizontally 2-feet over edge of floating ceiling to avoid exposed cabling from being seen at floor level.

H. Make floor penetrations no more than 4-inches from wall. Install conduit stubs to extend 4-inches from floor base. Cap conduits for protection.

3.8 ABOVE-GROUND CONDUIT INSTALLATION

A. Support conduit installed in aboveground interior and exterior locations at a maximum of 7-feet on center.

B. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.

C. Securely attach aboveground conduit under the provisions of this Section.

D. Conceal conduit in finished areas, leave exposed in unfinished areas and where not possible to conceal. In finished areas, the Architect will make the final decision on conduit concealment.

E. Run exposed and concealed conduits parallel or perpendicular to walls, structural members, or intersections of vertical planes to maintain headroom and provide a neat appearance. Follow surface contours as much as possible.

F. No section of conduit located within buildings to exceed 100-feet in length between pull points and/or pull boxes.

G. Expansion/Deflection Joints:

1. Where indicated on the Drawings, provide specific purpose expansion/deflection fittings for conduit crossing building expansion/deflection joints in structures or concrete slabs.

2. Expansion fittings to have copper bonding jumper.

3. For PVC conduit, provide expansion/deflection joints for 25 degrees F maximum temperature variation. Install in accordance with manufacturer's instructions.

4. For rigid steel conduit located in exterior areas, provide expansion/deflection joints for maximum site temperature variation, installed in accordance with manufacturer's instructions.

H. Provide each conduit passing from a nonhazardous or noncorrosive area to a hazardous area and each conduit entering an enclosure within a hazardous area with a sealing fitting in accordance with NEC Article 500. The sealing fitting to be UL listed and to be filled with approved sealing compound of the same manufacture.

I. Hubs, Bushings, and Insulating Sleeves:

1. Interior Box and Cabinet Connections: Install insulating throat connectors wherever conduit terminates in boxes or cabinets. In addition, install bonding type locknuts at metallic conduit terminations.

2. Wet Box and Cabinet Connections: Use watertight threaded conduit sealing hubs with insulated throat and bonding type locknuts for fastening rigid steel conduit to cast or sheet metal pull boxes.

3. Exposed Conduit Terminations: Cap exposed steel communication conduit ends with bushings or smooth collars to protect cable sheath.

J. Flexible Conduit:

1. Make no bends in flexible conduit that exceed allowable bending radius of the cable to be installed or that significantly restricts the conduit's flexibility.

2. A flexible conduit section to be long enough to allow the item to which it is connected to be withdrawn or moved off its base.

3. For final connection to TO's or equipment, where flexible connection is required to minimize vibration or where required to facilitate removal or adjustment of equipment, provide 12-foot minimum lengths of flexible conduit or as indicated on the Drawings.

3.9 PULLTAPE AND DUCT PLUGS

A. Following conduit installation, install pulltape (muletape) with preprinted foot markers in each empty conduit containing a bend or over 10-feet in length, except sleeves, nipples. Tie the pulltapes securely to duct plug or wall racking at each end.

B. Immediately after pulltape installation, install removable manufactured plugs in empty conduit and wireway openings. For underground conduit openings, use screwtight, removable, watertight, and dust-tight duct plugs.

C. Verify lengths at the time of installation and provide as-built documentation.

3.10 WIREWAY TYPE TO BE USED

A. Install the following types of wireway in the locations listed unless otherwise indicated on the Drawings:

1. Interior, Exposed: Steel.

2. Interior, Concealed: Not approved.

3. Exterior, Exposed: Steel or nonmetallic.

3.11 WIREWAY INSTALLATION

A. Install wireway, as indicated on the Drawings.

B. Securely support wireways at intervals not to exceed 5-feet and at each end or joint for individual sections.

C. Attach wireways and related materials under the provisions of this Section.

D. Run exposed wireways parallel or perpendicular to walls, structural members, or intersections of vertical planes to maintain headroom and provide a neat appearance.

E. Close dead ends of wireway with fittings by the same manufacturer.

F. Gasket each joint if in oiltight gutter.

G. Mount raintight gutter in horizontal position only.

H. Maintain grounding continuity between raceway components to provide a continuous grounding path.

3.12 TELECOMMUNICATIONS OUTLET BOX INSTALLATION

A. Provide 4-inch by 4-inch by 2.5-inch deep outlet boxes for mounting telecommunications outlets with single-or double-gang plaster rings as required, or as indicated on the Drawings.

B. Do not install outlet boxes back to back in walls. Provide minimum 6-inch separation, except provide minimum 24-inch separation in acoustic-rated walls.

C. Locate outlet boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for outlet boxes. Use boxes with sufficient depth to permit conduit hubs to be located in masonry void spaces.

D. Provide knockout closures for unused openings.

E. Support telecommunications outlet boxes independently of conduit.

F. Use multiple-gang boxes where more than one device is mounted together; do not use sectional outlet boxes.

G. Install outlet boxes in walls without damaging wall insulation.

H. Coordinate mounting heights and locations of outlet boxes mounted above counters, benches, and backsplashes.

I. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlet boxes in hollow stud wall.

J. Provide cast outlet boxes in exterior and wet locations.

3.13 RACEWAY IDENTIFICATION BANDING

A. Degrease and clean surfaces to receive tape labels.

B. Exposed conduits and wireway, including raceways above lay-in or accessible ceilings, together with associated pull boxes to be banded at intervals of not over 10-feet and at direction changes. Two-band identification to be different contrasting colors as follows:

Raceway Use	**Color**
Grounding	Green
Building fire alarm system/voice evacuation	Red
Telecom/Datacom	Yellow
Facility management system (FMS) and general	Blue and Black

control circuitry	
CCTV	White
Building monitoring and security	Grey
Controls (non-FMS)	Brown and White

3.14 WIRE BASKET RUNWAY INSTALLATION METHODS

A. Cut standard straight sections of materials to length in the field.

B. Deburr and file rough edges and cut sections.

C. Locations shown on the Drawings are approximate unless dimensioned.

D. Install as shown on the Drawings and securely attach under the provisions of this Section.

E. Entire length of wire basket runway to be accessible.

F. Maintain minimum 6-inch clearance between cable tray and piping. Locate a minimum of 12-inches away from heat sources such as parallel runs of flues, steam or hot water pipes, and heating appliances.

G. Run exposed and concealed cable tray parallel or perpendicular to walls, structural members, or intersections of vertical planes to maintain headroom and provide a neat appearance.

H. Do not obstruct passageways.

I. Route wire basket runway within the assigned communications utility space.

J. Install appropriate cable tray bends, dropouts, and other accessories to protect minimum cable bend radius and provide adequate support at locations where cable direction changes occur.

3.15 PENETRATIONS

A. Provide removable heat-expanding pillows at fire barrier penetrations as specified in Firestopping section, and described as Firestop Material Type 7 (indicated as FSM-7).

3.16 INNERDUCT TYPE TO BE USED

A. Underslab and Underground Conduit Installation: Outdoor or indoor innerduct.

B. Aboveground, Exterior, and Interior Conduit Installations: Indoor innerduct.

C. Interior Exposed Locations Including Cable Tray Installations:

1. Nonplenum Areas: Indoor innerduct.

2. Plenum Areas: Plenum-listed innerduct.

3.17 INNERDUCT INSTALLATION

A. Pull innerduct through conduit and wireways, or place innerduct in cable trays using continuous unspliced lengths of innerduct between pull boxes, and/or section termination points as indicated on the Drawings.

B. Cut innerduct square. Deburr cut ends.

C. Bring innerduct to the shoulder of fittings and couplings and fasten securely.

D. Wipe innerduct and fittings clean and dry before joining. Apply full, even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

E. Provide suitable innerduct slack in pull boxes, and at turns to ensure that there is no kinking or binding of the cable.

F. Make changes in direction of communications innerduct runs with sweeps of the longest possible radius and at least 10 times the inside diameter of the innerduct.

G. During innerduct pulling, avoid excessive tension which can damage the innerduct. Inspect innerduct following placement and replace damaged sections.

H. Indoor Conduit Installation:

1. Arrange innerduct neatly, cut to proper length, and remove surplus. Provide trained and bundled innerduct pigtails extending at least 18-inches beyond exposed conduit openings.

2. At locations where the ends of innerduct sections appear in a pull box, join the pulltape and then splice innerduct sections together using couplers which do not reduce the inside diameter of the innerduct.

I. Cable Tray Installation: Velcro innerduct to one side of vertical ladder rack every 2-feet minimum, and to one side of horizontal ladder-type cable tray every 5-feet minimum.

J. Following installation, visually inspect innerduct, remove burrs at openings, and, if necessary, clean innerduct interior.

K. Use factory pulling eye to prevent twisting of innerduct and cable.

3.18 PULLTAPE AND DUCT PLUG INSTALLATION

A. Following innerduct installation, install pulltape (muletape) with preprinted foot markers in innerduct sections. Tie the pulltape securely at each end.

B. Verify lengths at the time of installation and provide as-built documentation.

C. Following innerduct and pulltape installation, cap or plug innerduct with manufactured seals to prevent moisture or foreign matter from entering until cable installation starts. Seal duct openings in underground or underslab innerduct sections immediately after installation using screwtight, removable, watertight, and dust-tight duct plugs.

3.19 GROUNDING

A. Provide ground connections and bonding continuity between raceway and wire basket runway sections, boxes, enclosures, cabinets, and fittings as required per code and industry standard.

END OF SECTION

SECTION 27 13 00 -COMMUNICATIONS BACKBONE CABLING

PART 1 GENERAL

1.1 SUMMARY

A. Work included: Materials, installation and testing of:

1. Fiber Optic Backbone Cable
2. Copper Termination Hardware
3. Fiber Optic Termination Hardware
4. Copper Patch (Jumper) Cords
5. Fiber Optic Patch (Jumper) Cords
6. Splice Cases

1.2 RELATED SECTIONS

A. Contents of Division 27 and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Section 27 00 00 and Division 01, General Requirements.

B. In addition, meet the following:

1. NFPA 780, Standards for Installation of Lightning Protection Systems.

1.4 SUBMITTALS

A. Submittals as required by Section 27 00 00 and Division 01, General Requirements.

B. In addition, provide:

1. Shop Drawings that include, but are not limited to, the following: Telecommunication Room layout, Telecommunication Room wall elevations, equipment rack elevations, cable routing, cable connecting diagrams, termination pin outs, supporting hardware details, block diagrams, riser diagrams and cable pathways. Work may not begin until shop drawings are approved. Note: Intent of submitting shop drawings is for contractors to display a conceptual understanding of the issued Engineer drawings. Do not submit Engineer Drawings on your title block.
2. Procedures for cable labeling and identification, long term documentation methods and numbering scheme in accordance with ANSI/TIA/EIA-606-A.
3. A copy of certified installer certificates and warranty certificates for products proposed.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Section 27 00 00 and Division 01, General Requirements.

B. In addition, meet the following:

1. Manufacturers to have a recognized certified installer program in place for system components proposed. Cable will be approved with manufacturer system installed.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Section 27 00 00 and Division 01, General Requirements.

B. In addition, provide:

1. Labor, materials, and documentation according to Panduit/General manufacturer requirements necessary to ensure that the Owner will be furnished with an Extended Product Warranty and Application Assurance of a minimum of 25 years in length. The Application Assurance Warranty will cover the failure of the wiring system to support current or future applications that are designed for the link/channel specifications of ANSI/TIA/EIA-568-C. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, 10GBASE-T, and 155 Mb/s ATM.
2. Provide a warranty on the physical installation.
3. Furnish necessary documentation required by Panduit/General immediately following 100 percent testing of cables.
4. Administer the warranty process with the responsible Panduit/General representative. Provide warranty directly to the Owner from the manufacturer. Ensure that the manufacturer provides the Owner with the appropriate warranty certification within 90 calendar days of the final project completion.

1.7 SYSTEM DESCRIPTION

A. Provide a standards-based cable system to serve backbone communication systems requirements as specified in these specifications and shown on Drawings. Closely follow ANSI/TIA/EIA, IEEE and ISO standards which apply to backbone communication systems.

B. Install intrabuilding backbone cables from ER-s to TR's through raceway systems as shown on Drawings.

C. Install interbuilding (OSP) backbone cables from EF to ER's through duct and tunnel raceway systems as shown on Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide like items from one manufacturer, such as jacks, patch panels, equipment connection cords, and wall plates. The following manufacturers/solutions are preapproved.

1. ADC
2. Belden
3. BTR Netcom
4. Commscope
5. Corning -fiber optic only
6. Leviton
7. Ortronics/Berk-Tek
8. General or Panduit
9. Mohawk or Siemon

2.2 FIBER OPTIC BACKBONE CABLE

A. Intrabuilding Singlemode Riser: 12-strand, 8.3-micron, high performance low water peak distribution cable with maximum attenuation of .35dB/km at 1310 nm and .25dB/km at 1550 nm. OFNR rated.

B. Intrabuilding Singlemode Plenum: 12-strand, 8.3-micron, high performance low water peak distribution cable with maximum attenuation of .35dB/km at 1310 nm and .25dB/km at 1550 nm. OFNP rated.

C. Interbuilding: Singlemode: 24-strand, 8.3-micron, high performance low water peak loose tube cable with maximum attenuation of .35dB/km at 1310 nm and .25dB/km at 1550 nm. Cable will be hybrid under one jacket. Corning or approved equal.

D. General: between MDF and IDF: 24-strand singlemode 8.3-micron, high performance cable with maximum attenuation of .35dB/Km at 1310 nm and .25dB/Km at 1550 nm. Cable will be hybrid under one jacket. Corning or approved equal.

2.3 FIBER OPTIC TERMINATION HARDWARE

A. High Density Fiber Termination Shelf:

1. 7-inch-high shelf designed for mounting in 19-inch equipment racks and capable of accepting 12 adapter panels. The shelf will contain built-in slack management and be accessible from the front or rear with locking doors.

    a. 19-inch Rack Mount, 13-inches deep
    b. 19-inch rack mount, 19-inches deep

2. 3.5-inch-high shelf designed for mounting in 19-inch equipment racks and capable of accepting 6 adapter panels. The shelf will contain built-in slack management and be accessible from the front or rear with locking doors.

    a. 19-inch Rack Mount, 13-inches deep
    b. 19-inch rack mount, 19-inches deep

3. Fiber Adapter Panels:

    a. Adapter panel for high density termination shelf with 6 LC multimode phosphor-bronze alignment sleeves.

4. Preloaded Fiber Termination Shelf:

    a. 1.75-inch-high shelf designed for mounting in 19-inch equipment racks with 12 LC multimode phosphor-bronze alignment sleeves. The shelf will contain built-in slack management and be accessible from the front or rear.
    b. 1.75-inch-high shelf designed for mounting in 19-inch equipment racks with 24 LC multimode phosphor-bronze alignment sleeves. The shelf will contain built-in slack management and be accessible from the front or rear.

B. Singlemode LC Connector:

1. Ceramic tip LC style capable of being terminated on 8.3/125 fiber with 900-micron buffer.

2.4 FIBER OPTIC PATCH (JUMPER) CORDS

A. Singlemode Fiber Optic Jumpers:

1. Factory terminated double ended, two-strand singlemode cordage with LC connectors on each end, length as defined by the Owner.

2.5 SPLICE CASES

A. Fiber Optic: Provide as close as practicable (within 50-feet) of where OSP cable enters building in a duct or conduit system. Size splice cases(s) to accommodate strand count of the cable(s) entering building. Splice case must be capable of bonding to the Telecommunications Main Grounding Bus Bar (TMGB). Complete with end caps to properly seal cable from expanding water blocking gel. Approved manufacturers: Preformed, Corning, and 3M.

2.6 MISCELLANEOUS HARDWARE

A. Provide supporting hardware, cable ties, labels, underground vault racking, bullet bonds, gel blocking kits, pull rope, and other miscellaneous hardware for a complete and operable system.

PART 3 EXECUTION

3.1 GENERAL

A. Communications Backbone Cabling includes cables, jacks, patch panels, connecting blocks, and patch cords, as well as the necessary support systems, such as cable managers, tie wraps, and D-rings.

B. Furnish and install materials necessary for a complete and working system.

C. Contractor must be a Certified Installer for selected manufacturer prior to, during, and through completion of the system installation, and must be able to provide the manufacturer's extended warranty.

D. Perform work in a neat and workmanlike manner.

E. Install cable after interior of building has been physically protected from the weather and mechanical work likely to damage cabling has been completed.

F. Before installing cabling, ensure cable pathways are completely and thoroughly cleaned:

1. Inspect conduit, wireway, cable trays, and innerduct systems prior to installation.

2. Swab any additional enclosed raceway and innerduct systems.

G. Provide protection for exposed cables where subject to damage. Provide abrasion protection for any cable or wire bundles, which pass through holes or across edges of sheet metal.

H. Install cable ties and other cable management clamps via hand so that it fits snugly. Do not over tighten or use mechanical tools which could compress, crimp, or otherwise change the physical characteristics of the cable jacket or distort the placement of twisted-pair components. Replace any cable exhibiting stresses due to over tightening of cable management devices.

I. Where possible, route cables in overhead cable trays and inside wire management systems attached to the equipment cabinets and racks. Use Velcro ties or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets.

J. Co-install a pull cord (nylon; 1/8-inch minimum) with cable installed in conduit.

K. Limit cable raceway fill to less than the TIA/EIA-569-B maximum fill for the particular raceway type.

L. If a J-hook or trapeze system is used to support cable bundles, support cables at a maximum of 48 to 60-inch intervals. Cables are prohibited to rest on acoustic ceiling grids or panels.

M. Cable sizes are shown on Drawings. Verify that as a minimum, two cable pairs are provided for each telephone user outlet. Install specified fiber optic cable between TRs as shown on drawings.

N. Install cable above fire-sprinkler systems and ensure that the cable does not attach to the system or any ancillary equipment or hardware. Install cable system and support hardware such that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

O. Do not attach cables to ceiling grid or lighting fixture wires. Where support for cable is required, install appropriate carriers to support the cabling.

P. Any cable damaged or exceeding recommended installation parameters during installation will be replaced by the contractor prior to final acceptance at no cost to the Owner.

1. Install cable in accordance with manufacturer's recommendations and best industry practices.
2. Install cables in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
3. Install transition points or consolidation points in accessible locations and housed in an enclosure intended and suitable for the purpose, where allowed by standards and approved by the Owner's representative.
4. Do not exceed the cable's minimum bend radius and maximum pulling tension.
5. Install unshielded twisted pair cable so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
6. Do not exceed 25-lbf pulling tension on 4-pair UTP cable.

Q. Splice Case Installation: Provide splice cases within 50-feet of where OSP cable enters building in a duct or conduit system. Size splice cases to accommodate pair or strand count of cable entering building. Properly bond cable entering and exiting splice case to Main Telecommunication Grounding Bus Bar (TMGB). Install end caps to properly seal cable from expanding water blocking gel.

R. Determine requirements for plenum rated cable and devices. When doubt exists, seek prior determination in writing by AHJ.

S. Seal conduits entering from outside the building and install listed firestop material in conduits and sleeves to satisfy CEC and local codes.

T. Dress and terminate cables in accordance with the recommendations made in the ANSI/TIA/EIA-568-C.1 document, manufacturer's recommendations and best industry practices.

U. Terminate 4 pair cables on the jack and patch panels using T568A wiring scheme.

V. Maintain the cable jacket within 1-inch of the termination point.

W. Do not exceed 0.5-inch of pair untwist at the termination point.

X. Do not exceed 4 times the outside diameter of the cable in the termination area for bend radiance compliance.

Y. Neatly bundle and dress cables to their respective panels or blocks. Feed each panel or block by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

3.2 OPTICAL FIBER CABLE INSTALLATION PRACTICES

A. Place fiber optic cable so as to maintain the minimum cable bend radius limits specified by the manufacturer or ten times the cable diameter, whichever is larger.

B. Place fiber optic cable runs in innerduct. Use care when handling fiber optic cable. Carefully monitor pulling tension so as not to exceed the limits specified by the manufacturer.

C. Terminate fiber optic cable in rack-mounted fiber optic terminated units at each end using standard SC style bulkhead connectors.

D. Splicing of fiber optic cable is prohibited unless directed in drawings or approved via RFI.

3.3 TESTING PROCEDURES

A. Test cables and termination hardware for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-C.

B. Verify pairs of each installed cable prior to system acceptance. Repair or replace any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks in order to ensure 100 percent useable conductors in cables installed.

C. Test cables in accordance with this document, the ANSI/TIA/EIA standards, the manufacturer's procedures and best industry practice. If any of these are in conflict, bring any discrepancies to the attention of the project team for clarification and resolution.

1. The cable length will conform to the maximum distances set forth in the ANSI/TIA/EIA-569-C standard. Record cable lengths, referencing the cable identification number and circuit or pair number. For multi-pair cables, record the shortest pair length as the length for the cable.
2. Follow the Standards requirements established in ANSI/TIA/EIA-568-C.
3. Perform testing with a Level IV tester.
4. The basic tests required are:

    a. Wire Map
    b. Length
    c. Attenuation
    d. NEXT (Near end crosstalk).
    e. Return Loss
    f. ELFEXT Loss
    g. Propagation Delay
    h. Delay skew
    i. PSNEXT (Power sum near-end crosstalk loss).
    j. PSELFEXT (Power sum equal level far-end crosstalk loss).
    k. Provide test results in written format, with the following minimum information per cable:
    l. Circuit ID
    m. Test result, “Pass” or “Fail”
    n. Date and Time of test
    o. Project Name
    p. NVP

D. Provide an electronic copy of the test results, in the native tester software format, to the Consultant along with the written test results.

E. Provide a fully functional version of the tester software for use by the Consultant in reviewing the test results.

F. Any failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs), must be reported in writing to the Consultant immediately, along with a copy of the test results.

G. Labeling:

1. Label cables using a machine printed label at each end of the cable at approximately 12 - inches of the termination point, and again at approximately 48-inches from the termination point. Do not use handwritten labels.
2. Label patch panel ports with the cable identifier.
3. Provide the final cable ID matrix to the Architect one week prior to cable installation.
4. Note labeling information on the as-built drawings.

3.4 PATCH CORDS

A. Fiber Optic: Provide sufficient duplex fiber optic jumpers (patch cords) at each fiber termination point to cross-connect one-half the number and type of fibers terminated there. Assume a minimum of 2 duplex fiber optic jumpers per termination point for a 6-strand optical fiber.

B. Provide lengths for a neat appearance not to exceed 15-feet. Some jumpers may require LC to SC, or SC to ST connections to support existing or readily available hardware. Coordinate connector requirements with Owner.

C. Field terminated patch cords and jumpers are not allowed.

END OF SECTION 27 13 00

SECTION 27 20 00 – DATA CABLING AND INFRASTRUCTURE

1.1 SCOPE

A. Furnish And Install The Following:

1. Product submittals, construction drawings, Contractor qualifications.

2. All Category 6a data cable, jacks and related terminations.

3. All fiber optic cable, jacks, inner duct, and related terminations.

4. Wiring cabinets complete with necessary Category 6a and fiber optic patch panels and required patch Cables.

5. Testing and certification of fiber optic cable and terminations.

6. Testing and certification of Category 6a cable and terminations.

B. References

1. References to Category 6a in this specification shall mean the latest approved version of the EIA/TIA Category 6a standards.

C. Work In Other Sections

1. Section 26 00 00, 26 05 00.

2. Section, Excavating, Back-filling, and Compacting.

D. Contractor Qualifications

1. Data/networking systems/cabling Contractors shall have the following qualifications:

a. 5 years experience in the design, installation, testing and maintenance of data communications systems and associated inside and outside network cabling and systems.

b. Contractor must employ full time at least one BICSI certified Registered Communications Distribution Designer (RCDD) who is involved in approving all design work covered by this project.

c. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

d. Possess a full working knowledge of data/networking systems, cabling and infrastructure planning in accordance with EIA/TIA 568 and 569.

e. Has performed successful installation and maintenance on at least three (3) projects similar in scope and size.

f. Can provide contact job references on at least three (3) similar projects, including scope of Work, project type, owner/user contact name and

telephone number.

g. Holds and maintains a valid California C-7 or C-10 Contractors License and can exhibit validity upon request.

h. Possesses the ability to create AUTOCAD "as built" documentation, including hard copy and digital media.

i. Possess calibrated acceptance testing equipment as delineated within EIA/TIA 568 Building Wiring Standards for Ethernet network topology and can perform acceptance testing through 1000Mbps.

E. QUALITY ASSURANCE

1. Contractor will provide for each installer proposed for Work in the data cabling portion of this project a Panduit Certificate of completion for training in fiber optic and/or Category 6a cabling.

2. Only workers with certificates of fiber optic training may perform Work in that area.

3. Only workers with certificates of Category 6a training may perform Work in that area.

4. The District's inspector or project manager may ask any or all data cabling Workers to demonstrate their skill level before performing any Work or continuing Work. If in the opinion of the District any worker is found to be deficient in this area, the Contractor must immediately provide necessary training to remove the deficiency or replace the worker with one having the required skills.

5. The Contractor shall place and maintain on the project a sufficient number of skilled workmen who are thoroughly trained and experienced on the necessary crafts and completely familiar with the specified requirements and methods needed for the proper performance and completion of the Work.

6. The Contractor must provide a project manager who has demonstrated the ability to supervise similar projects. The project manager must be available to be interviewed by the District and/or their representative, and must be deemed acceptable by the District and/or their representative. The Project Manager must be available to attend meetings as required.

7. The Work of this section shall conform to California Code of Regulations, and all other applicable codes and standards.

8. Only a qualified Contractor holding licenses required by legally constituted authorities having jurisdiction over the Work shall do the defined Work. The Contractor shall have been engaged in business of supplying and installing the specified type of systems for at least three (3) years and shall be an equipment manufacturers' certified Contractor for the specified type cabling system.

9. Manufacturer shall warranty availability of spare parts common to proposed system for a period no less than that stipulated within the California Multiple Award Schedule (CMAS) terms and conditions. If no time period is contractually stipulated, the Contractor shall provide a warranty of 15 years.

10. Contractor shall warranty all Certified installations for a period of not less than fifteen (15) years from the date of acceptance. A complete installation warranty will be provided per site with specific details of the coverage. The Contractor shall repair or replace at no expense to the District, any defective material or Workmanship discovered within the warranty period. Any materials, structures or Work damaged thereby that may be displaced in repair or replacement of material and/or Workmanship will be replaced and/or repaired at no cost to the District. Examination of or failure to examine Work by the District shall not relieve Contractor from these obligations.

11. Contractor shall have a service organization capable of responding to warranty service requests within 24 hours of receipt of written notification and resolution within 5 Working days for MDF equipment and 15 Working days for IDF equipment located either in the IDF or computer laboratory. If Contractor fails to repair or replace material or Work indicated above within 15 days of receiving written notice, the District, may at its discretion hire a qualified Contractor to make required repairs and assess cost against Contractor. Contractor shall include the telephone number of the customer's client contact for three (3) completed projects and a letter signed by a corporate officer, partner, or owner of the contracting company describing the service capability of the company and stating the company's commitment to maintain that service capability through the warranty period. Persons skilled in the trade represented by the required Work, and in accordance with all applicable building codes, shall install the systems in accordance with best trade practices.

12. Contractor shall include in the Material List Submission copies of the manufacturers' valid certifications that the Contractor is an authorized installer of the submitted manufacturers' products and has been adequately trained in the installation of those products. This applies to all Category 6a components and cable and all fiber optic components and cable.

F. Rules And Regulations -- All Work and materials shall be in full accordance with the latest rules and regulations of the following codes, industry standards and references:

1. State of California:

   a. Title 24, Building Standards, State of California.

   b. Occupational Safety and Health Act (OSHA).

   c. Title 8, Electrical Safety, State of California.

   d. Title 19, California Code of Regulations.

2. Telecommunications Industry Association/Electronics Industry Association (TIA/EIA).

   a. ANSI/TIA/EIA-STD-RS455, Standard Test Procedures for Fiber Optic Fibers, Transducers, Connecting and Terminating Devices.

   b. BICSI-Telecommunications Distribution Methods Manual-1995, or latest version, volumes #1 & 2.

   c. Underwriters Laboratories Inc. (UL): Applicable listings and ratings.

d. UL LAN Cable Certification Level 6.

e. National Electric Code.

f. National, State, and Local Occupational Safety and Health Administration (OSHA) building and fire codes.

g. ANSI/TIA/EIA Telecommunications Building Wiring Standards.

h. ANSI/TIA/EIA-568-A and B, Commercial Building Telecommunications Cabling Standard (October 1995)

i. ANSI/TIA/EIA-568-A-2, Corrections and Additions to TLVEIA-568-A-2 (August 1998)

j. ANSI/TIA/EIA-568-A-3, Addendum No. 3 to TIA/EIA-568-A (December 1998)

k. ANSI/TIA/EIA-568-B.2-1, Transmission Performance Specifications for 4-Pair 100 ohm Category 6a Cabling

l. ANSI/TIA/EIA-568-B-3 Optical Fiber Cabling Components Standard (March 2000)

m. ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces (February 1998).

n. ANSI/TIA/EIA-569-A-1 Commercial Building Standard for Telecommunications Pathways and Spaces Addendum 1 - Surface Raceways (March 2000).

o. ANSI/EIA/TIA-598-A, Optical Fiber Cable Color Coding (May 1995)

p. ANSI/TIA/EIA-606, The Administration Standard for the Telecommunications Infrastructure of Commercial Building (February 1993).

q. ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications (August 1994).

r. ANSI/TIA/EIA-758, Customer-Owned Outside Plant Telecommunications Cabling Standard (April 1999).

s. ANSI/TIA/EIA-758-1, Addendum No. 1 to TIA/EIA-758, Customer-Owned Outside Plant Telecommunications Cabling Standard (March 1999).

t. TIA/EIA TSB-67, Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems (October 1995).

u. TIA/EIA TSB-72, Centralized Optical Fiber Cabling Guidelines (October 1995).

v. Institute of Electrical and Electronic Engineers (IEEE) 802.3 (Ethernet), 802.32 (Gigabit Ethernet over optical fiber), 802.3ab (Gigabit Ethernet over 4 pair category 5 or higher), 802.11 (Wireless LAN).

w. BICSI Telecommunications Distribution Methods Manual (2000 or latest).

x. FCC Part 68.50.

y. National Fire Protection Association (NFPA), NFPA-70.

z. CCR Part 3 - California Electrical Code.

aa. CCR Part 2 - Uniform Building Code.

bb. ITU International Telecommunications Union.

3. Nothing in the drawings or specifications is to be construed to permit Work not conforming to the codes or standards. These codes or standards are to be considered minimum requirements. Should the plans or specifications call for material, methods or construction of a higher standard, the plans or specifications shall govern.

1.2 SUBMITTALS

A. Construction Schedule

1. Construction Schedule to be provided by the Contractor and approved by the District prior to Notice to Proceed.

a. Submit a Construction Schedule outlining project milestone in the project as follows:

1. Submittals
2. Conduits & Raceways
3. Racks/Cabinets, and hardware & components
4. Horizontal Cable
5. Fiber Optic Cable
6. Cabling Testing
7. Final Inspection
8. Closeout Documents, as-builts, test records, etc.

1.3 MATERIAL SUBMITTALS

A. Submit manufacturer's literature including product specification, and installation instruction for all hardware, cabinets, racks, components, cable, and materials to be provided for this project.

1. Submit four (4) complete sets of Product Submittal as follows:

2. Each set shall be edge bound (not stapled).

3. Each set shall be formatted as follows:

a. Title Page, showing project name & address, owners name, Contractors name & address.

b. Table of Contents, listing page number of each product in submittal, product manufacturer and model number, in the order as follows:

c. Active Components, and Electronic Equipment.

d. Fiber optic Cable, with connectors, patch panels, and patch cables.

e. Category 6a Cable, with connectors, patch panels, and patch cables.

f. Racks and Enclosures.

g. Raceways, including all manufacturers factory fittings, devices boxes, and faceplates, in each size to be used.

h. Conduits, including all fittings, connectors, bushings, and junction boxes, in each size to be used.

i. Misc. items, fasteners, cable support, sealants, etc.

4. Submit one (1) complete set of Product Submittal above in electronic form (e.g. PDF, HTML)

1.4 CONSTRUCTION DRAWNGS:

A. Submit one (1) “ANSI B” size reproducible Construction Drawing and one (1) in electronic form (e.g. PDF format).

1. Construction Drawings: as follows:

EC0 - Title Sheet
EC0.1,2,3… - Drawing Index/symbol sheet.
EC1.1,2,3… – Site Plans
EC3.1,2,3… - Floor plans. At 1/8” scale, as follows:
-Data outlet locations with circuit number.
-MDF & IDF locations
-Cable pathways
-Raceways
-Rough in
-Mounting height
-Conduit size
-Wire type
-Wire fill
EC4.1,2,3… - Equipment Rooms/Rack Elevations. At scale as required.
EC5.1 – Riser
EC6.1 – Racks
EC7.1,2,3… – Installation Details, as required
--Mounting details Stamped and signed by Engineer licensed in jurisdiction for Work of this type.
--Show loads, strength of connections, etc
--Show calculations -on drawings or in bound volume for review by authorities having jurisdiction.

1.5 SYSTEM SPECIFICATIONS

A. Cable Plant Requirements

1. The cable plant shall be a star configured, unshielded twisted pair system and shall support data rates as required for Category 6a specifications.

2. The drop cable shall run from intermediate distribution frame (IDF(s)) to each classroom and office location as well as other miscellaneous locations defined in the scope of this project.

3. The trunk fiber optic cable shall run between the main distribution frame (MDF) and each IDF location as indicated on the project drawings (if supplied).

4. The cable plant shall meet EIA/TIA-568 “Commercial Building Telecommunications Wiring Standard” and the maximum length of any UTP data drop shall NOT exceed 100 meters including patch cables and future station cables in the classroom.

5. Every IDF location shall have one dedicated 24-strand hybrid multi-mode and single-mode fiber optic cables (dedicated from other MDF for LAN service). There should be 12 strands of single-mode and 12 strands of multimode fiber.

6. Quantity of LAN cable drops shall be as indicated in Figures 1 and 2. Typical classroom cable drop distribution and count, and Typical office drop distribution and count, respectively.

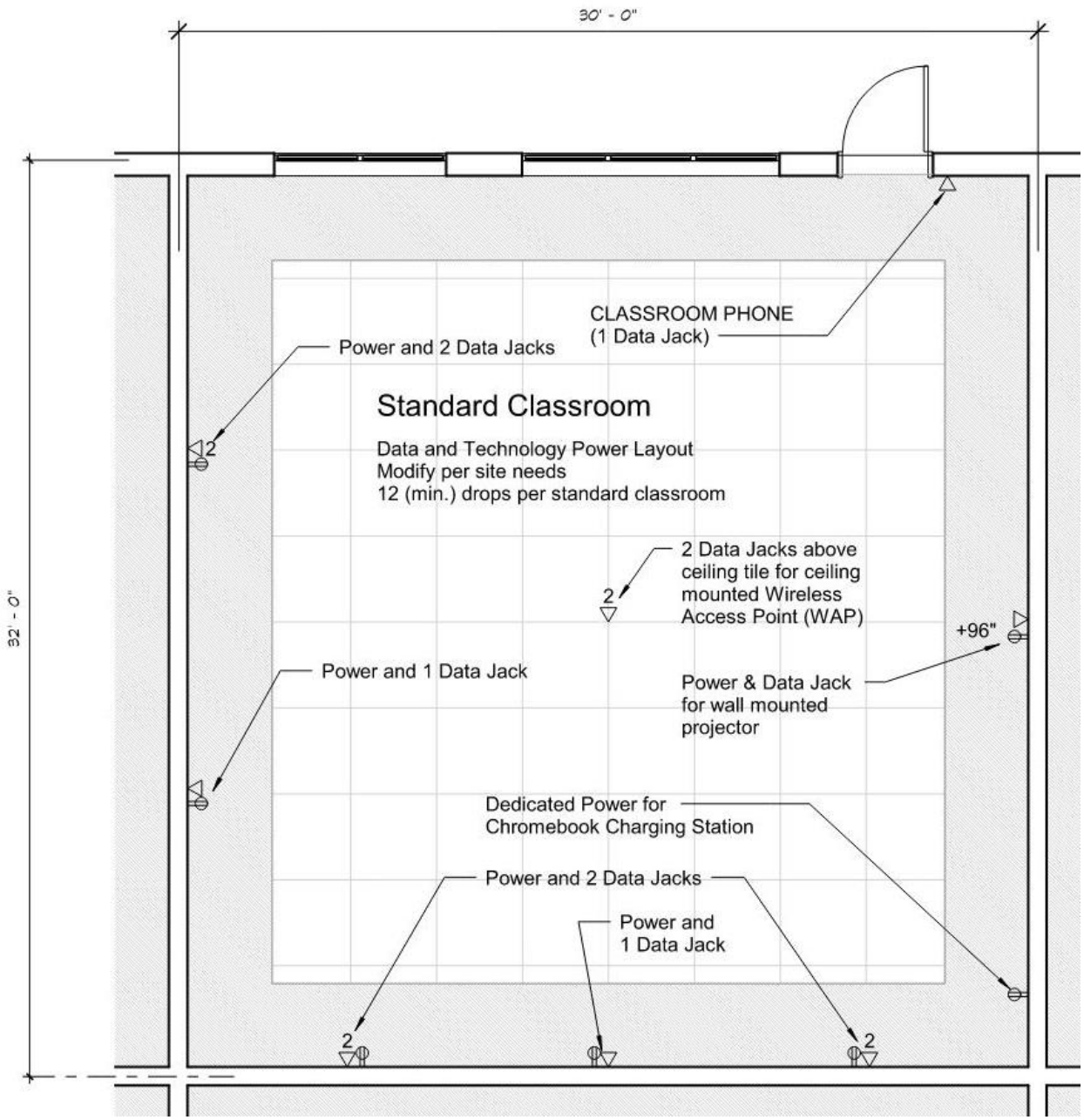


Figure 1. Typical Classroom

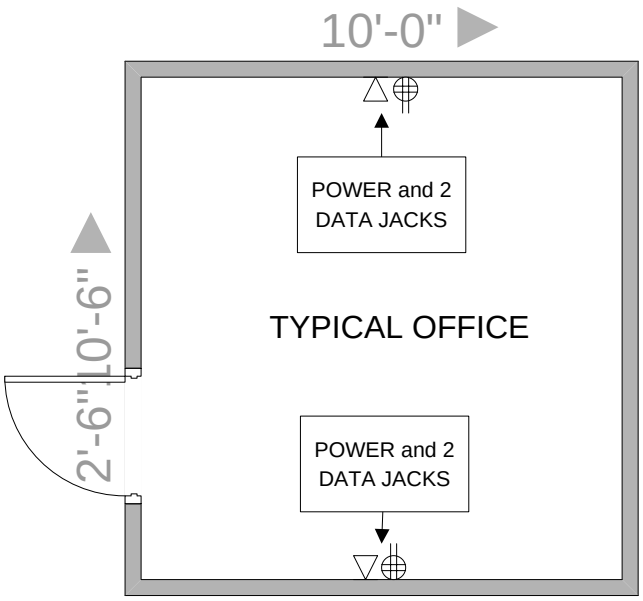


Figure 2. Typical Office

2.1 PRODUCTS

A. Inside Plant Category 6a Cable, UTP.

1. Cable shall meet, as a minimum, the requirements of the latest revision of EIA/TIA Category 6a.

2. The UTP cabling shall be Belden 7851A DataTwist 600e or equivalent (please have SUSD Information Services approve any replacement brands).

B. Outside Plant Category 6a Cable, UTP.

1. Outside plant Category 6a cable shall be designed and constructed for installation in outside underground conduits and shall meet the transmission requirements for TIA/EIA 568-B Category 6a horizontal cables.

2. Cable construction shall utilize a UN-resistant Polyethylene jacket with water blocking flooded core. The Outside Plant Category 6a cable shall be Mohawk part# M57622 or equal.

C. Category 6a Patch Panels.

1. Shall be rack mounted with 24, and/or 48 modular front accessible RJ45 jack ports (Based on Configuration).

2. Panels shall be Panduit part # CP- (#of ports) BL loaded with 24 or 48 Category 6a RJ45 jacks (Based on Configuration). Jacks shall be Panduit brand or of a brand of equivalent quality (SUSD Information Services shall approve any replacement brands).

2.2 WIRE MANAGEMENT

A. Wire management shall be provided for each patch panel and switch installed into the MDF and IDF racks or cabinets (see drawings for details).

B. Vertical wire management shall be Panduit Part# WMPV45

C. Horizontal wire management shall be Panduit Part# NCMH2.

2.3 DATA JACKS

A. Data jacks shall meet the requirements of most recent revision of EIA/TIA Category 6a Standard. The data jacks shall be Panduit brand or equivalent quality (SUSD Information Services shall approve any replacement brands).

2.4 DATA JACK PLATES/HOUSINGS/ENCLOSURES

A. Data Jack Plates and housings shall be appropriate for jack type and location where they are to be used and shall be labeled using a numbering system specified by the District. Color shall be approved by the District.

2.5 FIBER OPTIC CABLE

A. All data backbone/trunk fiber optic shall be 24-strand Ethernet compliant cable.

1. On campuses with existing fiber optic cable that is 62.5/125 micron multimode fiber, the same shall be used and shall be Corning Part# M-RN-12-DN-L-OR-SI or equal.

2. On campuses with no existing fiber optic cable (ie. new school with no existing infrastructure), then a hybrid fiber optic cable with 12 strands of multimode (50/125 micron) and 12 strands of single-mode (9/125 micron) fiber shall be used. Such fiber shall be Corning brand or equivalent. SUSD Information Services shall approve any replacement brands.

3. All data fiber optic cable shall be labeled with sequential strand identification including color scheme, and destination of fiber.

2.6 FIBER OPTIC PATCH PANEL

A. The fiber patch panel for the MDF location shall be rack mountable with applicable number of LC duplex port connector outlets for termination of all fiber runs (24 strands per IDF). The fiber patch panel for the MDF shall be sized such that the initial installation does not exceed 60% of its capacity.

1. The MDF fiber patch panel shall be Panduit FAP12WAQLCZ for multi-mode and FAP12WBULCZ for single-mode.

2. Panduit part # FAP6WEIDLC mounting plate with 6 duplex LC connectors shall be used to support each IDF. The Panduit FRME72E5BL will support up to 144 strands of fiber or 12 IDF(s). If the configuration exceeds this capacity then the vendor should use comparable substitutions necessary to support the greater capacity.

3. The IDF patch panel shall be a Panduit FMD24 loaded with FAP6WEIDLC.

B. NOTE: If current campus configuration utilizes ST or SC type connectors, then above

mentioned part numbers shall be adjusted to substitute ST or SC. If the installation is a part of a new campus, and there is no existing fiber optic cable, then LC type terminations and connectors are to be utilized.

2.7 FIBER OPTIC PATCH CORDS

A. The Fiber Patch Cords shall be factory constructed using materials that are compliant with the current revision of Fiber Optic Standards.

B. The Fiber Patch Cords shall be Panduit P/N F6D2-3M2 for SC to ST terminations, Panduit P/N F6D3-3M2 for LC to LC terminations. Substitutions for patch cords of equal quality must be approved by district prior to installation. For installations that require 50/125 multimode or 9/125 single mode fiber, vendor must substitute above mentioned part numbers must be adjusted to accommodate 50/125 or 9/125 fiber.

2.8 CATEGORY 6a PATCH CABLES

A. The Category 6 Patch Cables shall be factory constructed using materials that are compliant with the current revision of the Category 6 Standard.

B. The Patch Cables shall be Panduit UTPCH – YL (Yellow) or equal and the length shall be no longer than necessary to accommodate the physical layout of the equipment to be connected.

2.9 DATA CABINETS/RACKS

A. The following cabinets/racks shall be used:

Cabinet/Rack Configuration	Dimensions	*Typical Use	Make/Model or Equal
Floor Mounted Open Rack	19"W x 7' H	IDF's in Secure Environments	

-Typical use will vary with site. Rack type may be specified by District personnel.

1. Cabinet size shall be chosen such that the initial installation does not exceed 60% of the number of available Rack Units.

2.10 INNERDUCT

A. The Inner duct shall be an extruded, corrugated wall, coil able and meet the following additional criteria:

1. Manufactured of Polyethylene with a density of .944 gm/cc.

2. One inch diameter.

3. Orange in color.

4. Tensile strength: 500 pounds.

5. Impact Resistance at 32 degrees F: 50 ft. Pounds.

6. Couplings shall be threaded metallic type.

7. Shall have factory installed pull-rope.

2.11 POWER STRIP

A. Power Strip shall be Wiremold #R8BZ-15, six surge suppressed outlets, rear mounted, 19" rack mount. Any specification for a UPS (uninterruptible power supply) power supply negates the need for a power strip, assuming the UPS accommodates a sufficient number of receptacles.

3.1 WIRING CABINET

A. FOR MDF USE

1. MDF is existing

B. For IDF Use

1. The designated IDF rack shall provide adequate space to house the necessary network devices and equipment that will support the corresponding number of data drops with room for future growth.

2. The IDF shall provide connectivity to the fiber optic backbone and connection to data jacks/outlets in various locations.

3. The IDF shall be located within 90 Meters of all jacks served by the IDF.

C. Cabinet Mounting

1. Provide the following equipment and materials at the MDF and IDF locations:

a. A plywood ¾" fire rated A-C backboard measuring a minimum of 2' X 4' shall be installed on an appropriate wall. The backboard shall be installed in a manner that will allow the designated cabinet to be mounted approximately six inches from the ceiling unless otherwise designated.

b. Floor mount freestanding racks require 30" minimum clearance from walls and obstructions unless otherwise designated. Ladder rack should cross overhead from the wall to the relay rack for free standing systems.

c. The mounting of cabinets and racks shall be done in accordance with all code requirements including earthquake standards for the local area. It is the vendor's responsibility to fully comply with these requirements to help ensure the safety of the District's students and employees.

d. All cabinets shall be grounded or bonded in accordance with NEC Article 250

3.2 CATEGORY 6 CABLE

A. All Category 6 cable installation shall be in accordance with manufacturers recommendations, and as referenced in the TIA/EIA standard, and the following:

1. All cable shall be hand pulled and neatly formed.

2. Provide rigging to allow cable to feed from spools without twists.

3. Pulling tension shall not exceed 25 pounds.

4. Cable runs shall be installed in continuous lengths, without splice.

5. Minimum cable bending radius shall not be less than four times the cable diameter or less than the manufacturers recommendation, both during cable pulling and in the final installation.

6. Individual and group cable runs in accessible ceiling spaces shall be open cable runs supported by “J” hooks attached to the building structure. Cable support spacing shall not be greater than 5 feet. Cables shall not be pulled tight, but shall exhibit a “noticeable” sag.

7. Cables shall not be pulled through “J” Hooks, but shall be pulled using low friction devices such as pulleys or other equipment, then placed into the “J Hooks.”

8. Cable routing shall be positioned to minimize obstruction when accessing the space and to minimize the potential for damage from other building construction or maintenance operations.

9. Cables shall be routed by grouping into a bundle and branching to the final locations with right angle bends.

10. Provide as a minimum 10 foot service loop inside the cabinet for each cable run, neatly formed and mounted to the back of the cabinet.

11. Bundled cables shall be tie wrapped to prevent undue sagging between cable support devices. Tie wraps shall be manually tightened, without tools, to avoid deforming the cable.

12. Cables shall not rest upon “T” bar ceiling or be supported from existing ceiling, fixtures, or air terminal support wires.

13. Provide a 6 to 12 inch length of cable at each jack location, and 10 foot length of cable in the ceiling (if possible), to accommodate future servicing of the jack.

14. All cable in exposed indoor areas shall be installed in an approved plastic raceway system which provides a not to exceed 40% fill ratio.

15. Cable routed via concealed, non-accessible spaces shall be installed per Specification Section 16010 or as shown on the drawings.

16. Maintain cable spacing from sources of electromagnetic interference in accordance with TIA/EIA-569.

17. Observe manufacturer’s recommendations for cable stripping and maintenance of pair twists at terminations. Maintain cable jacket to within .5 inches of the point

of termination.

18. Cables in Classroom, Offices, etc. shall be installed within wall spaces where possible. Drill through blocking if necessary.

3.3 PATCH PANELS, CATEGORY 6

A. Install Category 6 patch panels at locations in wiring cabinets as indicated.

1. Cables shall be secured with tie wraps at patch panel cable management support bar to stabilize cable and ensure proper maintenance of bend radius.

2. Each patch panel port shall be labeled with the jack number that it serves. The label on the attached port cable shall provide the information for the port label.

a. Port label shall consist of the MDF/IDF designation followed by the 3-digit drop location number (i.e. A-001, A-002……B-001, B-002……).

b. The lettering color shall be black on a white background.

c. The label shall be machine printed on a “self-laminating”, adhesive material.

d. The label shall be applied in the space provided on the patch panel.

B. Contractor shall demonstrate a clear understanding of the labeling concept before proceeding with label application.

C. Contractor shall submit a sample of the proposed label for written approval by the District.

3.4 INNERDUCT

A. Any time fiber optic cable penetrates a building or is exposed in a Christy box, it shall be encapsulated in District approved innerduct. If it is not reasonable or feasible to use innerduct due to space limitations or routing issues, then a district representative must be notified.

3.5 FIBER OPTIC CABLE INSTALLATION

A. Fiber optic cable shall be installed only after complete raceway system and inner duct has been installed.

B. Any observed bending of any fiber optic cable during the installation process which exceeds the manufacturer’s recommended bending radius shall be cause for complete replacement of that cable at the Contractor’s expense. Such bending can cause micro-cracks which are undetectable with normal testing, and which can cause performance problems in later years.

C. Fiber optic cables runs shall be installed in a continuous length, no splice allowed. Additionally, there shall be no cross-connects between any IDF and the MDF, without prior approval.

D. Provide necessary rigging to allow cable to feed from reels without twisting and provide a smooth bending transition of cable outside the raceway.

E. Pulling tension shall be monitored and not exceed the manufacturer's recommendations.

F. Minimum cable bending radius shall not be less than 20 times the cable diameter during pulling installation and not less than 10 times the cable diameter after installation.

G. All fiber optic cabling installed underground and within buildings shall be installed in an approved raceway. Except, in accessible attic spaces fiber optic cable may be run "open" in "J Hooks" or other approved support system.

H. All fiber optic cabling installed underground shall be rated for outdoor installation and shall be installed in an approved underground raceway.

I. Provide a 36-inch length of buffered fiber at each fiber patch panel or storage tray. Provide at a minimum, a 15 foot service loop of cable at both ends of each cable run, neatly formed and mounted to the back of the cabinet.

J. Individual buffered fibers shall be grouped in pairs and labeled. The fiber pair shall be considered as a single port cable (much the same as a 4 pair, Category 6 cable which is considered a single port cable).

K. When SC connectors shall be installed on the fiber pair, a separate duplexing clip shall be applied to join the connectors as a duplexed pair.

L. SC/ST connector shall be attached to the fiber using an epoxy type cement, or equal. Crimp type connectors are not acceptable.

M. Any cable not meeting District approved specifications shall not be installed.

N. Any cable installation not meeting manufacturer specifications shall be removed and reinstalled.

3.6 FIBER OPTIC CONNECTORS

A. Connectors shall be attached to fiber strands using an epoxy type cement.

B. Crimp type connectors are not acceptable.

C. Connectors with indexing gel are not acceptable.

D. Connectors shall be Panduit.

E. Following installation and termination of the cable, conduct the following tests, using an approved Fluke DSP 4000 or equal:

1. Measure end-to-end attenuation at 850 and 1300 nm for Multimode fiber.

2. Measurement must be made from each end of the cable.

3. Any cable or termination that shows signs of deterioration or failure to meet manufacturers specification shall be replaced.

4. Measurements shall be made in the presence of a District appointed observer.

3.7 LABELING AND IDENTIFICATION

A. Category 6 Jacks

1. Category 6 jack numbers will be developed by the Contractor using the following information and have the generalized format shown below.

2. X-ZZZ Where: X=MDF/IDF designation. Will be capital letters beginning with A as the MDF. ZZZ= Jack location # beginning with 001 and ending at 999 (e.g. 001,005,090, etc.) For example; Jack # D-035 indicates: Jack 035, served by IDF-D.

3. Ceiling mounted Wireless Access Point (WAP) locations should be labeled on T-Bar, two Category 6a Jacks should be placed above ceiling tile.

B. Category 6a Cable

1. Cable label information shall appear two times on the cable to facilitate ease of reading.

2. All cable labels shall have the same orientation.

3. The label shall be machine printed using an electronic labeling system, Brothers, P-touch 1200 or a laser printer, on appropriately size vinyl or other approved material. Lettering shall be black and printed on a white surface and covered with a clear protective material. A one-piece label is required. Labels shall be placed on each end of the cable, approximately four inches back from the point of termination. Labels shall be computer generated using appropriate software.

4. Contractor shall submit a sample of the proposed label for written approval before installation.

5. Hand written labels will not be accepted.

C. Fiber Optic Patch Panel

1. The MDF fiber optic patch panel labeling shall have the following generalized format:

a. Label on panel shall denote the letter designation of the IDF serviced.

b. Each strand shall be labeled 1 through 24 and fibers are to be terminated on the patch panel using standard color coding. For example:

Strand 01= BLUE
Strand 02= ORANGE
Strand 03= GREEN
Strand 04= BROWN
Strand 05= SLATE
Strand 06= WHITE
Strand 07= RED
Strand 08= BLACK
Strand 09= YELLOW
Strand 10= VIOLET
Strand 11= ROSE
Strand 12= AQUA
…and so on.

D. Fiber Optic Cable

1. Cable Label information shall appear two times on the label to facilitate ease of reading.

2. Cable Label shall depict the letter designation of the IDF that is serviced by that cable.

3. All Cable Labels shall have the same orientation.

4. The label shall be machine printed, using a laser printer, on appropriately sized Mylar, vinyl or other approved material. Lettering shall be black and printed on a white surface and covered by a clear protective material. A one-piece label is required. Labels shall be placed on each end of the cable, approximately four inches back from the point of termination. Labels shall be computer generated using appropriate software.

5. Contractor shall submit a sample of the proposed label for written approval before installation.

E. Data Jack, Plates/Housings/Enclosures:

1. Each Cat. 6 Jack shall be labeled using information obtained per Section 16744 - 3.01 E.1.

F. IDF Racks:

1. The label shall be machine printed, using a laser printer, on appropriately sized Mylar, vinyl or other approved material. Lettering shall be black and printed on a white surface and covered by a clear protective material. A one-piece label is required. Labels shall be computer generated using appropriate software.

3.8 PLACEMENT AND ADJUSTMENTS OF JACK LOCATIONS

A. Contractor shall locate jacks as near as possible to the specified pre-determined locations.

B. Where jack locations are obstructed by existing construction or Architectural features or to accommodate minor furniture re-arrangement, revise jack locations as directed by the District's Representative.

C. Any jack location revisions as directed by the Owner shall be accomplished at no change in Contract cost, if re-location is within 20 feet and remains within the room shown on the plans.

3.9 PLACEMENT OF WIRING CABINET

A. Contractor shall, upon approval of the District representative, remove or modify any items, such as shelves or cabinets, which may prevent the installation of the equipment cabinet.

3.10 NETWORK ELECTRONICS/EQUIPMENT AND UPS UNITS

A. It shall be the responsibility of the District to acquire, install, and setup active network electronics/equipment and UPS units.

3.11 VOIP PHONES

A. It shall be the responsibility of the District to configure, deploy, and test VoIP phones.

3.12 TESTING

A. All Category 6a cable and data jacks shall be tested following installation. Testing shall be in accordance with TIA/EIA TSB-67 for link testing at Category 6a standards and shall meet the following criteria:

1. Field tester shall meet TIA/EIA TSB-67 level LLE accuracy criteria.

2. Field tester shall be Fluke DSP 4000 or equal.

B. The chosen test shall check the following parameters:

-Wire Map
-Length
-Attenuation NEXT
-PSNEXT
-ELFEXT
-Delay and Delay Skew
-PSELFEXT
-SRL
-PS-NEXT

C. Any cable or termination, which fails to test, shall be replaced and retested.

D. Proper cable NVP shall be entered into tester prior to testing, according to cable manufacturer's specifications.

E. Three copies (hard copy) and one electronic copy in PDF format of the test results shall be delivered to the Owner prior to project acceptance.

3.13 FIBER OPTIC CABLE TESTING AND CERTIFICATION

A. All fiber optic cable shall be tested using an approved Fluke DSP 4000 or equal.

B. Power Meter measurements shall be made from both ends of the cable.

C. Measured results shall be within cable manufacturers specifications.

D. Cable shall be tested at both 850 nm and 1300 nm for Multimode fiber.

E. Any cable or termination, which does not meet manufacturers specifications, shall be replaced and retested.

F. Provide three copies (hard copy) of the test results for owner's approval, before project acceptance.

G. All power meter testing shall be done in the presence of a District appointed observer.

H. All Testing shall be done in the presence of a District appointed observer.

I. Network Electronics, UPS, and VoIP Phones.

J. Network electronics (switches, routers), UPS, and VoIP Phones shall have a “burn in” period of 7 calendar days. “Burn in” means that the unit is powered and operational.

K. Network layer (layer 3) tests must be completed to ensure that the units are properly configured.

L. MDF routers for sites shall have their SRST function configured and tested when the primary WAN link interface is down.

3.14 AS-BUILT DRAWING & CLOSE-OUT DOCUMENTS

A. As-built drawings shall be an augmentation of existing District As-built drawings whenever the District possesses electronic drawings.

B. As-built Drawings shall be provided in the same format and detail as the Constructions Drawings (see Section 16744 -- 2.03), and shall also show the following:

1. Show wall elevation and wire details on shop drawings. Show equipment function, make and model and wire routing and terminations within rack or cabinet.

2. Show as-built location of all devices on as-built drawings.

3. Provide one (1) set of “ANSI B” size reproducible un-bound drawings.

C. Provide three (3) sets, of bound operation and maintenance manuals, including approved material submittal, and record of field changes.

D. Provide three (3) sets, in 3-ring binders, and one (1) electronic copy in PDF format of Cat-6 and fiber optic cable test records.

E. Provide complete as built wiring diagrams in AutoCAD 2000 format.

3.15 HAND-OFF

This section deals with expectations of the vendor before the deliverables are handed off to SUSD.

A. Cable Plant

1. The cable plant (Cat 6 or fiber) must have passed all tests and must have met any standard requirements.

B. Documentation & Labeling

1. Network cabinets shall be physically labeled with IDF cabinet locations.

2. Fiber patch cables for the uplink ports at the MDF/IDF should be labeled to reflect the IDF cabinets location.

END OF SECTION

SECTION 28 31 00 – FIRE ALARM INTEGRATED SAFETY SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. General

1. Drawings and conditions of the contract, including but not limited to General Conditions, and the Special Conditions listed below, apply to work of this section.

a. Supplementary Instructions to Bidders.
b. Supplementary Conditions.
c. Summary of the Work.
d. Project Coordination.
e. Cutting and Patching.
f. Definitions and Standards.
g. Submittals.
h. Schedules and Reports.
i. Temporary Facilities.
j. Security Regulations.
k. Safety and Health.
l. Products.
m. Project Closeout.
n. Section 26 05 00, Basic Materials and Methods

B. Project/Work Identification

1. Project Name and Location: Stagg HS – Stagg HS AG Mechanics Shop Renovation, Stockton Unified School District. Contract documents indicate the work of the contract, related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the contract documents include, but are not necessarily limited to, the following:

a. Existing site conditions and restrictions.
b. Other work prior to work of contract.
c. Alterations and coordination with existing work.
d. Other work to be performed concurrently by Owner.
e. Other work to be performed concurrently by separate contractors.
f. Other work subsequent to work of Contract.
g. Requirements for occupancy by Owner prior to completion of work of contract.

C. Summary – Fire

1. This performance specification provides the minimum requirements for the Life Safety System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:

a. Smoke, fire, and carbon monoxide detection.
b. Sprinkler suppression system monitoring and control.
c. Off-premise notification.
d. Smoke control.
e. Releasing Service
f. Emergency Voice Alarm communication

D. Project representatives

1. All contacts with the Project Building shall be directed to the Owner's Representative, hereafter referred to as the Architect.

E. Interpretation

1. No interpretations of the meaning of the bid documents will be made to any bidder orally. Each request for such interpretation shall be made to the engineer in writing, addressed to the Architect of Record.
2. Written requests for interpretation will be received until 10 days prior to bid date.

F. Manufacturer

1. Edwards (United Technologies Corporation), EST3 Life Safety Platform.
2. Provide manufacturer's current model of equipment and components. The materials, appliances, equipment, and devices to be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, is responsible for the satisfactory installation of the complete system.
3. Provide from the acceptable manufacturer's current product lines, equipment and components which comply with the requirements of these specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

G. Alternates – Fire

1. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, and will accommodate the future requirements and operations of the building owner. All specified operational features must be met without exception.
2. The authorized representative of the manufacturer of the major equipment shall be responsible for the satisfactory installation of the complete system.
3. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling system, access control, and smoke control.
4. All control panel assemblies and connected field appliances shall be provided by the same system supplier, and shall be designed and tested to ensure that the system operates as specified. The system shall utilize independently addressed, microprocessor-based smoke detectors, heat detectors, as described in this specification.
5. All equipment and components shall be installed in strict compliance with the manufacturer's recommendations.
6. The equipment to be supplied will be considered only if it meets all sections of the performance specification. Any deviations of system performance outlined in this specification will only be considered when the following requirements have been met:
    a. A complete description of proposed alternate system performance methods with three (3) copies of working drawings thereof for approval by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
    b. The supplier shall furnish evidence that the proposed or alternate system performance is equal or superior to the system operation stated in the specification. Such evidence shall be submitted to and accepted by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
    c. The supplier shall submit a point-by-point statement of compliance for all sections in this specification. The statement of compliance shall consist of a list of all paragraphs within these sections. Where the proposed system complies fully with the paragraph as written, placing the word "comply" opposite the paragraph number shall indicate such. Where the proposed system does not comply with the paragraph as written and the supplier feels the proposed system will accomplish the intent of the paragraph, a full description of the function as well as a full narrative description of

how its proposal will meet its intent shall be provided. Any submission that does not include a point by point statement of compliance as described herein shall be disqualified. Where a full description is not provided, it shall be assumed that the proposed system does not comply.

d. Contractor shall be responsible for paying all fees, including design fees, associated with obtaining DSA approval for the alternate system.

7. The acceptability of any alternate proposed system shall be the sole decision of the Owner or his authorized representative.

1.2 REFERENCES

A. Definitions and abbreviations - general

ADA: Americans with Disabilities Act.
AFF: Above Finished Floor.
AHJ: Authority Having Jurisdiction.
Approved: Unless otherwise stated, materials, equipment or submittals approved by the Authority or AHJ.
Circuit: Wire path from a group of devices or appliances to a control panel or transponder.
CPU: The central computer of a multiplex fire alarm or voice command control system.
CRC: Card Reader Controller
CRT: Cathode Ray Tube.
FACP: Fire Alarm Control Panel.
FCC: Fire Command Center.
FSCP: Firefighter's Smoke Control Panel
HVAC: Heating Ventilating and Air Conditioning.
IDC: Initiating Device Circuit.
LED: Light Emitting Diode.
LCD: Liquid Crystal Display.
NFPA: National Fire Protection Association.
NAC: Notification Appliance Circuit.
NCP: Local Network Control Panel.
PTR: Printer.
RCP Remote Control Panel
SLC: Signaling Line Circuit.
Style 1: As defined by NFPA 72, Class B.
Style 4: As defined by NFPA 72, Class B.
Style 6: As defined by NFPA 72, Class A.
Style 7: As defined by NFPA 72, Class A.
Style B: As defined in NFPA 72, Class B.
Style D: As defined in NFPA 72, Class A.
Style Y: As defined in NFPA 72, Class B.
UL or ULI: Underwriters Laboratories, Inc.
UL Listed: Materials or equipment listed and included in the most recent edition of the UL Fire Protection Equipment Directory.
Zone: Combination of one or more circuits or devices in a defined building area, i.e. 3 speaker circuits on a floor combined to form a single zone.

B. Codes – general

1. All work and materials shall conform to all applicable Federal, State and local codes and regulations governing the installation. If there is a conflict between the referenced standards, federal, state or local codes, and this specification, it is the bidder's responsibility to immediately bring the conflict to the attention of the Engineer for resolution. National standards shall prevail unless local codes are more stringent. The bidder shall not attempt to resolve conflicts directly with the local authorities unless specifically authorized by the Engineer.

2. System components proposed in this specification shall be ULI listed to operate together as a system. The supplier shall provide evidence, with his submittal, of listings of all proposed equipment and combinations of equipment. The supplier shall be responsible for filing of all documents, paying all fees (including, but not limited to plan checking and permit) and securing all permits, inspections and approvals. Upon receipt of approved drawings from the authority having jurisdiction, the supplier shall immediately forward two sets of drawings to the Owner. These drawings shall either be stamped approved or a copy of the letter stating approval shall be included.

C. Codes - fire

1. The equipment and installation shall comply with the current provisions of the following codes and standards:

a. NFPA 70 – 2022 California Electric Code®
b. NFPA 72 – 2022 California Fire Alarm Code®
c. NFPA 90A - Air-Conditioning and Ventilating Systems
d. NFPA 92A - Smoke Control Systems
e. NFPA 92B - Smoke Management Systems in Malls, Atria, and Large Areas
f. NFPA 101- Life Safety Code®
g. UL 864 - Control Units for Fire Protective Signaling Systems.
h. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
i. UL 268A - Smoke Detectors for Duct Applications.
j. UL 217 - Single and Multiple Station Smoke Alarms
k. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
l. UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
m. UL 464 - Audible Signaling Appliances.
n. UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems
o. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
p. UL 1971 - Signaling Devices for the Hearing-Impaired.
q. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
r. UL 1711 - Amplifiers for Fire Protective Signaling Systems.
s. UL 1635 - Digital Alarm Communicator System Units
t. Division of the State Architect
u. California State Fire Marshall
v. Federal Codes and Regulations
w. Americans with Disabilities Act (ADA)
x. Factory Mutual (FM) approval
y. International Standards Organization (ISO)
z. ISO-9000
aa. ISO-9001
bb. Electromagnetic Compatibility Requirements

1.3 SYSTEM DESCRIPTION

A. General – fire

1. Automatic fire alarm system shall transmit the alarm supervisory and trouble signals to a proprietary supervising station as required by NFPA 72. The supervising station shall be listed as UUKA by Underwriters Laboratory or shall meet the requirements of Factory Mutual Research approval standard 3011. Supervision of system and leased telephone lines shall be arranged by owner.

2. The automatic system shall cover all rooms and areas and upon activation of an initiating device alert all occupants and transmit the alarm, supervisory and trouble signals to an approved supervising station.

3. The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional fire alarm system(s). The System(s) shall comply in

respects with all pertinent codes, rules, regulations and laws of the Authority, and local jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (UL) listings.

B. It is further intended that upon completion of this work, the Owner be provided with:

1. Complete information and drawings describing and depicting the entire system(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the system(s) at a future date.
2. Complete documentation of system(s) testing.
3. Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and UL listings, and is/are in proper working order. Fire Alarm System shall be tested only when the system is 100% complete. Contractor shall use "Fire Alarm System Certification and Description" as required by Section 1-6.2 of NFPA 72 - 2022 edition.
4. Manufacturer supplied training to allow district personnel to access and program Fire Alarm system.

1.4 Description – Fire Detection and Alarm System

A. Provide and install a new fire detection and alarm system consisting of:

1. Fire command center shall be located as shown on the approved drawings.
2. LCD annunciator shall be located as shown on the approved drawings.
3. Graphic annunciator shall be located as shown on the approved drawings.
4. Remote control panel(s) shall be located, as shown on the approved drawings.
5. Manual pull stations shall be located as shown on the approved drawings.
6. Area smoke detection shall be provided as shown on approved drawings.
7. Area heat detection shall be provided as shown on approved drawings.
8. Area smoke/carbon monoxide (CO) detectors shall be provided as shown on the approved drawings.
9. Beam smoke detection shall be located as shown on the approved drawings
10. Duct smoke detection shall be provided as shown on the approved drawings.
11. Monitor the sprinkler system waterflow(s) and valve supervisory switch(s).
12. Monitor the stand-alone suppression systems as shown on the approved drawings.
13. Provide emergency voice system audible appliances located throughout the building(s), as shown on the approved drawings.
14. Provide synchronized visual appliances located throughout the building, as shown on the approved drawings.
15. Provide magnetic door holders, as shown on approved drawings.
16. Provide fan shutdown controls as shown on approved drawings.
17. Provide elevator recall functions for primary and alternate floors and elevator power shunt trip activation.
18. Provide connection to a Central Station. The owner shall arrange for two dedicated phone lines to be terminated as directed by the installing contractor.

1.5 SEQUENCE OF OPERATIONS

A. General

1. Upon the alarm activation of any area smoke detector, heat detector, CO detector, manual pull station, sprinkler waterflow, the following functions shall automatically occur:

a. The internal audible device shall sound at the control panel or command center.
b. The LCD display shall indicate all applicable information associated with the alarm condition including; zone, device type, device location and time/date.
c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
e. Activate audible notification.
f. Activate visual strobes notification appliances. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.
g. Transmit signal to the central station with point identification.
h. Activate automatic smoke control sequences.
i. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
j. All self-closing fire/smoke doors held open shall be released.
k. Transmit alarm text messages to "alpha-numerical" display pagers.

B. Duct smoke activation – alarm

1. The alarm activation of any duct smoke detector, the following functions shall automatically occur:

a. The internal audible device shall sound at the control panel or command center.
b. The LCD display shall indicate all applicable information associated with the alarm condition including; zone, device type, device location and time/date.
c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LED's associated with the alarm zone shall be illuminated.
e. Transmit signals to remote Annunciators.
f. Transmit signal to the central station with point identification.
g. Shall shutdown the local air-handling unit.
h. Transmit alarm text messages to "alpha-numerical" display pagers.
i. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

C. Supervisory operation

1. Upon supervisory activation of any sprinkler valve supervisory switch, the following functions shall automatically occur:

a. The internal audible device shall sound at the control panel or command center.
b. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
e. Transmit signal to the central station with point identification.

D. Trouble operation

1. Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:

a. The internal audible device shall sound at the control panel or command center.

b. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
e. Transmit signal to the central station with point identification.

E. Monitor activation

1. Upon activation of any device connected to a monitor circuit, the following functions shall automatically occur:

a. The internal audible device shall sound at the control panel or command center.
b. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

1.6 SUBMITTALS

A. Project

1. The contractor shall purchase no equipment for the system specified herein until the owner has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The contractor shall submit one (1) complete set of documentation in PDF format within 30 calendar days after date on notice to proceed.

2. The submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the contract documents. In addition, the Contractor shall provide specific notation on each shop drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.

3. All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, and address, date including revisions, and preparer and reviewer's initials.

B. Product data

1. Data sheets with the printed logo or trademark of the manufacturer for all equipment. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Architect/Engineer.

C. Shop drawings

1. A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:

a. Control panel wiring and interconnection schematics.
b. Complete point-to-point wiring diagrams.
c. Riser diagrams.
d. Complete floor plan drawing locating all system devices and 1/4' = 1'-0 scale plan and elevation of all equipment in the Fire Command Station. Including showing the placement of each individual item of fire alarm, security, and access control

equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
e. Detailed system operational description. Any Specification differences and deviations shall be clearly noted and marked.
f. Complete system bill of material.
g. All drawings shall be reviewed and signed off by an individual having a minimum of a NICET certification in fire protection engineering technology, subfield of fire alarm systems.

D. Samples

1. A sample of each smoke detector, intelligent modules, horn, strobes, card reader controller, card reader, and door locking mechanism shall be provided to the contractor for their familiarization.

E. Quality assurance /control submittals

1. Installer's Certification

a. The engineered systems distributor must be licensed in the state of project location and have been incorporated in the business in that state for a minimum of 5 years.
b. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

F. System calculations

1. Complete calculations shall be provided which show the electrical load on the following system components:

a. Each system power supply, including stand alone booster supplies.
b. Each standby power supply (batteries).
c. Each notification appliance circuit.
d. Each auxiliary control circuit that draws power from any system power supply.

G. Close out

1. Two (2) print copies and one (1) electronic copy in PDF of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:

a. Project specific operating manuals covering the installed integrated life safety system. The manual shall contain a detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.

2. As-Built drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Integrated Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system. Supply one set of as-built drawings, to be installed in lockable print holder (tube style) located at Main FACP, on site.

3. All drawings shall be provided in standard .DXF and PDF formats. A bond plot of each sheet shall also be provided.

4. The application program listing for the system as installed at the time of acceptance by the building owner and/or local AHJ (disk, hard copy printout, and all required passwords).
5. Provide the name, address and telephone of the authorized factory representative.
6. A filled-out Record of Completion in accordance with NFPA 72 verifying that the system has been installed and tested in accordance with the approved plans and specifications.
7. Provide a detailed test report of the final commissioning of the Fire Alarm System. Report shall include the number of devices installed within each building.

1.7 QUALITY ASSURANCE

A. Qualifications of contractor

1. Fire Alarm

a. The contractor shall have successfully installed similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.
b. The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote-control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

B. Pre-installation requirements

1. The provider shall submit a detailed project plan that will describe in detail how the provider will approach the project, from inception to finalization. The plan must include at a minimum the following information:

a. Project Staging
b. Project Management
c. Equipment Schedules
d. Installation Time Lines
e. Other Trade Requirements
f. Final Acceptance Testing
g. Personnel Resumes
h. Progress Report Sample

2. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the manufacturer’s riser/connection diagram and details for all specific system installation/termination/wiring data.

C. Start and completion dates

1. The starting and completion dates for this work will be established at the pre-bid meeting.

1.8 DELIVERY, STORAGE AND HANDLING

A. Receiving and handling

1. The Contractor shall be responsible for all receiving, handling, and storage of his materials at the job site.
2. Use of loading docks, service driveways, and freight elevators shall be coordinated with the Owner.

1.9 PROJECT CONDITIONS

A. It shall be the Contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. Inspection of the building may be made by appointment with the Owner. Contractors are requested to inspect the building prior to the pre-bid meeting.

B. A pre-bid meeting will be held to familiarize the Contractors with the project. Failure to attend the pre-bid meeting may be considered cause for rejection of the Contractor's bid. The minutes of this meeting will be distributed to all attendees and shall constitute an addendum to these specifications.

C. The Contractor shall be responsible for prior coordination of all work and demolition with the Owner.

1.10 WARRANTY AND MAINTENANCE

A. Spare parts – fire alarm system

1. The Contractor shall supply the following spare parts:

a. Automatic detection devices - Two (2) percent of the installed quantity of each type.
b. Manual fire alarm stations - Two (2) percent of the installed quantity of each type.
c. Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.
d. Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

B. Warranty

1. The contractor shall warranty all materials, installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals.
2. The System Supplier shall maintain a service organization with adequate spare parts stock within 25 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

1.11 TRAINING

A. The System Supplier shall schedule and present a minimum of 8 hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

B. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

C. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

D. Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Fire Alarm System: Edwards (United Technologies Corporation EST3 Life Safety Platform

1. The manufacturer of the system equipment shall be regularly involved in the design, manufacture, and distribution of all products specified in this document. These processes shall be monitored under a quality assurance program that meets the ISO 9000 requirements.

2. All System components shall be the cataloged products of a single supplier. All products shall be listed by the manufacturer for their intended purpose.

3. All control panel assemblies and connected field appliances shall be both designed and manufactured by the same company, and shall be tested and cross-listed as to ensure that a fully functioning is designed and installed. The system supplied under this specification shall be a microprocessor-based direct wired, multi-priority peer-to-peer networked system. The system shall utilize independently addressed, microprocessor-based smoke detectors, heat detectors, and modules as described in this specification.

2.2 SYSTEM CONFIGURATION

A. General:

1. Provide Life Safety System equipment arranged and programmed to provide the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building components.

B. Power Supply:

1. Provide standby power supply that is an electrical battery with capacity to operate the system under maximum supervisory load for 24 hours and capable of operating the system for 15 minutes in the alarm mode at 100% load. System to include a charging circuit to automatically maintain the electrical charge of the battery. System to automatically adjust the charging of the battery to compensate for temperature.

C. Display:

1. Main display interface to show the first and most recent highest priority system events without any operator intervention. System events to be directed to one of four message queues. Messages of different types cannot intermix to eliminate operator confusion. A “DETAILS” switch to provide additional information about any device highlighted by the operator.

D. Initiating Device Circuits:

1. Initiating device circuits monitoring manual fire alarm stations, smoke, smoke/CO, and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class B (Style “A” or “B”).

E. Notification Appliance Circuits:

1. All notification appliance circuits shall be Class “B” (Style “Y”). All notification appliance circuits hall have a minimum circuit output ration of: 2 amps at 24 vdc. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

F. Signaling Line Circuits

1. When a signaling line circuit covers more than one fire/smoke compartment, a wire-to-wire short shall not effect the operation of the circuit from the other fire/smoke compartments. The signaling line circuit connecting network panel/nodes, annunciators, command centers, shall be Class A (Style 7). The media shall be copper except where fiber optic cable is specified on the approved drawings.

2. The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, intrusion detection modules, and notification circuit modules shall be Class B (Style 4).

3. The signaling line circuit connecting to the audio communications (pre-amp signal), amplifiers, and nodes shall be Class B (Style 4). The circuit shall be power limited.

4. The signaling line circuit connecting to the two-way communications circuit (riser) shall be Class B (Style 4).

G. Network Wiring

1. The system supplied under this specification shall utilize node-to-node, direct wired multi-priority peer-to-peer network operations. The system shall utilize independently addressed smoke detectors, smoke/CO detectors, heat detectors, and input/output as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional node of the network, which is capable of making all local decisions and generating network tasks to other nodes in the vent of node failure or communications failure between all nodes.

2. When a network is wired in a Class B configuration, a single break or shot on the network wiring insolates the system into two groups of panels. Each group continues to function as a peer-to-peer network working with their combined databases. When wired using a Class A configuration, a single break or short on the network wiring causes the system to isolate the fault, and network communication continues uninterrupted, without any loss of function. Should multiple wiring faults occur, the network re-configures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages.

H. Network Nodes

1. The remoted control panel(s) (network notes) shall meet the same requirements as described in the control panel section and shall contain the following:

a. Integral power supply(s) with secondary stand-by power.
b. Signaling line circuits for communications with analog/addressable devices, as required.
c. Notification appliance circuits, as required.
d. Auxiliary function circuits and operations, as required.

I. DACT

1. The system shall provide off premise communications capability (DACT) for transmitting system events to multiple Central Monitoring Station (CMS) receives.

2. The system shall provide an individual CMS account for each tenant, and send the required signals to the one or more CMS(s) and account(s) specified by each tenant. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

3. The system shall also transmit an alphanumeric system activity message, by event, to a commercial paging system of the owner’s choice, using TAP Pager protocol.

4. The DACT shall be installed internal to the FACP panel.

5. Coordinate reporting information with district representative.

2.3 PANEL COMPONENTS & FUNCTIONS

A. The control panel(s) shall be a multi-processor based networked system designed specifically for fire. The control panel shall be listed and approved for the application standard(s) as listed under the General section.

B. The control panel shall include all required hardware, software, and site-specific system programming to provide a complete and operation system. The control panel(s) shall be designed such that interactions between any applications can be configured, and modified using software provide by a single supplier. The control panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.

C. The control panel shall include the following capacities:

1. Support up to 2500 analog/addressable points.
2. Support network connections up to 63 other control panels and annunciators.
3. Support multiple digital dialers and modems.
4. Support multiple communication ports and protocols.
5. Support up to 1000 historical events.
6. The network of control panels shall include the following features:
    a. Ability to download all network applications and firmware from the configuration computer from a single location on the system.
    b. Provide electronic addressing of analog/addressable devices.
    c. Provide an operator interface control/display that shall annunciate, command, and control system functions.
    d. Provide an internal audible signal with different programmable patterns to distinguish between alarm, supervisory, trouble, and monitor conditions.
    e. Provided a discreet system control switch for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch, and details switch.
    f. Provide system reports that provide detailed description of the status of system parameters for corrective actions or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.
    g. Provide an authorized operator with the ability to operate or modify system functions; such as system time, date, passwords, holiday dates, restart the system, and clear control panel event history file.
    h. Provide a test feature internal to the panel to be accessed by any service technician designated authorized by the District.
7. Program the password to the main FACP with the District standard password.
8. The control panel shall contain a standby power supply that automatically supplies electrical energy to the system upon primary power supply failure. The system shall include a charging circuit to automatically maintain the electrical charge of the battery.
9. Fire Alarm Emergency Voice/Alarm Communications System Control Unit:
    a. Integral to the fire alarm control panel.
    b. The audio system shall provide eight simultaneous and distinct audio channels. These shall consist of a minimum of: Local Page, Emergency Communication, Multiple Evacuation, Alert, Auxiliary, and General Signaling. Channels shall support hierarchical operation and be controllable from system programming. The audio system shall provide Elevator, Stairwell, and Auxiliary Signaling. Systems that cause signaling device to go silent while performing any signaling functions will not be accepted.
    c. The system must provide operation to 25Vrms or 70.7Vrms speakers.
    d. The system must provide as a minimum the following paging common controls and indicators: Ready to Page LED, VU display of paging output level, single switch function for paging to all – Alert zones, Evacuation zones, and areas not programmed for signaling.
    e. The system must provide high quality analog to digital conversion of paging sources. Digital transmission of paging must be provided between system nodes. The analog

sources must be sampled and converted to digital with a sampling rate no less than 9600 samples per second.

f. The system shall be able to transmit signal sources (Alert, Alarm, Page, etc.) together over a single pair of wires between nodes.

g. System amplifiers must be distributed zoned type. Centrally banked systems are not acceptable. The circuit must carry a minimum rating of 3.5 Amps for operating 24 Vdc signals.

h. The system shall provide fully integrated fire fighters' telephone system that shall provide 2-way communication between the fire alarm control panel and any fire fighters' telephone station. The system shall include an alphanumeric user display and control. When a telephone is activated, a call-in buzzer shall sound and the location of the phone shall be shown on the alphanumeric display. The display shall be capable of bilingual operation, displaying English, Dutch, Finnish, German, Italian, Portuguese, or Spanish messages. The incoming call shall be selected by activating a single button. All subsequent telephone call locations shall be displayed in full text. The system shall be configured so that page messages may be issued from any firefighter's telephone connect to the system, as directed by the emergency operator.

2.4 OPERATOR'S INTERFACE

A. System Message Processing and Display Operations

1. The system shall allow network functions to be configured to apply to any combination of nodes (panels) in the network.

2. Each control panel (network node) shall be capable of supporting a printer. All system control panel printer ports shall be configurable to output any combination of alarm supervisory, trouble, monitor, or service group event messages.

3. Each control panel (network node) shall be capable of supporting a LCD display. The display on each system node (cabinet) shall be configurable to display the status of any and all combinations of all alarm, supervisory, trouble, monitor, or service group event messages.

4. From each LCD display on the system shall be capable of being programmed for control functions of any node or the entire network. The LCD display shall reside on the network as a node and continue to operate with any fault on the network. An LCD shall be capable of being programmed to only be operational when a node is in stand alone mode, with a network fault.

5. The system program shall have a minimum of 100 system definable service groups with the program to facilitate the testing of installed system based on the physical layout of the system Service groups that disable the wiring of circuits serving multiple floors of fire zones shall not be considered as equal.

6. Advanced Windows based programming with program version reporting to document any and all changes made during system start-p or system commissioning. Time and date stamps of all modifications made to the program must be included to allow full retention of all previous program versions data.

7. The operator display shall clearly identify unacknowledged and acknowledged alarm, supervisory, trouble, and monitor status messages.

8. The system shall provide the ability to download data from analog/addressable detectors to a PC while the system is on-line and operational in the protected premises. The downloaded data may then be analyzed in a diagnostic program supplied by the system manufacturer.

9. The standby power supply shall automatically supply electrical energy to the system upon primary power failure.

B. Annunciation

1. The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the building. Standard LED annunciators may be combined in common enclosures provided that the groups of LEDs comprising each of the required annunciators are separated from one another (Detection, Supervisory, Status, and Status) and clearly labeled.
2. Manufacturer's standard control switches shall be acceptable if they provide the required operation, including performance, supervision, and position indication. If the manufacturer's standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the Owner is required.
3. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet. The annunciator shall contain the following system status indicators:
    a. 168-character backlit Liquid Crystal Display
    b. System Normal Indicator
    c. System Common Alarm Indicator
    d. System Common Trouble Indicator
    e. System Common Supervisory Indicator
    f. System Ground Fault Indicator
    g. System Common Security Indicator
    h. System Disable Point(s) Indicator
    i. System Reset Switch with Indicator
    j. System Alarm Silence Switch with Indicator
    k. System Trouble Silence Switch with Indicator
    l. System Message Queue Scroll Switches
    m. 10-digit Keypad to Enable/Disable System and Functions
4. The LED Annunciator rows shall contain the following format:
    a. Provide one row of red (alarm) and yellow (trouble) LEDs. LEDs in each row shall be arranged in columns, one column per type of alarm initiating device, and shall illuminate upon receipt of an alarm signal from the associated device(s) (i.e., electrical room smoke detector).
    b. Provide one row of red (alarm) LEDs. LEDs in each row shall be arranged in columns, one column per type of alarm initiating device, and shall illuminate upon receipt of an alarm signal from the associated devices(s) (i.e., electrical room smoke detector).
    c. Provide one row of yellow (supervisory) LEDs. LEDs in each row shall be arranged in columns, one column per type of supervisory type device, and shall illuminate upon receipt of a supervisory signal from the associated device(s) (i.e., 2nd floor sprinkler value supervisory switch).
5. The LED annunciator shall be provided with 25% spare LEDs minimum. Each pair of LEDs shall be labeled "Spare".

C. DACT Dialer

1. The system shall provide off premise communication capability using a digital alarm communications transmitter (DACT) for sending system events to multiple central monitoring station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols. The system shall also transmit an alphanumeric system activity message, by event, to a commercial paging system of the owner's choice, using TAP Pager protocol. The system shall provide an individual CMS account for each tenant and send the required signals to one or more CMS(s) and account(s) specified by each tenant. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

D. Power Supply

1. System power supply(s) shall provide multiple power-limited 24 VDC output circuits as required by the panel.
2. Upon failure of normal (AC) Power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functions.
3. Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.
4. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately annunciate as battery trouble and identify the specific power supply affected.
5. All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, 48 hours maximum.
6. All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 72. The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each control panel the disconnect serves.

E. Reports

1. The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance programs. The system shall provide these reports via the main LCD, and shall be capable of being printed on any system printer.
2. The system shall provide a report that gives a sensitivity listing of all detectors that have less than 75% environmental compensation remaining. They system shall provide a report that provides a sensitivity (% Obscuration per foot) listing on any particular detector.
3. The system shall provide a report that gives a listing of the sensitivity of all of the detectors on any given panel in the system, or any given analog/addressable device loop within any given panel.
4. The system shall provide a report that give a chronological listing of up to the last 1000 system events.
5. The system shall provide a listing of all of the firmware revision listings for all of the installed network components in the system.

2.5 GRAPHIC ANNUNCIATORS (**WHEN REQUESTED BY SCHOOL DISTRICT**)

A. Exterior Graphic Annunciator (**PREFFERED APPLICATION**)

1. Basis of Design Product: Subject to compliance with requirements, provide H.R. Kirkland; RSE-GR-GP6-WP or comparable product by one of the following:
   a. District and Architect approved equal.
2. 30 inches wide x 24 inches high x 3 ½ inches deep (Semi-Flush)
3. The annunciator enclosure shall be constructed of cold rolled steel with welded and ground seams and finished with an exterior powder paint. The door shall be constructed of brushed stainless steel with a concealed stainless-steel hinge. The door shall have a gasketed 3/16-inch-thick (minimum) polycarbonate viewing pane. A minimum of (5) tamper-proof stainless-steel screws shall fasten the door against the box gasket.

Ventilation of the interior must be provided. The display shall be silkscreened on an anodized aluminum face with UV protection paints. Alarm LEDs shall have a brightness of 600mcd and be visible in full sunlight. The LED wiring shall be neatly harnessed to designated terminal blocks located in the annunciator backbox. The LEDs shall protrude through the aluminum making the LEDs visible at all times. A NEMA 4 key operated Lamptest Switch shall be provided. The annunciator shall be UL listed and CSFM listed. These listings shall be for a complete annunciator unit. The graphic shall be to scale and it shall be possible to update the graphic image in the field without replacing the entire graphic.

B. Interior Graphic Annunciator

1. Basis of Design Product: Subject to compliance with requirements, provide H.R. Kirkland; RSE-GR-GP6 or comparable product by one of the following:

   a. District and Architect approved equal.

2. 30 inches wide x 24 inches high x 3 ½ inches deep (Semi-Flush)

3. The annunciator enclosure shall be constructed of cold rolled steel with welded and ground seams for a finished appearance. The backbox shall be finished with a black powder coating. The annunciator door shall have a concealed piano hinge and shall be finished in brushed stainless steel. The door shall be secured by a key lock with no other fasteners visible. The display shall be a black image on clear anodized aluminum. The LED wiring shall be neatly harnessed to designated terminal blocks located in the annunciator backbox. The LEDs shall protrude through the aluminum making the LEDs visible at all times. A clear front pane shall render the LEDs and the image tamperproof. The annunciator shall be UL listed and CSFM listed. These listings shall be for a complete annunciator unit. The graphic shall be to scale and it shall be possible to update the graphic image in the field without replacing the entire graphic.

2.6 FIELD MOUNTED SYSTEM COMPONENTS

A. FIRE INITIATING DEVICES

1. ANALOG ADDRESSABLE SMOKE – GENERAL

a. Provide analog addressable smoke detectors at locations shown on the drawings.
b. Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. In addition to the five sensitivity levels the detector shall provide a pre-alarm sensitivity setting, which shall be settable in 5% increments of the detector's alarm sensitivity value.
c. An alternate alarm sensitivity level shall be provided for each detector, which can be set to any of the five (5) sensitivity settings manually or automatically using a time of day event. In addition to the five alternate sensitivity levels the detector shall provide an alternate pre-alarm sensitivity setting, which shall be settable in 5% increments of the detector's alternate alarm sensitivity value.
d. The detector shall be able to differentiate between a long drift above the prealarm threshold and fast rise above the threshold.
e. The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal that 75% to 99% compensation has been used. The detector shall provide a dirty fault signal that 100% or greater compensation has been used.
f. The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

2. DUCT DETECTOR HOUSING

a. Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. The housing shall be finished in baked red enamel. Remote alarm LED indicators and remote test stations shall be provided.

3. DUCT DETECTOR MOUNTING PLATE

a. Where smoke detectors are directly inserted into a low velocity ducts 3 ft (0.91m) high x 3 ft (0.91m) wide, ceiling plenums, or raised floors, provide factory supplied mounting plate assemblies to facilitate mounting the detectors. The mounting plate shall be code gauge steel with corrosion resistant red enamel finish. The detector mounting plate shall support an analog/addressable detector along with a standard, relay or isolator detector-mounting base.

4. SMOKE DETECTOR GUARDS

a. Smoke detector guards shall be installed at the locations shown on the drawings. The guards shall be Underwriters Laboratories tested and listed by for use with the smoke detectors they protect. Guard design shall not affect the detector operating sensitivity and shall not reduce the listed detector spacing. The guards shall be constructed of 16-gauge steel with a baked white finish to match the detectors. Tamperproof mounting hardware shall be provided.

5. ANALOG ADDRESSABLE SMOKE/CO DETECTOR

a. Provide analog/addressable combination smoke and CO detectors at locations shown on the drawings. The combination smoke and CO detectors shall function the same as the analog/addressable smoke detectors called for in this specification with the added element of carbon monoxide sensing. The detector shall analyze the smoke sensor independently from the CO sensor to determine whether to initiate a fire alarm, a life safety CO alarm, or both.

6. BEAM SMOKE DETECTOR

a. Provide Beam type smoke detectors at locations shown on the drawings. The beam smoke detector shall consist of a separate transmitter and receiver capable of being powered separately or together. The detector shall operate in either a short range of 30 to 100 feet or a long range of 100 to 300 feet. The detector shall feature a bank of alignment LEDs on both the receiver and the transmitter to ensure proper alignment without the use of special tools. The detector shall utilize an automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses. The beam smoke detectors shall be powered from the system control panel. Testing shall be carried out using calibrated test filters.

B. HEAT DETECTORS

1. FIXED TEMPERATURE-ROR HEAT DETECTOR

a. Provide analog/addressable combination fixed temperature / rate-of-rise detectors at the locations shown on the drawings. The heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate of rise alarm point of 15°F (9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications. When installed above ceilings, an identification label visible from the ground shall identify the location of the heat detector.

C. DETECTOR BASE – STANDARD

1. Provide standard detector mounting bases suitable for mounting on either North American 1-gang, 3½ or 4-inch octagon box and 4-inch square box, or European BESA or 1-gang box. The base shall, contain no electronics and support all series detector types.

D. MANUAL STATIONS – DOUBLE ACTION SINGLE STAGE

1. Provide analog/addressable double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of polycarbonate construction and incorporate an internal toggle switch. A locked test feature shall be provided. The station shall be finished in red with silver “PULL IN CASE OF FIRE” lettering. The manual station shall be suitable for mounting on North American 2 ½ inch deep 1-gang boxes and 1 ½ inch deep 4 square boxes with 1-gang covers.

2.6 NOTIFICATION APPLIANCES

A. LOW PROFILE SPEAKERS

1. Provide low profile speakers at the locations shown on the drawings. The speaker shall provide an 84 dBA sound output at 10 ft. when measured in reverberation room per UL-464. The speaker shall have a selectable output. In and out screw terminals shall be provided for wiring. The speaker shall mount in a North American 1-gang box. Ceiling mounted speakers shall be white.

B. LOW PROFILE SPEAKER / STROBES

1. Provide low profile speaker/strobes at the locations shown on the drawings. The speaker/strobe shall provide an audible output of 84 dBA at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs. The strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd & 110cd devices. The speaker shall have a selectable output. In and out screw terminals shall be provided for wiring. Low profile speaker/strobes shall mount in a North American 1-gang box. Ceiling mounted speaker/strobes shall be white.

C. LOW PROFILE STROBES

1. Provide low profile wall mounted strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Strobes shall provide synchronized flash outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd, or 110cd devices. Low profile strobes shall mount in a North American 1-gang box. Ceiling mounted strobes shall be white.

D. GENERAL

1. All appliances which are supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA (AG)), and shall be UL 1971 Listed.

2. All appliances shall be of the same manufacturer as the fire alarm control panel specified to ensure absolute compatibility between the appliances and the control panels, and to ensure that the application of the appliances is done in accordance with the single manufacturer's instructions.

3. Any appliances that do not meet the above requirements, and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purpose intended. All strobes shall be provided with lens markings oriented for wall mounting.

4. All notification appliances shall be red unless noted otherwise on the drawings.

2.7 INITIATION & CONTROL MODULES

A. RELAY MODULE

1. Provide addressable control relay circuit modules at the locations shown on the drawings. The module shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware.

B. NOTIFICATION APPLIANCE CIRCUITS

1. Provide addressable notification appliance circuit modules at the locations shown on the drawings. The module shall provide one (1) supervised Class B notification circuit. The module shall provide polarized audible / visual selection for 24Vdc @ 2amps, audio outputs at 25Vrms @ 50 watts or 70 Vrms @ 35 watts.

2.8 MISCELLANEOUS COMPONENTS

A. Remote Diagnostic Software

1. The system shall have the ability to upload its status and sensitivity remotely using either a direct connection or through a network connection to an owner supplied personal computer. The remote diagnostic software shall be capable of generating sensitivity and system status reports. The utility shall supply data for trend analysis reports using an owner supplied spreadsheet program. The Remote Diagnostic Software shall be

Windows based and capable of receiving data from multiple installed life safety systems. The software shall be capable of off-line reports. Use of the remote diagnostic software shall not compromise the functionality of the site-installed software.

B. DRAWING STORAGE BOX

1. Basis of Design Product: Subject to compliance with requirements, provide AcerBox; DSB ACE-12 or comparable product by one of the following:

   a. District and Architect approved equal.

2. 37 inches tall x 5 ½ inches wide x 4 ½ inches deep

3. The Drawings Storage Box (DSB) shall be UL and CSFM listed and constructed of 18 gauge cold rolled steel. It shall be painted with a durable read powder coat paint. The access door shall be lettered on 2 angled sides of the cabinet providing 180 degrees of viewing. “FIRE ALARM DOCUMENTS” in White indelible letters minimum of 1 inch in height. The door shall have a stainless steel continuous piano hinge. The door of the DSA shall be locked with a keyed lock ¾ inch barrel. Inside the cabinet there shall be a strap to secure the drawings in the cabinet that is adjustable for the size of rolled drawings. Location to hold keys and to secure emergency contact information inside cabinet for easy access shall be provided.

PART 3 EXECUTION

3.1 INSTALLATION

A. INSTALL SEQUENCE

1. Installation of the systems shall be conducted in stages and phased such that circuits and equipment are installed in the following order:

   a. Riser conduits, AC power conduits and control cabinets.
   b. Fire command center, remote control panel(s), control component(s), annunciator(s), remote CRT terminal(s), and printer(s). Provide temporary mounting of fire command center in <location.>
   c. Conduits and wiring for complete notification circuits and appliance installation throughout facility.
   d. Pre-test the audible and visual notification appliance circuits.
   e. Install all new detection devices.
   f. Terminations between field devices and the associated control equipment.
   g. The detection system shall be switched over and end of each day the system shall be operational. At no time will the system be placed out of service over night.
   h. Complete the interface to the building automation system.
   i. Complete contractor pre-test of system.
   j. Complete system testing.

B. GENERAL

1. All equipment shall be attached to walls and ceiling/floor assemblies and shall be mounted firmly in place. Detectors shall not be supported solely by suspended ceilings. Fasteners and supports shall be sized to support the required load.

2. Where notification devices or initiation devices are surface mounted, provide manufacturer’s surface backbox.

C. CONDUCTORS

1. The requirement of this section applies to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.

2. All circuits shall be rated power limited in accordance with NEC Article 760.
3. Installed in conduit or enclosed raceway.
4. The existing cable/wiring may be re-used providing they meet the manufacturer's published wiring requirements.
5. All new system conductors shall be of the type(s) specified herein.
6. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
7. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cable or twisted shielded or as per manufacturer's requirements.
8. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.
9. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 7 strands shall be permitted for No. 16 and No. 18 conductors, and a maximum of 19 strands shall be permitted for No. 14 and larger conductors.
10. All audible notification appliance circuits shall be 14 AWG minimum twisted pairs or twisted pairs shielded or per manufacturer's requirements.
11. All visual notification appliance circuits shall be 14 AWG minimum THHN or twisted pairs or twisted shielded pairs or per manufacturer's requirements.

D. CONDUCTORS AND RACEWAY

1. Except as otherwise required by, the installation of all system circuits shall conform to the requirements of Article 760 and raceway installation to the applicable sections of Chapter 3 of NFPA 70, National Electrical Code. Fire alarm circuit wiring shall include all circuits described in Section 760-1 including Fine Print Note No. 1 (FPN No. 1), and as defined by the manufacturer's UL listing.
2. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type required by the NEC and approved by local authorities having jurisdiction for the purpose.
3. Any shorts, opens, or grounds found on new or existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.
4. The contractor shall neatly tie-wrap all field-wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except home runs from life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. No wiring splices shall be permitted in a control panel enclosure.
5. All penetration of floor slabs and firewalls shall be fire stopped in accordance with all local fire codes.

E. CONDUIT RACEWAY

1. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
2. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.
3. All system conduits shall be of the sizes and types specified.
4. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.
5. All system conduits shall be installed in accordance with Division 26 Electrical Specifications.
6. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.
7. Provide all new conduit raceway and conduit riser.
8. Existing conduit raceway system may be re-used where possible.
9. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.
10. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.
11. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.

F. IDENTIFICATION AND LABELS

1. Label each FACP with a printed label that contains the following information:
   a. Fire alarm panel number
   b. Supply power feed designation
2. Label wires at each device with the designated zone and device number.
3. Submit and affix in a clear folder, to the inside door of the control panel, a plot plan of the site that will identify the following:
   a. Location of each fire Alarm Control Panel
   b. Location of supply power for each control panel
   c. General location of the designated zone as per the FACP programming
4. All FA devices should be identified in programming with physical location, corresponding room number, and/or name of room:

3.2 FIELD QUALITY CONTROL

A. TEST & INSPECTION

1. All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 – 2022, Chapter 14.

2. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.
3. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.
4. All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.
5. The system including all its sequence of operations shall be demonstrated to the Owner, his representative, and the local fire inspector. In the event the system does not operate properly, the test shall be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to the Owner, his representatives and the fire inspector.
6. **(NEW FIRE ALARM SYSTEM)** A final 100 percent test & inspection shall be performed by a factory trained representative of the system manufacturer only when the system is 100 percent complete. At the final 100 percent test and inspection, the representative shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision and participate during all of the testing for the system.
7. **(SYSTEM MODIFICATIONS – REACCEPTANCE TESTING)** Reacceptance testing is required after any of the following occur: Addition or deletion of system components; any modification, repair, or adjustment to system hardware or wiring; and any change to site-specific software. The extend of testing necessary is determined as follows:
    a. When an initiating device, notification appliance, or control relay is added, it must be functionally tested.
    b. When an initiating device, notification appliance, or control relay is deleted, another device, appliance or control relay on the circuit must be operated.
    c. When modifications to control equipment hardware are made, the control equipment must be tested in accordance with NFPA 72, Table 14.4.2.2, items 1(a) and 1(d).
    d. When changes are made to site-specific software, all functions known to be affected by the change or identified by a means that indicates changes, must be 100 percent tested. In addition, 10 percent of initiating devices that are not directly affected, up to a maximum of 50 devices, must also be tested and proper operation verified.
    e. Whenever there are changes to control units connected or controlled by the system executive software, a 10 percent functional test of the system is required, including a test of at least one device on each input and output circuit to verify critical system functions such as notification appliances, control functions, and off-premises reporting.
8. A letter from the Contractor certifying that the system is installed entirely in accordance with the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.
9. The “End of Line Resistance” for each circuit shall be tested in the presence of the project inspector and shall not exceed a maximum of 10% of the 24-volt system. Each component in the circuit shall not exceed the listed manufacturer’s minimum operating voltages. See NFPA 72, Loop resistance. This section requires that all initiating and notification appliance circuits be measured and recorded.

END OF SECTION

SECTION 31 00 00 – EARTHWORK

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 23 33, Trenching and Backfilling.

D. Section 32 16 00, Site Concrete.

E. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.

D. Tests (See Part 3 for Compaction Testing).

E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to General Conditions and Section 01 78 36.

1.06 REFERENCES AND STANDARDS

A. General: Site survey, included in the drawings, was prepared by Warren Consulting Enginer, inc., dated 7/11/22, and is the basis for data regarding current conditions. While the survey is deemed generally accurate, there exists discrepancies and variations due to elapsed time, weather, etc. Existing dirt grades may vary 0.2 ft. from that shown.

B. Geotechnical Engineering Report was prepared by Wallace Kuhl and Associates. Report is entitled Stagg High School Livstock Facility, and is on file with Architect. Recommendations of the Goetechnical report were used to develop the contract plans and specifications. The Geotechnical report shall be used as a reference for the soil condition of the project site. The design information contained in the contract plans and specifications shall govern over the recommendation of the Geotechnical report.

C. Site Visitation: All bidders interfacing with existing conditions shall visit the site prior to bid to verify general conditions of improvements. Discrepancies must be reported prior to the bid for clarification.

D. ANSI/ASTM D698-e1 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

E. ANSI/ASTM D1556-e1 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ANSI/ASTM 698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

G. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

H. ANSI/ASTM D 4318-10e1 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

I. CALTRANS Standard Specifications Section 17.

J. CAL-OSHA, Title 8, Section 1590 (e).

K. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

B. Excavation dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for excavation dewatering no matter what the source.

Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 ON SITE UTILITY VERIFICATION AND REPAIR PROCEDURES

A. Ground-breaking requirements:

1. All underground work performed by a Contractor must be authorized by the District's Construction Manager or the Low Voltage Consultant prior to start of construction.
2. The Contractor is to obtain and keep the original School's construction utility site plans on site during all excavation operations. Contractor can contact the District's Construction Manager, Facilities Manager, or the Low Voltage Consultant to procure the drawings.

B. Underground Utility Locating:

1. The contractor shall hire an Underground Utility Locating Service to locate existing underground utility pathways in areas affected by the scope of work for excavation.
2. Contractor must use an underground utility locator service with a minimum of 3 years' experience. The equipment operator must have demonstrated experience.
3. The Underground Utility Locator Service must have the use of equipment with the ability to locate by means of inductive clamping, induction, inductive metal detection, conductive coupling, or TransOnde (Radio detection) to generate signals, passive locating (free scoping) for "hot" electric, and metal detector.
4. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72".
5. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:
   a) All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.
   b) All conduit pathways containing an active cable TV system.
   c) All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.
   d) All empty conduit pathways or pipe in which a signal probe or sonde (miniature transmitter) can be inserted.
   e) All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.
   f) All plastic and other nonconductive water lines in which a TransOnde Radio detection) or other "transmitter" can be applied to create a low frequency pressure waive (signal) without damaging or triggering the existing systems.
   g) All copper or steel waterlines and plastic or steel gas lines
6. All markings made by the Underground Utility Locator Service or other shall be clear and visible.
7. The contractor shall maintain all markings made by Underground Utility Locator Service or other throughout the entire length of the project.
8. The Underground Utility Locator Service shall provide the contractor with two sets of maps showing the location of utilities and average depth. They will be referenced to permanent buildings. Contractor will deliver one copy to the district at no additional

charge.

9. Contractor is responsible to contact Underground Service Alert (U.S.A. 800/227-2600) and receive clearance prior to any excavation operations.
10. Contractor shall inform the (District's Construction Manager) (Architect) (Owner) no later than five (5) days prior to the date scheduled for the utility locator service to be on site.

1.11 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.12 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Excessively wet fill material shall be bladed and aerated per section 3.08, B.

1.13 TESTING

A. General: Refer to Section 01 45 00 – Quality Requirements.

B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and back charged to Contractor.

1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the cost of all testing of this material shall be paid for by the Contractor.
2. Testing of import fill for compliance with Department of Toxic Substance Control (DTSC) shall be paid for by the Contractor.

1.14 ARCHEOLOGICAL AND CULTURAL RESOURCES

A. If archeological or cultural resources are discovered during the Work, the Contractor must cease all construction operations in the vicinity of the discovery until a qualified archeologist can assess the value of these resources and make recommendations to the State Historic Preservation Officer. Archeological and cultural resources include artifacts, large amounts of bone, shell, or flaked stone, and other evidence of human activity. If the State Historic Preservation Officer or the Owner directs that work be temporarily ceased at the location of an archeological or cultural find, the Contractor must temporarily suspend work at the location.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer free from debris, and concentrations of clay and organics; and contain rocks no larger than 3-inches in greatest dimension. The soil and rock should be thoroughly blended so that all rock is surrounded by soil. This may require mixing of the soil and rock with a dozer prior to placement and compaction. Clods, rocks, hard lumps or cobbles exceeding 3-inches in final size shall not be allowed in the upper 6 inches of any fill. Native clay or clayey soils will not be permitted within the upper 6 inches of building pad areas or paved areas.

B. Imported Engineered Fill Material: Imported fill may be required to complete work. Proposed import fill material shall meet the above requirements; shall be similar to the native soils. Import fill shall meet the above requirements; shall have plasticity index of 12 or less; an Expansion Index of 20 or less; be free of particles greater than ___-inches in largest dimension; be free of contaminants and have corrosion characteristics within the acceptable limits. All import fill material shall be tested and approved by Soils Engineer prior to transportation to the site. Proposed fill material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

1. DTSC TESTING: Site work contractor is to coordinate testing with an analytical lab, hired by the owner, licensed by the State of California for the DTSC testing. The costs associated with the testing will be paid by the contractor.
2. DTSC testing shall include documentation as to the previous land use, location, and history. Soils shall be analyzed for all compounds of concern to ensure the imported soil is uncontaminated and acceptable. Testing shall be performed per the recommendations included in DTSC Imported Fill Advisory http://www.dtsc.ca.gov/Schools/upload/SMP FS Cleanfill-Schools.pdf). Soils shall be tested prior to import to the project site.
   Lab shall determine geographically which tests and analysis comparison will be appropriate for the testing. (CAM 17 / Title 22); (RWQCB) Regional Water Quality Control Board; or (OEHHA) Office of Environmental Health Hazard Assessment.
3. Frequency of testing shall be conducted in accordance with DTSC's Imported Fill Advisory as follows;

Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 Acres or less	Minimum of 4 samples
2 to 4 Acres	Minimum of 1 sample every ½ Acre
4 to 10 Acres	Minimum of 8 Samples
Greater than 10 Acres	Minimum of 8 locations with 4 subsamples per location
Volume of Borrow Area Stockpile	
Up to 1,000 Cubic Yards	1 sample per 250 cubic yards
1,000 to 5,000 Cubic Yards	4 samples for the first 1000 cubic Yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 Cubic Yards	12 samples for the first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

4. Reports/ Documentation

   a. Results of the testing analysis shall be sent to the Owner; Architect; Project Inspector, Project Civil Engineer, DTSC, and DSA. Letter shall reference DSA file and application numbers.

C. Landscape Backfill Material:

1. The top 12" of native topsoil stripped from the site may be used for landscape backfill material provided it meets the requirements as specified in Section 329000.
2. Imported Topsoil may be required to complete work. See Section 329000 for requirements. Proposed Topsoil material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.

D. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

E. Aggregate Base: Provide Class 2 3/4" Aggregate Base conforming to standard gradation as specified in Cal Trans Standard Specifications, Section 26,-1.02A.

F. Decomposed Granite: Decomposed Granite shall be well graded mixture of fine to 1/8" particles in size with no clods. The material shall be free of vegetation, other soils, debris and rock. The material shall be reddish-tan to tan in color.

G. Decomposed Granite Solidifier: PolyPavement or equal.

PART 3 – EXECUTION

3.01 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PERFORMANCE

A. GENERAL:

1. General: Do all grading, excavating and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.
2. Archaeological Artifacts: Should any artifacts of possible historic interest be encountered during earthwork operations, halt all work in area of discovery and immediately contact the Architect for notification of appropriate authorities.
3. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density determined by ASTM D1557 Compaction Test method, and such expressed percentage thereof will be minimum acceptable compaction for specified work.
4. Moisture Content: Moisture content shall be as noted below and as called for on the plans. Moisture content shall be maintained until subgrade is covered by surfacing materials.

3.03 DEMOLITION, DISPOSAL AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like shall be removed from site. Excavations resulting from these removal activities shall be cleaned of all loose materials, dish shaped, and widened as necessary to permit access for compaction equipment. Areas exposed by any required over-excavation should be scarified to a depth of 12", moisture-conditioned to (optimum) (2% above optimum) moisture content, and recompacted to at least 90% of the maximum dry density.

3.04 TESTING AND OBSERVATION

A. All grading and earthwork operations shall be observed by the Geotechnical Engineer or his representative, serving as the representative of the Owner.

B. Field compaction tests shall be made by the Geotechnical Engineer or his representative. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Geotechnical Engineer at least 48 hours in advance of any filling operation.

C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer or his representative. The Contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

D. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer or Architect/Engineer.

E. After each rain event Geotechnical Engineer shall test fill material for optimum moisture. Do not place any fill material until desired moisture is achieved.

3.05 CLEARING AND GRUBBING

A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled in accordance with paragraphs 3.07, 3.08, 3.09, and 3.10. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics. Stripping's meeting the requirements of Section 32 90 00 may be used in landscape areas only.

3.06 CUTTING

A. Building pads that are located within a cut/fill transition area will have to be overexcavated to provide a semi-uniform fill beneath the building pad. The portions of building pads located in cut areas shall be overexcavated to provide no more than1 foot difference in fill placed in the same building pad.

B. Do all cutting necessary to bring finish grade to elevations shown on Drawings.

C. When excavation through roots is necessary, cut roots by hand.

D. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

3.07 STRUCTURAL EXCAVATION

A. General: Excavate to bear on firm material at contract depth shown on Structural Drawings.

B. Footings: All footing excavations shall be of sufficient width for installation of formwork, unless earth will retain its position during concreting. All portions of footings above grade must be formed.

C. Unsuitable Ground: Any errors in structural excavation, soft ground, or clay soils found when excavating shall be reported to Architect. In no case shall work be built on any such soft or clayey unsuitable surface without direction from the Architect. Restore excavations to proper elevation with engineered fill material compacted to 90% of dry density.

3.08 SUBGRADE PREPARATION

A. Grade compact and finish all subgrades within a tolerance of 0.10' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks shall be within 0.05' of grades indicated.

B. After clearing, grubbing and cutting, subsurface shall be plowed or scarified to a depth of at least 12", until surface is free from ruts, hummocks or other uneven features and uniform and free from large clods. Moisture condition to (optimum) (2% above optimum) moisture content and recompact to at least 90% of the maximum dry density as determined by ASTM Test Method D1557. If the existing soils are at a water content higher than specified, the

contractor shall provide multiple daily aerations by ripping, blading, and/or disking to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the architect. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work.

C. Subgrade in areas to receive landscaping shall be compacted to 90%.

D. Where Contractor over-excavates building pads through error, resulting excavation shall be recompacted as engineered fill at Contractor's expense.

3.09 PLACING, SPREADING AND COMPACTING FILL MATERIAL IN BUILDING PAD AND PAVEMENT AREAS

A. Selected fill material shall be placed in layers which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content.

B. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading or other methods mentioned in 3.08 B until moisture content is satisfactory.

C. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to a minimum of 90% as determined by the ASTM D1557 Compaction Test. Compact each layer over its entire area until desired density has been obtained.

D. Recompaction of Fill in Trenches and Compaction of Fill Adjacent to Walls: Where trenches must be excavated, backfill with material excavated. Place in lifts that when compacted do not exceed 6”, moisture conditioned to (optimum)(2% above optimum) moisture content, and compact to a minimum of 90% relative compaction in building pad and paved areas, and to 90% relative compaction in landscape areas.

E. Jetting of fill materials will not be allowed.

3.10 FINAL SUBGRADE COMPACTION

A. Building Pads: Upper ___" of all final building pad subgrades (including future buildings) shall be uniformly compacted at specified moisture content to at least ___% of maximum dry density, as determined by ASTM D1557 Compaction Test, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

B. Paved Areas: Upper 12" of all final subgrades supporting pavement sections and all other flatwork shall be brought to specified moisture content and shall be uniformly compacted to not less than 90% of maximum dry density, regardless of whether final subgrade elevation is attained by filling, excavation, or is left at existing grade. After acceptance of final compaction test, contractor shall maintain the required moisture content of subgrade until concrete flatwork is placed.

C. Other Fill and Backfill: Upper 12" of all other final subgrades or finish grades shall be compacted to 90% of maximum dry density.

D. Gravel Fill: Do not place compacted gravel fill until after underground work and foundations are in place. Compact gravel fill with vibratory plate or similar equipment to preclude settlement.

3.11 PLACING, SPREADING, AND COMPACTION OF LANDSCAPE BACKFILL MATERIALS

A. All landscaped areas shall receive topsoil. After subgrade under landscape area has been scarified and brought to 90% maximum dry density, top soil shall be placed evenly to depth of 12" at 85% of maximum dry density.

B. Project Inspector must verify that materials are uniformly spread to minimum depth specified.

3.12 DECOMPOSED GRANITE COMPACTION AND STABILIZATION

A. Decomposed granite paving, paths or track shall be placed uniformly to the required depth and treated with PolyPavement or approved equal. Apply PolyPavement using Application Method 1 or a mixed application method.

3.13 SLOPE CONSTRUCTION

A. Cut slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Fill slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio of __2_horizontal to _1__vertical. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.14 FINISH GRADING

A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be "flat graded" to grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be +-0.05'. Tie in new and existing finish grades. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for sod thickness.

B. All landscape areas shall be left free of rock or foreign material as specified in Section 32 90 00.

C. All landscape areas shall be approved by Architect prior to any planting.

3.15 SURPLUS MATERIAL

A. Excavated material not required for grading or backfill shall be removed from site at contractor's expense.

3.16 CLEANING

A. Refer to Section 01 74 00.

B. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact

with ground; buried wood will not be permitted in any fill.

END OF SECTION 31 00 00

SECTION 31 23 33 – TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The general conditions, supplementary conditions and Division 1 are fully applicable to this section as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 00 00, Earthwork.

C. Section 33 40 00, Site Drainage.

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Submit Manufacturers data and shop drawings.

1.05 WARRANTY

A. Submit fully executed warranty for work and materials in this section per 01 60 00.

1.06 REFERENCES AND STANDARDS

A. California Building Code current edition.

B. California Plumbing Code current edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.

C. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.09 PROTECTION

A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.

B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.

D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.

H. Trees: Carefully protect existing trees which are to remain.

1.10 TRENCH SAFETY PROVISIONS

A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.

B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.

C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.11 SEASONAL LIMITS

A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, full operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

B. Material above optimum moisture shall be processed per section 310000, 3.08, B.

1.12 TESTING

A. General: Refer to Section 01 45 00 – Quality Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.

1. ¾ inch crush rock.
2. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than __-inches.
3. Sand: Fine granular material, free of organic matter, mica, loam or clay.
4. Lean Mix Concrete/Controlled Density Backfill: 2 sacks cement slurry.
5. Class 2 aggregate base, ¾" rock, per Caltrans section 26-1.02B

B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

C. Provide other bedding and backfill materials as described and specified in Section 31 00 00, Section 33 40 00 and Divisions 15 and 16.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verification of Conditions:

1. Examine areas and conditions under which work is to be performed.
2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.02 COORDINATION

A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.03 INSTALLATION

A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings.

3.04 TRENCHING

A. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.

B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.

D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:

1.	Sewer pipe:	depth to vary
2.	Storm drain pipe:	depth to vary
3.	Water pipe - Fire Supply:	36 inches
4.	Water pipe – Domestic Supply:	30 inches

E. Where trench through existing pavement saw cut existing pavement in straight lines. Grind existing asphalt on each side of trench 3” wide x ½ the depth of the section. Apply tact coat to vertical surfaces before installing new asphalt. Replace asphalt and concrete pavement sections to matched existing conditions. In concrete pavement provide expansion and control joints to match existing joint layout.

3.05 BACKFILL

A. Pipe Trench Backfill is divided into two zones:

1. Bedding: Layer of material directly under the pipe upon which the pipe is laid.
2. Initial Backfill: Backfill from the top of the bedding to 12 inches (compacted) over the top of the pipe.

B. Bedding and Initial Backfill:

1. Type of material for Bedding and Pipe Zone shall be as required by Drawings.
2. Compaction of Bedding and Initial Backfill shall be achieved by vibratory plate as necessary to consolidate material.
3. Backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.

C. Backfill Compaction:

1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.
2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture

content is above that required, aerate by blading or other methods until specified moisture content is met, see section 310000, 3.08, B.

3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to ____% of maximum dry density while at specified moisture content. Compact each layer over its entire area until desired density has been obtained.
4. The top ___ inches of subgrade compaction under pavement or building shall be per Earthwork section 31 00 00.
5. Compaction: All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.

3.06 TRENCH AND SITE RESTORATION

A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.07 PROTECTION

A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.

B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.

C. Replace damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cute neatly and replaced with new materials.

D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.08 SURPLUS MATERIAL

A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.09 CLEANING

A. Refer to Section 01 74 00.

B. Contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.

C. After completion of work in this section, remove all equipment, materials, and debris. Leave entire area in a neat, clean, acceptable condition.

END OF SECTION 31 23 33

SECTION 32 16 00 – SITE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section describes the requirements for providing portland cement concrete paving, including accessibility ramps, sidewalks, accessible routes of travel, vehicular travel, drain structures, sewer structures, thrust blocks and for other non-structural or non-vehicular applications.

1.02 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 00, Earthwork.

1.04 QUALITY ASSURANCE

A. Use only new materials and products.

B. Use materials and products of one manufacturer whenever possible.

C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted

1.05 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

C. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to sand, gravel, admixtures, surface treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

D. With concrete submittal, provide documented history of mix design performance.

1.06 WARRANTY

A. Refer to General Conditions and Section 01 60 00.

1.07 REFERENCES AND STANDARDS

A. California Building Code, latest edition.

B. ACI Standards, ACI 301-20.

C. ASTM C-94, Specification for Ready-Mixed Concrete.

D. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).

E. ASTM – American Society for Testing and Materials.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.

B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.

C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stock pile.

1.09 TESTING

A. General: Refer to Section 01 40 00 – Quality Requirements.

1.10 ADEQUACY AND INSPECTION

A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.

B. Notify Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.11 PROTECTION

A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by contractor at contractor expense.

1.12 FIELD MEASUREMENTS

A. Make and be responsible for all field dimensions necessary for proper fitting, slopes and

completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: Portland cement, ASTM C150, Type II, per ACI 318-19 Section 26.4.

B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33. Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318-19.

D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for portland cement.

E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.

F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal.

G. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.

H. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.

I. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.

J. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed 3’-0” O.C.E.W. Staggered and each support securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with 3” concrete blocks with embedded wire ties. Concrete supports without wire ties will not be allowed.

H. Truncated Domes: Vitrified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; “Armor-Tile”, “Access Tile Tactile Systems”, or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of Regulations (CCR) Title 24, Part 2, Chapter 11B (dome spacing shall be 2.35”). Install tiles as recommended by manufacturer. Detectable warning surface shall be yellow and approximate 33538 of SAE AMS-STD-595A.

K. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.

L. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.

M. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.

N. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed,non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.

O. Aggregate Base: Class 2 AB per Caltrans specification section 26-1.02A.

P. Expansion Joint Material: Preformed 3/8" fiber material, full depth of concrete section, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.

Q. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893.

1. Reference Standard: ASTM C920, Grade P, Class 25, Use T.
2. Dow Corning 890-SL (self-leveling) Silicone, or accepted equal.
3. Dow Corning 888-NS (non-sagging) Silicone, at slopes exceeding 5%. May not be used at asphalt surfaces.
4. Color: Custom color as selected by Architect.

R. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8" "Snap Cap", Tex-Trude expansion joint cap, or an approved equal.

S. Adhesive Anchoring (Epoxy): Simpson SET-XP, or approved equal..

2.02 CONCRETE DESIGN AND CLASS

A. Class "B": Concrete shall have 1" max. size aggregate, shall have 3000 psi min. at 28 day strength with a maximum water to cementitious ratio no greater than 0.50. Use for exterior slabs, including walks, vehicular paved surfaces, manhole bases, poured-in-place drop inlets, curbs, valley gutters, curb & gutter and other concrete of like nature.

B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".

C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of ASI 318-19. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete to improve workability in amounts up to 15% of the total cementitious weight.

D. Air Entrainment; Per the Local Jurisdiction minimum requirements, or 3% minimum.

2.03 MIXING OF CONCRETE

A. Conform to requirements of CBC, Chapter 19A.

B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.

C. Concrete shall be Ready-mixed Concrete.

1. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
2. Water may be added to the mix only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.04 MATERIALS TESTING

A. Testing of concrete shall be performed per article 3.12 of this specification.

2.05 EQUIPMENT

A. Handling and mixing of concrete: Project Inspector may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.

PART 3 - EXECUTION

3.01 APPROVAL OF FORMS AND REINFORCEMENTS

A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.

B. All reinforcing steel and shall be adequately supported by approved devices on centers close enough to prevent any sagging.

C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.

D. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole frames and covers that are located within the concrete placements.

1. The bars shall be placed so that there will be a minimum of 1 ½” clearance and a maximum of 3” clearance. The reinforcing steel shall be placed mid-depth of concrete slab.

E. At all right angles or intersections of concrete walks, additional 2’x2’ #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2” from concrete forms and supports at mid-depth of slab.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the

Architect at no additional cost to the Owner.

C. Sub-Grade in vehicular concrete paved areas: Subgrade shall be clean, shaped and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 31 00 00. Compaction and moisture content shall be verified immediately prior to placement of concrete. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.03 CLEANING

A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.

B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.04 FORMING

A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.

C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.

D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.

E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.

F. Slope tie-wires downward to outside of wall.

G. Brace, anchor and support all cast-in items to prevent displacement or distortion.

H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.

I. Concrete paving, Curbs, Curb and Gutters, Ramps:

1. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20' for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant where required. Expansion joints shall not exceed ¼ inch depth measured from finish surface to top of felt or sealant, and ½ inch width.
2. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 60' on center,

except when placing adjacent to concrete walks, the expansion joints shall align with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for backer rod and sealant will be required.

3. Isolation Joints: 3/8" felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.
4. Exterior Concrete Paving: Install expansion joints at 20' on center maximum, both directions, unless shown otherwise on plans.
5. Ramps; whether shown or not all ramps shall have control joints and expansion joints.
    a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.
    b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

3.05 FORM COATING

A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.

B. Before re-using form material, inspect, clean thoroughly and recoat.

C. Seal all cut edges.

3.06 INSTALLATION

A. General: Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Architect.

B. Placing Tolerances:

1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.
2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar diameter not 1 ½ times the maximum size of coarse aggregate.

C. Splices:

1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:
    a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56" minimum for No. 6 bars. No. 4 bar shall have a

minimum of 24” splice. 93 bar diameters for No. 7 bars and larger.

b. All splices shall be staggered at 5 feet minimum.

3.07 INSPECTION

A. Slope of concrete forms and finish condition shall be checked with a two foot (2’) digital level.

3.08 PLACING OF CONCRETE

A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.

B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.

C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.

D. Remove form spreaders as placing of concrete progresses.

E. Place footings as monolithic and in one continuous pour.

F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.

G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.

H. Concrete Flatwork:

1. All flatwork shall be formed and finished to required line and grades. Flatwork shall be true and flat with a maximum tolerance of 1/8" in 10’ for flatness. Flatwork which is not flat and are outside of the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.
2. Concrete vibrator shall be used to assist concrete placement. Contractor shall have spare concrete vibrator on site during concrete placement.
3. Thoroughly water and soak the exterior slabs, curbs, curb and gutters, footing subgrades with multiple daily waterings for at least three (3) days or as required to achieve required moisture content prior to the concrete pour in order to place the subgrade soils in full expansion. Provide damming as required to keep standing water within the formed area and to allow for proper saturation and full expansion of the subgrade soils. Remove any standing water before concrete placement.

I. Placing in hot weather: Comply with ACI 305R-10. Concrete shall not exceed 95 degrees F

at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.

J. Placing in cold weather: Comply with ACI 306R-16. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.

K. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.09 CONCRETE FINISHES

A. Concrete Slab Finishing: Finish slab as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use tools designed for the purpose of forcing the course aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. Surface shall be free from trowel marks, depressions, ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:

1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks and stairs.
2. Ramps, heavy broom finish: Concrete surfaces with slope greater than 5% including all ramps. Brooming direction shall run perpendicular to slope to form non-slip surface
3. Under no circumstances can water be added to the top surface of freshly placed concrete.

B. Curb Finishing: Steel trowel.

C. Joints and Edges: Mark-off exposed joints, where indicated, with ¼” radius x 1” deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of exposed expansion and contraction joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces.

1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.

D. Exposed Concrete Surface Finishing (not including top surface of flatwork): Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed. Damaged and irregular surfaces and holes left by form clamps and sleeves shall be patched with grout. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure noted under "Patching" below. Removal of tie wires shall extend to distance of 2" below established grade lines. Ends of tie wires shall be cut off flush at all other, unexposed locations. Care shall be taken to match adjacent finishes of exposed concrete surface. After patching, all concrete that is to remain

exposed, shall be sacked with a grout mixture of 1-part cement, 1 1/2- parts fine sand and sufficient water to produce a consistency of thick paint. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap. Entire finishing operation of any area shall be completed on the same day. This treatment shall be carried to 4" below grade, and all patching and sacking shall be done immediately upon removal of the forms.

E. Stair Treads and Risers: Tool exterior stair tread nosing per ADA requirements and as detailed. Paint or stain tooled area at every stair tread nosing or as detailed. Stair tread nosing shall contain no pockets, voids or spalls. Patching is not allowed. Damaged nosing shall be replaced.

3.10 CURING

A. Flatwork/Variable Height Curbs, Curb and gutter, Valley Gutter: Cure utilizing Curing Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.

1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.

B. No Curing Compound shall be applied to areas scheduled to receive resilient track surface including, curbs, ramps, run ways, etc.

3.11 DEFECTIVE CONCRETE

A. Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.

B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.

C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.

D. Permission to patch any area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.

E. Defective concrete is:

1. Concrete that does not match the approved mix design for the given installation type.
2. Concrete not meeting specified 28-day strength.

3. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
5. Concrete containing embedded wood or debris.
6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
7. Concrete not containing required embedded items.
8. Excessive Shrinkage, Traverse cracking, Crazing, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
9. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
10. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
11. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.
12. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
13. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.

F. Patching: Install specified Patching Mortar per manufacturer's recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND DSA.

3.12 CONCRETE TESTING

A. Comply with CBC Section 1903A, 1905A.1.16, 1910A and 1705A.3 and as specified in B. below. Costs of tests will be borne by the Owner.

B. Four identical cylinder samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.

C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six (56) days if the 28-day cylinder test results do not meet the required design strength.

D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.

F. Each truck shall be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

A. Remove without damage to concrete surfaces.

B. Sequence and timing of form removal shall insure complete safety of concrete structure.

C. Forms shall remain in place for not less than the following periods of time. These periods represent cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.

1. Vertical forms of foundations, walls and all other forms not covered below: 5 days.
2. Slab edge screeds or forms: 7 days.
3. Concrete columns and beam soffits: 28 days.

D. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 CLEANING

A. Refer to Section 01 74 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean excess material from surface of all concrete walks and utility structures.

D. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 32 16 00

SECTION 32 31 13 – CHAIN LINK FENCING AND GATES:

1. GENERAL:

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Special Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. Extent of chain link fences and gates is indicted on drawings.

1.3 QUALITY ASSURANCE:

A. Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data, and installation instructions for metal fencing, fabric, gates and accessories.

B. Shop Drawings: Submit shop drawings indicating extent, type gate locations and post footing details.

2. PRODUCTS:

2.1 GENERAL: Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.

2.2 MANUFACTURER: Subject to compliance with requirement, provide products of one of the following:

A. Galvanized Steel Fencing and Fabric: Equal to:

1. United States Steel Corp.

2. Anchor Fence, Inc.

3. Master-Holco Co.

2.3 STEEL FABRIC:

A. Fabric: No 9-gauge (0.148" + or – 0.005") size steel wires, 2" mesh, with top and bottom selvages knuckled.

B. Furnish one-piece fabric widths for fencing up to 12' high.

C. Fabric Finish: Galvanized, ASTM A 392, Class I, with not less than 1.2 oz. Zinc per sq. ft of surface.

2.4 FRAMING AND ACCESSORIES:

A. Steel Framework General: Galvanized steel, ASTM A 120 or A 123, with not less than 1.8 oz. Zinc per sq. ft. of surface.

B. Fittings and Accessories: Galvanized, ASTM A 153, with zinc weights per Table 1.

C. Line Posts: Space 10' o.c. maximum, unless otherwise indicated of following minimum sizes and weights.

1. 6' to 8' fabric height 2.375" OD steel pipe, 3.65 lbs. per lin. ft.

2. Over 8' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft.

2.5 GATE POSTS: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

LEAF WIDTH	GATE POST	LBS./LIN. FT.
Up to 6’	3.5 “x 3.5” roll-formed Section	4.85
	or 2.875: OD pipe	5.79
Over 6’ to 13’	4.000 OD pipe	9.11
Over 13’ to 18’	6.625 OD pipe	18.97
Over 18’	8.625 OD pipe	28.55

2.6 TOP RAIL: Manufacturer’s longest lengths, with expansion type couplings, approximately 6” long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end.

A. 1.66” OD pipe, 2.27 lbs. per ft.

B. Post Brace Assembly: Manufacturer’s standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375” diameter rod and adjustable tightener.

2.7 TENSION WIRE (BOTTOM):

A. Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire according to ASTM A817 or ASTM A824 with the following metallic coating:

1. Type II: Zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

a. Class 4: Not less than 1.2 oz./sq. ft. of uncoated wire surface.

2.8 POST TOPS: Provide weathertight closure cap with loop to receive tension wire or top rail; one cap for each post.

2.9 STRETCHER BARS: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16” x 3.4”. Provide one stretcher bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into post.

2.10 STRETCHER BAR BANDS: Space not over 15” o.c., to secure stretcher bars to end, corner, pull, and gate posts.

2.11 MAINTENANCE/SERVICE GATES:

A. Fabrication: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8’ apart unless otherwise indicated. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate ramp at not more than 15” o.c. Install diagonal cross bracing consisting of 3/8” diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

B. Swing Gates: Fabricate perimeter frames of minimum 1.90” OD pipe.

C. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Provide 1 ½" pair of hinges for each leaf over 6' nominal height.
2. Latch (Single Gates wider than 4'-0" wide): Forked type or plunger bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
    a. Padlock and Chain: Padlock: Schlage KS 47-743 Brass Padlock w/ Schlage Composite Keyway to accept district standard gate key for site. Chain to be welded to gate frame and padlock.
3. Latch (Single Gates 3'-0" wide to 4'-0" wide): Lockset w/ lever handles equal to: Schlage ND96PD – Storeroom Function w/ Schlage "Primus" System, Security Level Three, Type EP Keyways using 20-700 controlled access cylinders. Coordinate keying with the District's Locksmith Department.
4. Kickplate (Single Gates 3-0" wide to 4'-0" wide): Provide 10" high (minimum) galvanized steel kickplate on both sides of gate.

D Keeper: Provide keeper for vehicle gates, which automatically engages gate leaf and holds it in open position until manually released.

2.12 PEDESTRIAN GATES:

A. Fabrication: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8' apart unless otherwise indicated. Provide header at 6'-8" (min.) above walking surface to tie gate posts together. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate ramp at not more than 15" o.c. Install diagonal cross bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

B. Swing Gates: Fabricate perimeter frames of minimum 1.90" OD pipe.

C. Expanded Metal Mesh (Vandal Screens): ASTM F 1267, Type II (expanded and flattened), Class 1 (Uncoated): 1/2" x #13 with 14-gauge Type 014 U-Edging (0.080" opening x 1" width) welded around the perimeter. Mesh shall be attached to the gate and extended beyond each gate post as shown on the approved drawings to prevent the ability to reach around the sides to open the gates.

D. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

1. Hinges (Gate-Closer): Vandal-proof 180-degree self-closing hinge with hydraulic damping, and powder coated aluminum housing. Universal design that allows for left and right opening gates.
    a. Basis-of-Design Product: Subject to compliance with requirements, provide **Locinox; Mammoth180** or comparable product by one of the following:
        i. District and Architect approved equal.
    b. Provide manufacturer's standard chain link bracket.

c. Gate-Closer shall be capable of operating gates weighing up to 330lbs and 5'-0" in width.

d. Opening pressure of the Gate-Closer shall be between 3 and 5 pounds maximum applied perpendicular to the gate.

e. The gate closing sweep period from an open position of 90 degrees to a position of 12 degrees from the latch shall be 5 seconds minimum.

f. Color: Silver

2. Panic Device: Corbin Russwin ED8200 (Nightlatch function) w/ P857ET Wing Pull. Provide Schlage "Primus" System, Security Level Three, Type EP Keyways using 20-700 controlled access cylinders. Coordinate keying with the District's Locksmith Department. Manual cane bolts are prohibited on leaf with panic device.

3. Kickplate: Provide 10" high (minimum) galvanized steel kickplate on both sides of gate.

2.13 HORIZONTAL-SLIDE GATES:

A. General: ASTM F 1184 for gate posts and single slide gate types.

1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies and 6-inch double rolling gate wheel carrier.

a. Gate Frame Width and Height: More than 48 inches wide by any height (8'-0" maximum).

B. Fabrication:

1. Fabricate perimeter frames of minimum 1.90" OD pipe.

2. Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8' apart unless otherwise indicated.

3. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate ramp at not more than 15" o.c. Install diagonal cross bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

C. Horizontal-Slide Gate Hardware:

1. Hangers, Roller Assemblies, Stops, Double Wheel Carrier: Fabricated from galvanized steel. Wheel: Rubber

2. Latch: Forked type or plunger bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

3. Padlock and Chain: Padlock: Schlage KS 47-743 Brass Padlock w/ Schlage Composite Keyway to accept district standard gate key for site. Chain to be welded to gate frame and padlock.

2.14 CONCRETE:

Provide concrete consisting of portland cement, ASTM C 150, aggregate ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

2.15 PRIVACY SCREEN (**where indicated on drawings**):

A. Privacy Plus, as manufactured by Ball Fabrics Inc. 100% HD Polyethylene, 8.5 oz/sq-yd. Full height of fencing. #2 brass grommets @12" o.c. with triple grommeted corners. Grommet strip at heights over 8' #2 brass grommets @ 24" o.c..

B. Color: Black

3. EXECUTION:

3.1 INSTALLATION:

A. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.

3.2 EXCAVATION: Drill or hand excavate (using post hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.

3.3 SETTING POSTS: Center and align posts in holes 3" above bottom of excavation.

A. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to a crown to shed water.

3.4 TENSION WIRE: Pull wire taut, without sags. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

A. Extended along bottom of fence fabric. Install bottom tension wire within 3 inches of bottom of fabric and tim to each post with not less than same diameter and type of wire.

3.5 TOP RAILS: Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.

3.6 BRACE ASSEMBLIES: Install braces so posts are plumb when diagonal rod is under proper tension.

3.7 FABRIC: Leave approximately 2" between finish grade and bottom salvage, unless otherwise indicated. Pull fabricate taunt and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

3.8 STRETCHER BARS: Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.

3.9 GATES: Install gates plumb, level, and secure to full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.10 TIE WIRES: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts, with wire ties spaced 12" o.c. Tie fabric to rails and braces, with wire ties spaced 24" o.c. Tie fabric to tension wires, with hog rings spaced 24" o.c.

3.11 FASTENERS: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.12 PRIVACY SCREEN: Install for privacy factor of 98 percent securely locked in place. Attach per manufactures recommendations.

END OF SECTION 32 31 13

SECTION 33 40 00 – SITE DRAINAGE

PART 1 - GENERAL

1.01 INCLUSION OF OTHER CONTRACT DOCUMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 50 00, Construction Facilities and Temporary Controls.

B. Section 31 23 33, Trenching and Backfilling.

C. Section 32 16 00, Site Concrete

1.03 QUALITY ASSURANCE

A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.

B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.

C. The representatives of the Owner’s testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner’s testing lab representatives nor the testing by the Owner’s testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

1.04 SUBMITTALS

A. Refer to Section 01 33 00.

B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.05 WARRANTY

A. Refer to General Conditions and Section 01 60 00.

1.06 REFERENCES AND STANDARDS

A. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ANSI/ASTM D1557-02 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).

E. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.

F. CALTRANS Standard Specifications.

G. CAL-OSHA, Title 8, Section 1590 (e).

H. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

I. California Plumbing Code current edition.

1.07 DELIVERY, STORAGE AND HANDLING

A. Transport, store and handle in strict accord with the local jurisdiction.

B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.08 PROJECT CONDITIONS

A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.

1.09 EXISTING SITE CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.

D. Provide shoring, sheeting, sheet piles and/or bracing to prevent caving, erosion or gullying of sides of excavation.

E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.

F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

H. Trees: Carefully protect existing trees that are to remain.

1.11 SEASONAL LIMITS

A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

A. General: Refer to Section 01 40 00 – Quality Requirements.

B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

1.13 RECORD DRAWINGS

A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.

B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.

C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.

D. Properly identify all stubs for future connections, as to location and use, by setting of concrete marker at finished grade in the manner suitable to Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe: Use one of the following, unless noted on the Drawings otherwise.

1. Polyvinyl Chloride Pipe (PVC): SDR35 conforming to ASTM D3034 with elastomeric joints conforming to ASTM D3212. Sun damaged pipe will be rejected.
2. High density polyethylene pipe (HDPE): The pipe shall be corrugated exterior/smooth interior pipe and water tight per ASTM D3212 with dual wall water

tight gasket fittings.

B. Perforated Pipe (for subdrains): Shall be ADS N12 pipe, 3 hole, ASTM F 405, AASHTO M 252; PVC ASTM D3034 SDR-35 storm drain pipe

C. Manhole: Shall be as shown on the drawing details.

D. Drop Inlet: Shall be as shown on the drawing details.

E. Curb Inlet: Shall be as shown on the drawing details.

F. Mortar: For pipe connections to concrete drainage structures, conform to ASTM C270 type N mortar. Place within one half hour after adding water.

G. Crushed Rock: Imported washed crushed rock. Minimum 100% passing 3/4 inch sieve.

H. Trench drain: Polycast, Polydrain or equal and as shown on drawings.

I. Area Drains: Shall be as shown on the drawing details.

J. Floor Drains: Shall be as shown on the drawing details.

K. Clean-outs: Shall be as shown on the drawing details.

L. Planter drains: Shall be as detailed on the drawing details.

M. Filter Fabric: Mirafi 140N.

PART 3 - EXECUTION

3.01 INSPECTION LAYOUT AND PREPARATION

A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point were this installation may properly commence

B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.

C. Verify that specified items may be installed in accordance with the approved design.

D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 INSTALLATION

A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.

B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

C. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width in accordance with pipe manufacturer's recommendations and as per the drawings. Follow manufacturer's recommendations for use of each kind and type of pipe.
2. Bedding: Provide bedding as detailed on plans for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.
3. If the trenches for the site drainage fall within areas to be lime treated, the piping shall be installed prior to any lime treatment operations.
   a. If additional piping is added to previously lime treated areas, the contractor shall backfill the trench with class 2 aggregate base and compact to 95%.

D. Laying of Pipe:

1. General: Inspect pipe prior to placing. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe upgrade, true to line and grade.
2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution or as recommended by manufacture. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.
3. Pipe shall be bedded uniformly throughout its length.
4. Pipe elevation shall be within 0.02 feet of design elevation as shown on plans.
5. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the governing agency.

E. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished.
2. Trenches and Excavations: Backfill with material as detailed on plans, filling both sides of the pipe at the same time, carefully tamping to hold pipe in place without movement. Refer to Section 31 23 33 – TRENCHING AND BACKFILLING for fill above this layer.

F. Grouting of Pipes: Grout pipes smooth and water tight at drop inlet, manholes, and curb inlets. Grout back side of hood at curb inlets all grouting shall be smooth and consistent.

G. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the local agency.

H. Cutting and Patching: Remove and replace existing surface features per applicable specification section (i.e. asphaltic concrete or concrete paving) where pipe is installed in areas of existing improvements.

3.03 TOLERANCES

A. Storm Drain structure grates

1. In landscape and lawn areas +- 0.05'.
2. In sidewalk and asphalt pavement +-0.025'.
3. In curb and gutter application +-0.0125'.

B. Cleanout Boxes and Lids

1. In landscape areas; 0.10 higher than surrounding finish grade, +-0.05'.

2. In sidewalks and asphalt pavement; Flush with surrounding finish grade, +-0.025'.

3.03 DEWATERING

A. Contractor to provide trench dewatering as necessary, no matter what the source is, at no additional cost to the owner.

B. If the previously excavated material from trenching is too wet to achieve trench backfill compaction the contractor shall make a reasonable effort to aerate and dry the material per section 31 00 00, 3.08, B

3.04 FLUSHING

A. The Contractor shall thoroughly ball and flush the storm drain system to remove all dirt and debris. Discharge water to an approved location.

3.05 CLEANING

A. Refer to Section 01 74 00.

B. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.

C. Clean the dirt, rocks, and debris from all storm drain inlets, structures, and connecting pipes.

END OF SECTION 33 40 00