

SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA



ITEM: 3.29
(ID # 29964)

MEETING DATE:
Tuesday, March 10, 2026

FROM : FACILITIES MANAGEMENT AND RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SUBJECT: FACILITIES MANAGEMENT (FM) AND RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT (DISTRICT): Flood Control and Water Conservation District Office Tenant Improvement Project – Approval of Total Project Budget, and Approval and Adoption of Plans and Specifications to Advertise for Bids; District 1. [\$13,224,554 – 100% District Special Accounting Fund 15000] (Clerk to Advertise for Bids)

RECOMMENDED MOTION: That the Board of Supervisors:

1. Approve an increase to the project budget in the not-to-exceed amount of \$12,138,480 to establish a total project budget in the amount of \$13,224,554 for the Flood Control and Water Conservation District Office Tenant Improvement (Flood Control and Water Conservation TI) Project;
2. Authorize the use of District Special Accounting Fund 15000 in the not-to-exceed additional amount of \$12,138,480 for the Project, including reimbursement to Facilities Management (FM) for incurred project related expenses; and,
3. Approve and adopt the plans and specifications for bidding and construction of the Flood Control and Water Conservation TI Project located at 1995 Market Street in Riverside, and authorize the Clerk of the Board to advertise for bids to be received by the Clerk of the Board located on the 1st Floor of the County Administrative Center, at 4080 Lemon Street, in Riverside, up to 10:00 a.m. on April 22, 2026, as instructed in the specifications, at which the time bids will be opened.

ACTION:Policy, CIP

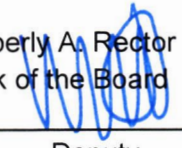

Jason Unley, GENERAL MGR-CHIEF FLD CNTRL ENG


2/25/2026 Vincent Yzaguirre 2/26/2026

MINUTES OF THE BOARD OF SUPERVISORS

On motion of Supervisor Medina, seconded by Supervisor Washington and duly carried by unanimous vote, IT WAS ORDERED that the above matter is approved as recommended.

Ayes: Medina, Spiegel, Washington, Perez, and Gutierrez
Nays: None
Absent: None
Date: March 10, 2026
xc: FM, Flood, COB/DL/NS

Kimberly A. Rector
Clerk of the Board
By: 
Deputy

**SUBMITTAL TO THE BOARD OF SUPERVISORS COUNTY OF RIVERSIDE,
STATE OF CALIFORNIA**

FINANCIAL DATA	Current Fiscal Year:	Next Fiscal Year:	Total Cost:	Ongoing Cost
COST	\$ 500,000	\$ 8,000,000	\$ 13,224,554	\$ 0
NET COUNTY COST	\$ 0	\$ 0	\$ 0	\$ 0
SOURCE OF FUNDS: District Special Accounting Fund 15000 – 100%			Budget Adjustment: No	
			For Fiscal Year: 2025/26 -2027/28	

C.E.O. RECOMMENDATION: [Approve]

BACKGROUND:

Summary

On July 1, 2025, the Board of Supervisors (Board) approved Item 3.16 in-principle, the project preliminary design development budget in the amount of \$1,086,074, and the Professional Services Agreement with Westgroup Designs, Inc. (Westgroup) in the amount of \$799,100 for architectural and engineering design services for the Flood Control and Water Conservation TI Project (Project). The scope of work for the Project includes the interior modifications to two main buildings, approaching 50 years old. The Project, totaling 62,000 square feet of office space, will reduce cubicle and office sizes to accommodate needed personnel growth and operational functionality. The contract also includes necessary work to bring the facility up to current code for plumbing, electrical, fire and ADA compliance.

The plans and specifications for the construction of the Project have been completed by Westgroup to advertise and bid the Project. Facilities Management (FM) recommends the Board approve and adopt the plans and specifications and authorize the Clerk of the Board to advertise the Notice Inviting Bids. Upon completion of the bid process, FM will return to the Board to award the bid to the lowest responsive and responsible bidder and authorize the Chair of the Board to execute the construction contract on behalf of the Board upon County Counsels' review and approval as to form.

Facilities Management is seeking Board approval for the additional funds to: 1) construct the project in the not-to-exceed amount of \$12,138,480; 2) establish the total project budget in the amount of \$13,224,544; and 3) approve and adopt the plans and specifications for advertisement to bid the Project for construction.

Impact on Residents and Businesses

The Flood Control and Water Conservation TI Project will modify and expand the use of the existing facility to allow the District to more economically grow in place. The District is constructing and accepting over 10 miles of storm drains and channels into its maintenance system every year. The Project will help the District address growing regulatory, maintenance, and capital construction needs associated with growth in their systems and the County. The Project will not impact any residents and businesses nor interfere with daily operations.

Additional Fiscal Information

The approximate allocation of the project budget adjustment is as follows:

**SUBMITTAL TO THE BOARD OF SUPERVISORS COUNTY OF RIVERSIDE,
STATE OF CALIFORNIA**

BUDGET LINE ITEMS	DESIGN DEVELOPMENT BUDGET	PROJECT BUDGET ADJUSTMENT	REVISED PROJECT BUDGET
DESIGN PROFESSIONAL OF RECORD	799,100	0	799,100
SPECIALTY CONSULTANTS	115,700	0	115,700
REGULATORY PERMITTING	4,000	0	4,000
CONSTRUCTION	0	10,898,726	10,898,726
COUNTY ADMINISTRATION	68,540	136,256	204,796
PROJECT CONTINGENCY	98,734	1,103,498	1,202,232
REVISED PROJECT BUDGET	\$ 1,086,074	\$ 12,138,480	\$ 13,224,554

The Board previously approved a design development project budget in the amount of \$1,086,074 on July 1, 2025, (Item 3.16) which is 100% funded through the District Special Accounting Fund 15000.

This Board action will increase the project budget to include construction of improvements for a revised total project budget of \$13,224,554 which will be 100% funded by the District Special Accounting Fund 15000. Of the \$13,224,554, expenditures for FY 25/26 are estimated at \$500,000; expenditures for FY 26/27 are estimated at \$8,000,000; and expenditures for FY 27/28 are estimated at \$4,724,554.

On July 1, 2025, Item 3.15, the Board approved the Flood Control and Water Conservation TI Project to be exempt from the California Environmental Quality Act (CEQA) Pursuant to State CEQA Guidelines Section 15301, Class 1 – Existing Facilities Exemption, and Section 15061 (b)(3), “Common Sense” Exemption. The Project, as proposed, is limited to tenant improvements within the existing District facility. The facility will continue to provide essential public services and will not result in a significant increase in capacity or intensity of use. The Notice of Exemption was filed by FM staff with the County Clerk and the State Clearinghouse after Board approval.

Attachments:

- Specifications and Contract Documents to Bid for the Flood Control and Water Conservation District Office Tenant Improvement Project
- Construction Documents

VY:TB:RM:RB

FM08947014286

MT Item #29964

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Evangelina Gregorio EO, Principal Mgmt Analyst

3/2/2026


Aaron Gettis, Chief Deputy County Counsel 2/26/2026



STANDARD FORM OF CONSTRUCTION CONTRACT BETWEEN COUNTY AND CONTRACTOR

by and between

CONTRACTOR'S NAME

(the "Contractor")

And

THE COUNTY OF RIVERSIDE

(the "County")

FOR:

**Flood Control and Water Conservation District Office
Tenant Improvement Project**

FM08947014286

1995 Market St, Riverside, CA 92501

STANDARD FORM OF CONSTRUCTION CONTRACT

BETWEEN COUNTY AND CONTRACTOR

THIS STANDARD FORM OF CONSTRUCTION CONTRACT BETWEEN COUNTY AND CONTRACTOR ("Agreement") is entered into as of the date of the last signature on the signature page of this contract by and between **THE COUNTY OF RIVERSIDE**, a political subdivision of the State of California ("County") and _____, a _____ ("Contractor") whose principal place of business is located at _____, _____, _____.

ARTICLE 1 DEFINITIONS

Capitalized terms used in the Contract Documents shall have the meanings assigned to them in the General Conditions. If not defined in the General Conditions, they shall have the meanings assigned to them elsewhere in the Contract Documents. If not defined in the General Conditions or elsewhere, they shall have the meanings reasonably understood to apply to them by the context in which they are used.

ARTICLE 2 PERFORMANCE OF WORK

2.1 SCOPE OF WORK

Contractor shall execute the entire Work called for by the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

2.2 STANDARD OF PERFORMANCE

In addition to and without limiting Contractor's other obligations under the Contract Documents, Contractor shall at all times in its performance of its obligations under the Contract Documents conform to the following general standards of performance:

2.2.1 the requirements of the Contract Documents;

2.2.2 the requirements and conditions of Applicable Laws;

2.2.3 the standard of care applicable to those who provide construction of the type called for by this Construction Contract for projects of a scope and complexity comparable to the Project;

2.2.4 Contractor shall furnish efficient business administration of the Work, utilizing sufficient senior level management and other qualified personnel to manage the Work; and

2.2.5 Contractor shall apply its best and highest skill and attention to completing the Work in an expeditious and economical manner, consistent with the expressed best interests of the County and within the limitations of the Contract Price and Contract Time.

ARTICLE 3 CONTRACT TIME

3.1 CONTRACT TIME

3.1.1 Substantial Completion. Subject to Contract Adjustments permitted by the Contract Documents, Contractor shall achieve Substantial Completion of the entire Work not later than **Three Hundred Sixty (360) Days** after the Date of Commencement.

3.1.2 Final Completion. Subject to Contract Adjustments permitted by the Contract Documents, Contractor shall achieve Final Completion of the Work not later than **Thirty (30) Days** after the actual occurrence of Substantial Completion.

3.1.3 Contract Adjustments. The Contract Time shall be extended or shortened only in accordance with the provisions of the Contract Documents governing Contract Adjustments to the Contract Time.

3.2 LIQUIDATED DAMAGES TO COUNTY

3.2.1 County's Right. County and Contractor acknowledge that if Contractor fails to Substantially Complete the Work within the Contract Time for Substantial Completion, County will suffer substantial Losses, which would be both extremely difficult and impracticable to ascertain. On that basis they agree, as a reasonable estimate of those Losses and not a penalty, to the assessment and recovery by County of liquidated damages under this Section 3.2.

3.2.2 Per Diem Rate. If Contractor fails to actually achieve Substantial Completion of the entire Work within the Contract Time for Substantial Completion, Contractor shall pay to County as liquidated damages the amount of One Thousand Five Hundred Dollars (\$1,500) per Day for each Day occurring after the expiration of the Contract Time for Substantial Completion until Contractor achieves Substantial Completion of the entire Work.

3.2.3 Adjustment for Extensions of Time. Subject to the provisions of Paragraph 8.2.8 of the General Conditions dealing with concurrency of Delays, liquidated damages shall not be charged to Contractor for a period of time for which the Contractor is entitled under the Contract Documents to a Contract Adjustment to the Contract Time for Substantial Completion.

3.2.4 Partial Completion. The liquidated damages provided for under this Section 3.2 shall not be reduced or apportioned: (1) for Substantial Completion of portions of the Work prior to Substantial Completion of the entirety of the Work; or (2) if portions of the Work are deleted pursuant to (a) the County's right to order Deleted Work; or (b) a termination by County of a portion of the Construction Contract or a deletion of portion of Work for the convenience of the County or due to an Event of Contractor Default.

3.2.5 Remedies. County may deduct any liquidated damages payable under this Section 3.2 from money due or to become due to Contractor under the Contract Documents, or pursue any other legal remedy to collect such liquidated damages from Contractor and/or its Surety.

3.2.6 Not a Limitation. County's rights under this Section 3.2 shall not be interpreted as precluding or limiting: (1) any right or remedy of County arising from an Event of Contractor Default other than a failure to achieve Substantial Completion of the Work within the Contract Time for Substantial Completion; or (2) County's right to order an acceleration, at Contractor's Own Expense, of performance of the Work to overcome Delay, including, without limitation, a Delay for which County has the right to assess liquidated damages under this Section 3.2.

3.3. LIQUIDATED DAMAGES TO CONTRACTOR

3.3.1 Contractor's Right. County and Contractor acknowledge and agree that if Contractor is unable due to Compensable Delay to actually achieve Substantial Completion of the Work within the Contract Time for Substantial Completion, Contractor and its affected Subcontractors will suffer Losses that would be both extremely difficult and impracticable to ascertain. On that basis they agree, as a reasonable estimate of those Losses and not a penalty, to the payment by County to Contractor of liquidated damages under this Section 3.3.

3.3.2 Daily Rate. Subject to the provisions of Paragraph 8.2.8 of the General Conditions dealing with concurrency of Delays, the Contract Price shall be increased by Change Order or Unilateral Change Order in the amount of One Thousand Five Hundred Dollars (\$1,500) per Day as liquidated damages for each Day for which Contractor is entitled under the Contract Documents to a Contract Adjustment extending the Contract Time for Substantial Completion due to Compensable Delay, with no additional amount added thereto or calculated thereon for Allowable Markup or any other markup for overhead or profit to Contractor or any Subcontractor, of any Tier.

3.3.3 Payment by County. A Change Order or Unilateral Change Order setting forth a Contract Adjustment to the Contract Price for liquidated damages permitted by this Section 3.3 shall be executed following, and not before, actual Substantial Completion and prior to or contemporaneously with Final Completion. Notwithstanding any other provision of the Contract Documents to the contrary and without limitation to the County's rights of withholding payment to Contractor as permitted elsewhere in the Contract Documents or under Applicable Laws, any amounts due to the Contractor under this Section 3.3 shall be payable as part of, and not prior to the due date for payment of, Final Payment to Contractor.

3.3.4 Deleted Work. A Contract Adjustment shall be made pursuant to Subparagraph 8.2.6.2 of the General Conditions reducing the Contract Price and Contract Time in the event that the Contract Time is shortened due to (1) Deleted Work; or (2) a termination by County of a portion of the Construction Contract for convenience or due to an Event of Contractor Default.

3.3.5 Termination. County shall have no liability to Contractor to pay any liquidated damages under this Section 3.3, nor shall County have any other liability to Contractor or any Subcontractor for any Loss due to Delay (including, without limitation, Compensable Delay) in the event the Construction Contract is wholly terminated (whether such termination is a termination for cause by County or Contractor or a termination for convenience by County) at any time prior to expiration of the Contract Time for Substantial Completion set forth in Paragraph 3.1.1, above.

3.3.6 Exclusive Remedy. Liquidated damages payable by County under this Section 3.3 constitute the Contractor's sole and exclusive right and remedy for recovery from County of Losses to Contractor and its Subcontractors, of every Tier, that are attributable to Compensable Delay, regardless of the cause, duration or timing of the Compensable Delay and no other Contract Adjustment, or other form of compensation or reimbursement, of any kind, shall be made to Contractor or any Subcontractor, of any Tier, for any Loss resulting, directly or indirectly, from, or attributable to, any of the following: (1) Unexcused Delay or acceleration to overcome Unexcused Delay; (2) Excusable Delay or any acceleration not authorized by County in writing to overcome Excusable Delay; or (3) concurrency of a Compensable Delay with any different type or class of Unexcused Delay or Excusable Delay, whether such concurrency is a concurrency in cause or in effect.

3.3.7 WAIVER BY CONTRACTOR.

CONTRACTOR WAIVES THE RIGHT TO FURTHER RECOURSE OR RECOVERY OF COSTS OR DAMAGES BY REASON OF OR RELATED TO ANY DELAY (INCLUDING, WITHOUT LIMITATION, COMPENSABLE DELAY) THAT IS IN EXCESS OF OR NOT RECOVERED BY CONTRACTOR AS PART OF THE LIQUIDATED DAMAGES PAYABLE TO CONTRACTOR UNDER THIS SECTION 3.3.

ARTICLE 4 CONTRACTOR COMPENSATION

4.1 CONTRACT PRICE

4.1.1 Contract Price. County shall pay the Contractor in current funds for the Contractor's performance of the Work in accordance with the Contract Documents the Contract Price, exclusive of Contract Adjustments, of _____ Dollars (_____).

4.1.2 Basis. The Contract Price set forth in Paragraph 4.1.1, above, is based on the Bid submitted by Contractor as adjusted for Alternates accepted by County as set forth in Section 4.2, below.

4.1.3 Adjustments. The Contract Price is only subject to adjustment as permitted by the General Conditions for Contract Adjustments due to Compensable Changes, Deleted Work or Compensable Delay.

4.1.4 All-Inclusive Price. The Contract Price as adjusted for Contract Adjustment permitted by the Contract Documents is the total amount payable by County to Contractor for performance of the Work under the Contract Documents and is deemed to cover all Losses, foreseeable or unforeseeable, arising out of or related to past, present or future circumstances within or outside the control of the Contractor or its Subcontractors affecting the time or cost of performing the Work, including, without limitation, the effects of natural elements upon the Work, unforeseen difficulties or obstructions affecting the performance of the Work (including, without limitation, unforeseen conditions at the Site that do not constitute

Differing Site Conditions) and unforeseen fluctuations in market conditions and price escalations (whether occurring locally, nationally or internationally).

4.2 ALTERNATES

The Contract Price includes the following Alternates, which are described in the Contract Documents and are hereby accepted by County:

Number	Description	Dollar Amount

4.3 UNIT PRICES

Unit prices agreed to by County and Contractor are as follows:

Description	Measurement Unit	Dollar Amount

ARTICLE 5 ENUMERATION OF CONTRACT DOCUMENTS

5.1 LIST OF CONTRACT DOCUMENTS

The Contract Documents include, without limitation, the following:

5.1.1 Construction Contract. The Contract Documents include this executed Standard Form of Construction Contract Between County and Contractor.

5.1.2 General Conditions. The Contract Documents include the ☒ General Conditions of the Standard Form of Construction Contract Between County and Contractor (Long Form) or ☐ General Conditions of the Standard Form of Construction Contract Between County and Contractor (Short Form).

5.1.3 Specifications. The Contract Documents include the following Specifications:

Title	Date	Divisions
SEE EXHIBIT 'A' WITH TABLE OF CONTENTS FOR SPECIFICATIONS AS APPROVED BY BOARD OF SUPERVISORS ON _____ AND INCORPORATED HEREIN.		

5.1.4 Drawings. The Contract Documents include the following Drawings dated ~~text~~, 20xx, unless a different date is shown below:

Sheet Number	Title	Date	Pages
SEE EXHIBIT 'B' WITH LIST OF DRAWINGS INCLUDED IN SPECIFICATIONS APPROVED BY BOARD OF SUPERVISORS ON _____ AND INCORPORATED HEREIN.			

5.1.5 Addenda. The Contract Documents include the following Addenda:

Addendum Number	Title	Date	Pages

5.1.6 Reference Documents. The Contract Documents include the following Reference Documents:

Title	Author	Date	Pages

5.1.7 [List Other Contract Documents, if any]

ARTICLE 6 SPECIAL REQUIREMENTS

6.1 LABOR CODE SECTION 1861 CERTIFICATION

By signing below, Contractor certifies that he/she/it is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of the California Labor Code, and that he/she/it will comply with such provisions before commencing the performance of the Work.

CONTRACTORS ARE REQUIRED BY LAW TO BE LICENSED AND REGULATED BY THE CONTRACTORS' STATE LICENSE BOARD WHICH HAS JURISDICTION TO INVESTIGATE COMPLAINTS AGAINST CONTRACTORS IF A COMPLAINT REGARDING A PATENT ACT OR OMISSION IS FILED WITHIN FOUR YEARS OF THE DATE OF THE ALLEGED VIOLATION. A COMPLAINT REGARDING A LATENT ACT OR OMISSION PERTAINING TO STRUCTURAL DEFECTS MUST BE FILED WITHIN 10 YEARS OF THE DATE OF THE ALLEGED VIOLATION. ANY QUESTIONS CONCERNING A CONTRACTOR MAY BE REFERRED TO THE REGISTRAR, CONTRACTORS' STATE LICENSE BOARD, P.O. BOX 26000, SACRAMENTO, CALIFORNIA, 95826.

IN WITNESS WHEREOF, the parties hereto have made and executed four (4) originals of this Construction Contract, on _____ [to be filled in by Clerk of the Board].

“COUNTY”

COUNTY OF RIVERSIDE

By: _____
Chairman, Board of Supervisors

ATTEST:

KIMBERLY RECTOR
Clerk of the Board

By: _____
(Deputy)

(SEAL)

APPROVED AS TO FORM:

MINH C. TRAN
County Counsel

By: _____

Deputy County Counsel

“CONTRACTOR”

(Sign on line above)

By: _____
(Type name)

Title: _____

The following information must be provided
concerning the Contractor:

State whether Contractor is corporation,
Individual, partnership, joint venture or other:

If “other”, enter legal form of business:

Enter address:

Telephone: _____

Facsimile: _____

Email: _____

Employer State Tax ID #: _____

State Contractor License #: _____

Department of Industrial Relations

Registration No: _____

If Contractor is not an individual or corporation, list
Names of 4 representatives who have authority to
contractually bind Contractor:

If Contractor is a corporation, state:

Name of President: _____

Name of Secretary: _____

State of Incorporation: _____

SPECIFICATIONS AND CONTRACT DOCUMENTS
FOR

FM08947014286

Flood Control and Water Conservation District Office Tenant
Improvement Project



PREPARED BY
COUNTY OF RIVERSIDE
FACILITIES MANAGEMENT

FORM APPROVED COUNTY COUNSEL
BY Kristine Bell-Valdez DATE _____

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NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the County of Riverside ("County") invites sealed Bids for the construction of the following project ("Work"):

[Flood Control and Water Conservation District Office Tenant Improvement Project \(FM08947014286\)](#)

Bids shall be prepared in conformance with the Instructions to Bidders and other Bidding Documents. Bids must be received, by hand delivery or mail, by the Clerk of the Board located on the 1st floor of the County Administrative Center, 4080 Lemon Street, Riverside, CA 92501, no later than the Bid Closing Deadline of **10:00 a.m.** on **04/22/26**, to be thereafter on said date and at said location publicly opened and read aloud. The Bidder assumes sole responsibility for timely receipt of its Bid.

On and after **March 11, 2026**, and up to seventy-two (72) hours prior to the Bid Closing Deadline, copies of Bidding Documents will be available to Bidders for pick-up by Bidder at, or for mailing to Bidder upon written request by Bidder submitted to, **A&I Reprographics, 898 Via Lata, Suite L, Colton, CA 92324, Phone: 909 514-0704; Website: <https://www.aandirepro.com>**. At the time of such pick-up, a non-refundable fee will be charged for each set of Bidding Documents furnished to bidders. Bidders and Plan Holders shall agree to and sign the County's "Sensitive Security Information Confidentiality Agreement" form, to be provided by A&I Reprographics prior to issuance of any bidding documents. The Bidding Documents may also be viewed in person at A&I Reprographics' office at the above-referenced address, **between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday (except Holidays) and on A&I Reprographics' Website: <https://www.aandirepro.com>**.

Pursuant to Labor Code section 1771.1, any contractor bidding, or subcontractor to be listed on a bid proposal subject to Public Contract Code section 4104, shall not be qualified to bid after March 1, 2015, unless currently registered and qualified to perform public works pursuant to Labor Code section 1725.5. No Contractor or subcontractor may enter into a contract (after April 1, 2015) without proof of current registration to perform public works.

A mandatory Pre-Bid Conference will be conducted **on 03/25/26**, commencing promptly at **10:00 a.m.**, at **1995 Market St, Riverside, CA 92501**. **Attendance at the mandatory Pre-Bid Conference is required as a condition of bidding**. Sign language services are available for the Pre-Bid Conference upon written request received by email at rbaluyot@rivco.org at least three (3) business days prior to the Pre-Bid Conference.

The Bidder receiving the Award by the County is required:

(1) to furnish a Performance Bond and Payment Bond as provided in the Instructions to Bidders and other Bidding Documents;

(2) both at the time Bidder submits its Bid and other Bid Submittals and at the time of Award, to: (a) hold a contracting license, active and in good standing, issued by the Contractors State License Board for the State of California for the following license classification(s): **B**; and (b) hold, or designate a Subcontractor that holds, the certification(s) required by Applicable Laws to perform the following work: **complete interior office remodel including, but no limited to, mechanical, electrical, plumbing, fire protection, fire life safety, interior wall construction, flooring, ceiling, audio visual, telecom, and other office interior work**; and

(3) to comply with the provisions of the California Labor Code, including, without limitation, Sections 1771.4, 1773.1, 1774, 1775 and 1776 of the California Labor Code and including, without limitation, the obligations to pay the general prevailing rates of wages in the locality in which the Work is to be performed and comply with Section 1777.5 of the California Labor Code governing employment of apprentices. Copies of the prevailing rates of per diem wages are on file at California State

Department of Industrial Relations, 464 West Fourth St., Suite 348, San Bernardino, CA 92401, and are available to any interested party on request.

THIS IS A PUBLIC WORKS PROJECT AND SUBJECT TO COMPLIANCE MONITORING AND ENFORCEMENT BY THE DEPARTMENT OF INDUSTRIAL RELATIONS. The awarded prime contractor shall post job site notices as prescribed by regulation starting January 1, 2015. Contractor or subcontractor shall furnish records specified in Labor Code section 1776 to the Labor Commissioner.

Substitution of securities for any moneys withheld by County shall be permitted as provided for by Section 22300 of the California Public Contract Code.

Capitalized terms used herein shall have the meanings assigned to them in the Bidding Documents. For information contact: Facilities Management, 3450 14th Street, 2nd Floor, Riverside, CA 92501.

INSTRUCTIONS TO BIDDERS

ARTICLE 1 GENERAL PROVISIONS

1.1 DEFINITIONS

Capitalized terms used on the Bidding Documents shall have the meanings assigned to them in the forms of Construction Contract and General Conditions that are included in the Bidding Documents. Capitalized terms not so defined shall have the meanings assigned to them in, or if none is assigned as reasonably interpreted according to the context of, the portion of the Bidding Documents where such terms are used.

1.2 SUMMARY OF PROJECT

1.2.1 Project Description. The Project to be constructed generally consists of the following: [Office Tenant Improvement](#). The identifying name of the Project is [Flood Control and Water Conservation District Office Tenant Improvement](#).

1.2.2 Contract Time. Substantial Completion of the Work must be achieved within [Three Hundred Sixty \(360\)](#) Days from the Date of Commencement. Final Completion must be achieved within [Thirty \(30\)](#) Days after the occurrence of Substantial Completion.

1.2.3 Liquidated Damages. The Construction Contract includes provisions: (1) permitting the County to assess liquidated damages to the Contractor of [\\$1,500](#) per Day for each Day after the expiration of the Contract Time for Substantial Completion that the Work is not Substantially Completed by Contractor; and (2) for payment by County to Contractor of liquidated damages to Contractor of [\\$1,500](#) per Day for each Day of Compensable Delay for which Contractor is entitled to a Contract Adjustment of the Contract Time and Contract Price.

1.2.4 County Furnished Materials. County reserves the right to elect to furnish the following County Furnished Materials for incorporation by Contractor as part of the Work pursuant to an assignment of one or more County Materials Contract(s) in accordance with Section 2.5 of the General Conditions: [TBD](#). Said County Materials Contract(s) are available for review by Bidders at [TBD](#). Bidder is solely responsible to familiarize itself prior to submission of its Bid with the terms and conditions of such County Materials Contract(s). County shall notify the successful Bidder prior to Award if the County elects to assign any of such County Materials Contracts to Contractor for incorporation Contractor of the County Furnished Materials as part of the Work.

1.2.5 Licensing. The Bidder to whom the Construction Contract for the Work is Awarded by the County is required, both at the time of the Bid Closing Deadline and at the time of Award, to: (1) hold a contracting license, active and in good standing, issued by the Contractors State License Board for the State of California for the following license classification(s): [B](#); and (2) hold, or designate in the Designation of Subcontractors a Subcontractor that holds, the certification(s) required by Applicable Laws to perform the following work: [complete interior office remodel including, but no limited to, mechanical, electrical, plumbing, fire protection, fire life safety, interior wall construction, flooring, ceiling, audio visual, telecom, and other office interior work](#).

1.2.6 No Warranty by County. Bidders are solely responsible to satisfy themselves as to the suitability of any estimates, projections, budgets, criteria, surveys, reports, test data, recommendations, opinions, and other information provided by County relating to the Site, Work or Project (including, without limitation, all information contained in any Reference Documents) and nothing stated in the Bidding Documents, Contract Documents or in any other information provided by the County shall be construed as implying the creation or existence of any warranty, express or implied, on the part of the County with respect to the completeness, accuracy or sufficiency thereof.

ARTICLE 2 BIDDER'S REPRESENTATIONS

2.1 THE BIDDER BY SUBMITTING ITS BID REPRESENTS THAT:

2.1.1 Bidding Documents. The Bidder has, in its capacity as contractor and not a design professional, carefully and thoroughly examined, compared and understood the Bidding Documents (including, without limitation, the Drawings, Specifications and Reference Documents identified in the Bidding Documents), and acting in that capacity has satisfied itself that the Bidding Documents are free of any errors, conflicts, ambiguities, lack of coordination and violations of Applicable Laws that might affect the Bidder's ability to complete the Work for the amount of its Bid and within the time period(s) for construction required by the Bidding Documents.

2.1.2 Site Information. In order to fully acquaint itself with all conditions, restrictions, obstructions, difficulties and other matters which might affect the Bidder's ability to complete the Work for the amount of its Bid and within the time period(s) for construction required by the Bidding Documents, the Bidder has carefully and thoroughly inspected: (1) the Site and its surroundings; (2) all Existing Improvements on the Site and their existing uses by the County, its invitees and the public; (3) routes of ingress and egress to and from the Site; (4) local conditions in the vicinity of the Site (including, without limitation, sources and availability of labor, materials and equipment); (5) the status of construction, if any, that is in-progress at the Site; and (6) all reports, data, as-built drawings and other information (including, without limitation, the Reference Documents identified in the Bidding Documents) concerning visible and concealed conditions (including, without limitation, locations and capacities of utility sources and lines) above and below the surface of the ground and in Existing Improvements that have been made available by the County to Bidders or that are disclosed by public records of the County of Riverside or the City in which the Project is located, and has correlated its observations with the requirements of the Bidding Documents.

2.1.3 Bid Compliance. The Bid and other Bid Submittals are in compliance with the Bidding Documents.

2.1.4 No Exceptions. The Bid is based upon the materials, equipment, systems and other work required by the Bidding Documents, without any exception, exclusion or qualification.

2.1.5 Legal Status. If the Bidder is a corporation, or if one or more of the partners or joint venturers of the Bidder (where the Bidder is a partnership or joint venture) is a corporation, such corporation(s) is(are) duly incorporated, authorized to do business and in good standing under the laws of the State of California.

2.1.6 Licensing. Bidder currently holds and, if and when an Award is made to Bidder, Bidder will hold at the time of Award, a license, active and in good standing, issued by the Contractors State License Board for the State of California authorizing the Bidder to contract to perform work in the requisite license classification(s) stated in the Notice Inviting Bids and/or in these Instructions to Bidders.

2.1.7 Due Authorization. The person or persons signing the Bid and other Bid Submittals on behalf of the Bidder are authorized to do so on behalf of the Bidder.

2.1.8 Balanced Bid. Cost breakdowns of the Bid that are provided by the Bidder are balanced, reflecting in each line item category of Work a reasonable estimate of the Bidder's cost commitments to perform that category of Work and a proportionate share of overhead and profit.

2.1.9 Labor Compliance. The Bid includes sufficient funds to enable Bidder to comply with, and Bidder will comply with, all of the applicable provisions of the California Labor Code, including, without limitation, payment of prevailing wages, maintenance and submission of weekly certified payrolls and hiring of apprentices.

2.2 MISREPRESENTATION BY BIDDER

The County may determine as unresponsive any Bid in which any statement or representation made or incorporated by reference in the Bid, including any Bid Submittal comprising the Bid, is false, incorrect or materially incomplete and misleading.

ARTICLE 3 BIDDING DOCUMENTS

3.1 COPIES

3.1.1 Availability. Copies of Bidding Documents will be available, on and after **03/11/26**, and up to **seventy-two (72) hours** prior to the Bid Closing Deadline, for pick-up by Bidder at, or for mailing to Bidder upon written request by Bidder submitted to, **A&I Reprographics, 898 Via Lata, Suite L, Colton, CA 92324**. At the time of such pick-up a non-refundable fee will be charged for each set of Bidding Documents furnished to bidders. The Bidding Documents may also be viewed in person at **A&I Reprographics'** office at the above-referenced address, between the hours of **8:00 a.m. and 5:00 p.m.** Monday through Friday (except Holidays) and on A&I Reprographics' Website: <https://www.aandirepro.com>.

3.1.2 Sub-Bidders. Unless otherwise stated in the Notice Inviting Bids, the County assumes no obligation to distribute Bidding Documents directly to Sub-Bidders.

3.1.3 Complete Sets. The Bidder shall use complete sets of Bidding Documents in preparing its Bid. The County assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.1.4 No License. No license to Bidder is intended or conferred by the County's issuance to Bidders of copies of the Bidding Documents.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.1 Examination by Bidder. The Bidder shall, with reasonable care and diligence in its capacity as a contractor and not a design professional, carefully and thoroughly examine the Bidding Documents and prior to the Bid Closing Deadline report to the County in writing by means of a request for clarification provided in accordance with Paragraph 3.2.3, below, any information contained in the Bidding Documents constituting an error, conflict, ambiguity, lack of coordination or violation of Applicable Laws that might affect the Bidder's ability to complete the Work for the amount of its Bid and within the time period(s) for construction required by the Bidding Documents. Failure by the Bidder to do so shall not relieve the Bidder from its representations set forth in these Instructions to Bidders nor serve as the basis for any claim by the Bidder that it was mistaken or misled in connection with the preparation of its Bid or its planning for construction of the Work.

3.2.2 Pre-Bid Conference. A mandatory Pre-Bid Conference will be conducted on **3/25/26**, commencing promptly at **10:00 a.m.**, at **1995 Market St, Riverside, CA 92501**. Attendance at the mandatory Pre-Bid Conference is required as a condition of bidding. Sign language services are available for the Pre-Bid Conference upon written request received by email at rbaluyot@rivco.org at least three (3) business days prior to the day of the Pre-Bid Conference. Regardless of whether the Pre-Bid Conference is described in the Bidding Documents as mandatory or optional, Bidder shall be deemed charged with knowledge of all facts, circumstances and other information that were apparent, available or provided to Bidders at the Pre-Bid Conference, including, without limitation, any and all of the physical conditions of the land and Existing Improvements at the Site that were visible or available for inspection or review by the Bidders attending the Pre-Bid Conference.

3.2.3 Requests for Clarification. If the Bidder requires clarification or interpretation of the Bidding Documents, it shall make a written request to County by a request for clarification. All requests for

clarification of the Bidding Documents must be submitted, in writing, between the hours of **8:00 a.m.** and **5:00 p.m.** on any Day, Monday through Thursday (except Holidays) up to, including and no later than the **Tenth (10) Day** prior to Bid Closing Deadline, by **e-mail** to the following: jonf@westgroupdesigns.com. No response will be made to requests for clarification received after that time.

3.2.4 Addenda. Interpretations, corrections and changes of the Bidding Documents will be made by Addenda. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding and the Bidder shall not rely upon them.

3.2.5 Communications. The Bidder shall not, at any time during the bidding process following advertisement of the Notice Inviting Bids and prior to issuance of the Notice of Intent to Award, communicate with the County, Architect, County Consultants or any employee or representative of any of them, concerning the Project except by means of a written requests for clarification submitted by Bidder in accordance with Paragraph 3.2.3, above.

3.3 SUBSTITUTIONS

3.3.1 Requests for Substitutions. The Bidder shall make requests for Substitutions on the County's Request for Substitution form included in the Bidding Documents. Such requests shall comply with the requirements of the Bidding Documents, including without limitation, the Plans and Specifications. Without limitation to the other requirements of the Request for Substitution form, requests for Substitutions shall include: (1) a description of the material, equipment or other work that is to be replaced or eliminated by the Substitution; (2) a description of any other changes to the Work, Existing Improvements, the Site or the work of Separate Contractors that would be necessary if the proposed Substitution were incorporated as part of the Work; (3) a statement that the Bidder accepts responsibility for the inclusion in its Bid of all of the costs of implementing the Substitution, including, without limitation, the costs of any related changes to the Work, Existing Improvements, the Site or the work of Separate Contractors; (4) all drawings, performance and test data and other information necessary for an evaluation of the Substitution by the County, Architect and County Consultants; and (5) a statement that the Bidder understands and agrees that if the Substitution is not approved and the Bidder submits a Bid, Bidder will provide the Work as specified in the Bidding Documents without such Substitution. The burden of proof of the merit of a proposed Substitution is entirely upon the Bidder requesting the Substitution.

3.3.2 Deadline for Submission. Any completed Request for Substitution form that Bidders wishes to have considered by County must be submitted, between the hours of **8:00 a.m.** and **5:00 p.m.** on any Day, Monday through Thursday (except Holidays) up to, including and no later than the **seventh (10th) Day** prior to the Bid Closing Deadline, in writing, by **email** to the following: jonf@westgroupdesigns.com. No response will be made to any Requests for Substitution form received after that time.

3.3.3 Review by County. To the maximum extent permitted by Applicable Laws, approval or disapproval of a Substitution proposed by a Bidder is in the sole and absolute discretion of the County. The County's decision to approve or disapprove of a proposed Substitution shall be final and binding. An Addendum shall be issued to all Bidders describing any Substitution properly and timely requested prior to the Bid Closing Deadline that is approved by the County. Failure by County to respond to a properly and timely submitted Request for Substitution prior to **10:00 a.m.** of the **third (3rd) working day** before the Bid Closing Deadline shall be automatically deemed to be a disapproval by County thereof.

3.3.4 Standards. In evaluating a Request for Substitution form submitted by a Bidder, the materials, products and equipment described in the Bidding Documents are generally viewed by the County as establishing the standards for function, dimension, appearance and quality to be met by the requested Substitution.

3.3.5 Performance by Bidder. In the event the Bidder has submitted a Request for Substitution form and the request for Substitution is denied, or deemed denied, by the County and the Bidder thereafter

submits a Bid and receives the Award, then the Bidder shall execute the Construction Contract and provide the Work as specified, without such Substitution and at no additional cost or expense to the County.

3.3.6 No Postponement. Delays associated with the review, processing or approval of a Request for Substitution form submitted by Bidder shall not entitle Bidder to a postponement of the deadlines set forth in the Bidding Documents.

3.3.7 No Bid Adjustment. Neither approval nor disapproval of a Request for Substitution form shall be grounds for adjustment of a Bid.

3.4 ADDENDA

3.4.1 Transmittal. Addenda will be transmitted by County to all prospective Bidders who (1) attended and signed in at the Pre-Bid Conference (if any) or (2) have submitted a written request to County for notice of Addenda at **A&I Reprographics, 898 Via Lata, Suite L, Colton, CA 92324, Email: col@aandirepro.com**, including in such request the Bidder's name and address for mailing.

3.4.2 Inspection. Copies of Addenda will also be made available for in-person inspection wherever Bidding Documents are on file for that purpose.

3.4.3 Issuance. Without limitation to the County's right to withdraw its request for Bids, Addenda may be issued up to, but not later than, seventy-two (72) hours prior to the Bid Closing Deadline; provided, however, that an Addendum withdrawing the request for Bids or one which postpones the Bid Closing Deadline may be issued at any time prior to the Bid Closing Deadline.

3.4.4 Receipt by Bidder. Failure of the Bidder to receive any Addendum shall not relieve the Bidder from any of its obligations under its Bid Submittal. The costs of performance by Bidder of all items of Work and other obligations contained in all Addenda issued by County shall be deemed included in the amount of the Bidder's Bid. The Bidder shall identify and list in its Bid all Addenda received and included in its Bid. The Bidder's failure to so acknowledge the receipt of all Addenda in its Bid may be asserted by the County as a basis for determining its Bid non-responsive.

ARTICLE 4 BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

4.1.1 Bid Form. Bidder shall state its Bid price using the Bid Form included in the Bidding Documents. A Bid presented on other forms shall be disregarded.

4.1.2 Blanks. All blanks on the Bid Form shall be legibly executed in a nonerasable medium.

4.1.3 Figures. Sums shall be expressed in a Bid in both words and figures. In case of discrepancy, the amount written in words shall govern.

4.1.4 Alterations. Interlineations, alterations and erasures in a Bid must be initialed by each and all of the signer(s) of the Bid.

4.1.5 Alternative Bids. Alternative Bids will not be accepted unless specifically requested in the Bidding Documents.

4.1.6 Multiple Bids. Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the Bid Security, state in its Bid the Bidder's refusal to accept the Award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on or conditions to its Bid Form nor qualify its Bid in any other manner.

4.1.7 Name of Bidder. Each copy of the Bid shall state the legal name of the Bidder and its legal form of business (i.e., sole proprietor, partnership, joint venture or corporation). Bids shall be submitted in the name of Bidder that appears in the Bidder's license issued by the State of California Contractors State License Board for the license classification(s) that the Bidder is required to hold pursuant to the Notice Inviting Bids. Each Bid shall bear the longhand signature and printed name and title of the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

4.1.8 Bid Submittals. Each Bid shall include the following Bid Submittals executed in the manner required by the Bidding Documents:

- .1 Bid Form, in the form specified in the Bidding Documents;
 - .2 Bid Security, consisting of either (a) a Bid Bond, in the form specified in the Bidding Documents, or (b) such other form of Bid Security as is permitted by these Instructions to Bidders;
 - .3 Bid Security Receipt, in the form specified in the Bidding Documents;
 - .4 Designation of Subcontractors, in the form specified in the Bidding Documents;
- and
- .5 Non-Collusion Declaration, in the form specified in the Bidding Documents.
 - .6 Iran Contracting Act Certification
 - .7 Economic Sanctions in Response to Russia's Actions in Ukraine

4.1.9 Modifications by Bidder. Changes or additions to the Bid Form, recapitulations of the Work bid upon, conditions or limitations on the Work to be done, alternative proposals or any other modification of the Bid Form not specifically called for by the Bidding Documents may result in the County's rejection of the Bid as being non-responsive. No oral, telephonic, electronic, facsimile or telegraphic modification of any Bid submitted will be considered.

4.1.10 Designation of Subcontractors. The Bidder shall submit, on the Designation of Subcontractors form specified in the Bidding Documents, a list of the proposed Subcontractors and the portion of Work to be done by each Subcontractor as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Sections 4100 et seq). Unless the Notice Inviting Bids expressly states otherwise, any information requested in the Designation of Subcontractors other than a Subcontractor's name and location of business must be submitted as part of the Bid and may not be submitted after the Bid Closing Deadline. If additional sheets are needed to provide the information requested in the Designation of Subcontractors, they shall be included by Bidder as part of its Bid and shall accompany the Designation of Subcontractors. If bidding of Alternates is called for by the Bidding Documents and the Bidder intends to use different or additional Subcontractors or if acceptance of the Alternate by County would cause the value of the Work to be performed by a Subcontractor not identified in the Designation of Subcontractors accompanying the Base Bid to exceed the threshold dollar amount required by Applicable Law for listing of Subcontractors, then a separate Designation of Subcontractors form must be submitted for each such Alternate. If the Bidding Documents require the performance of Work for which the Bidder or a Subcontractor must hold a certification required by Applicable Laws to perform the work, and if the Bidder intends to use a Subcontractor holding such certification to satisfy said requirement and to perform such Work, then Bidder shall, without limitation to any other information that may be required by Applicable Laws, include in the Designation of Subcontractors the name of such Subcontractor and a description of the Work requiring such certification that the Subcontractor will be performing.

4.1.11 Builder's All Risk (Course of Construction) Insurance. The Bid Form states whether the Bidder shall include Builder's All Risk (Course of Construction) Insurance for the Project. If the Bid Form

states that such insurance shall be included by the Bidder in its Bid, then Contractor shall provide a policy of Builder's All Risk (Course of Construction) insurance coverage that conforms to the requirements set forth in Subparagraph 11.1.1.5 and the other applicable provisions of Article 11 of the General Conditions. NOTWITHSTANDING THE FOREGOING, COUNTY RETAINS THE RIGHT exercised at any time prior to award TO ELECT TO USE ITS OWN BUILDER'S ALL RISK (COURSE OF CONSTRUCTION) INSURANCE and in the event County so elects to deduct the price for such insurance that is stated in Contractor's Bid, or if not so stated the amount included by Contractor for such insurance in the preparation of the Contractor's Bid, from the Contract Price by means of a Contract Adjustment pursuant to Change Order or Unilateral Change Order. If the County so provides the All Risk (Course of Construction) insurance for the Project, then Contractor shall assume the cost of any and all applicable policy deductibles (currently, \$50,000 per occurrence) and shall insure its own machinery, equipment, tools, etc. from any loss of any nature whatsoever.

4.1.12 Interested Bidder. No person, partnership, joint venture, corporation or other association of persons or entities submitting a Bid shall be allowed to submit more than one Bid or be interested in a Bid submitted by any other Bidder. A person, partnership, joint venture, corporation or other association of persons or entities that, in the capacity as a Subcontractor to a Bidder, has quoted a bid price to a Bidder is not disqualified from submitting a proposal or quoting prices to other Bidders or making a Bid as a general contractor for the entirety of the Work. For the purpose of this Paragraph, "interested in" means having a managerial or financial interest in another Bidder.

4.1.13 Prequalification. If the County has stated in the Notice Inviting Bids that bidding is limited only to bidders that were prequalified pursuant to a Prequalification conducted by County, and if Bidder was previously prequalified pursuant to that process to submit a Bid for the Project, then in addition to the requirements of the Bidding Documents the Bidder must comply with any additional requirements for bidding that are set forth in the Prequalification Documents, including, without limitation, compliance by Bidder with any continuing responsibilities for disclosure of any changes in ownership, management or financial condition. If the Bidder has been prequalified to submit a Bid for the Project it shall, if requested by County, submit prior to or with its Bid any certification(s) that the County is authorized to request by the terms of the Prequalification Documents governing the Bidder's prequalification.

4.1.14 Applicable Laws. All Bids must be submitted, filed, made and executed in accordance with Applicable Laws relating to bids for contracts of the nature provided for by the Bidding Documents, whether such Applicable Laws are expressly referred to herein or not.

4.1.15 Non-Transferable. A Bid is non-transferable.

4.1.16 Registration with Department of Industrial Relations. Pursuant to Labor Code section 1771.1, any contractor bidding, or subcontractor to be listed on a bid proposal subject to Public Contract Code section 4104, shall not be qualified to bid after March 1, 2015, unless currently registered and qualified to perform public works pursuant to Labor Code section 1725.5. No contractor or subcontractor may enter into a contract after April 1, 2015, without proof of current registration to perform public works.

4.2 BID SECURITY

4.2.1 Forms of Bid Security. Each Bid shall be accompanied by a Bid Security in the form of (1) cash, (2) a certified or cashier's check made payable to the County or (3) a Bid Bond (using the form of Bid Bond included in the Bidding Documents) issued by an Admitted Surety, in an amount equal to at least ten percent (10%) of the Bid Amount, as a guarantee that the Bidder, if awarded the Construction Contract, will enter into a Construction Contract with the County and furnish the Performance Bond, Payment Bond and other Post-Award Submittals required by the Bidding Documents. Should the Bidder refuse to enter into the Construction Contract or fail to furnish the Performance Bond, Payment Bond or any other Post-Award Submittal, then the Bid Security shall be forfeited to the County in an amount equal to the difference between the amount of Bidder's Bid Amount and the amount for which the County may procure the work from another Bidder plus the costs to the County of redrafting, redrawing and republishing the Bidding Documents.

4.2.2 Retention by County. The County will have the right to retain the Bid Security of any Bidder to whom an Award is being considered until either (1) the Construction Contract has been executed and the Performance Bond, Payment Bonds and other Post-Award Submittals have been furnished, or (2) all Bids have been rejected.

4.2.3 Return by County. Bid Security of an unsuccessful Bidder will be returned no later than sixty (60) Days after the Award by the County. Bid Security of the successful Bidder will be returned upon signing of a Construction Contract by the Bidder and County and submission by Bidder to the County of the Performance Bond, Payment Bond and other Post-Award Submittals in accordance with the requirements of the Bidding Documents.

4.3 SUBMISSION OF BIDS

4.3.1 Sealed Envelope. All copies of the Bidder's Bid, Bid Security and other Bid Submittals shall be enclosed by the Bidder in a sealed opaque envelope. Said envelope, as well as any other, outer envelope or packaging in which said envelope may have been placed by Bidder or the carrier for delivery, shall be addressed and delivered as provided in the Notice Inviting Bids and shall be clearly and conspicuously labeled with the Project name, the Bidder's name and address and the identifying name of the Project as set forth in Paragraph 1.2.1, above.

4.3.2 Deposit. Bids shall be hand delivered to, or received by mail at, the Clerk of the Board located on the 1st floor of the County Administrative Center, 4080 Lemon Street, Riverside, CA 92501, at any time Monday through Thursday (excepting Holidays) between the hours of **9:00 a.m.** to **5:00 p.m.** up to the Bid Closing Deadline. Bids must be received at the designated location prior to the Bid Closing Deadline. Bids, or any Bid Submittal comprising a Bid, that is received after the Bid Closing Deadline will be returned unopened.

4.3.3 Postponement. The County reserves the right to postpone the Bid Closing Deadline by issuance of an Addendum to the Bidding Documents at any time prior to the Bid Closing Deadline.

4.3.4 Timely Receipt. The Bidder assumes full and sole responsibility for timely receipt of its Bid, including its Bid Security and all other Bid Submittals, at the location designated in the Bidding Documents for receipt of Bid.

4.3.5 Delivery Methods. Deposit of Bids shall be by hand delivery or mail, only. Oral, telephonic, telegraphic, facsimile or other electronic transmission is not permitted.

4.4 WITHDRAWAL OR RESUBMISSION OF BID

4.4.1 Before Bid Closing Deadline. Prior to the Bid Closing Deadline, a Bid may be withdrawn by notice to the County at the place designated for receipt of Bids stated in the Notice Inviting Bids. Such notice shall be in writing and signed by the Bidder. Partial withdrawal of a Bid or any Bid Submittal is not permitted.

4.4.2 After Bid Closing Deadline. Except as otherwise permitted by these Instructions to Bidders, each Bid shall constitute an offer that shall remain open for a period of sixty (60) Days after the Bid Closing Deadline and during that period of time shall not, without the written consent of the County, be modified, withdrawn or canceled by the Bidder.

4.4.3 Resubmission. Withdrawn Bids may be resubmitted up to the Bid Closing Deadline.

4.4.4 Bid Security. If a Bid is withdrawn and re-submitted, the amount of Bid Security shall be based on the Bid Amount based on the Bid as resubmitted.

4.5 BID ALTERNATES

4.5.1 Alternates. The Bidding Documents ☒ do ☐ do not include Alternates.

4.5.2 Bid Form. If Alternates are included in the Bidding Documents, then a Bid amount for each and every such Alternate shall be included in the spaces provided in the Bid Form for that purpose. If the Bidder determines that the Alternate does not affect the amount of its Base Bid, then the Bidder shall enter "No Change" in the Bid Form.

4.5.3 Basis for Award. Where the Bidding Documents include Alternates, the method checked in the box provided below will be used to determine the lowest Bid price (only wording following a checked box applies):

☒ **Award Method #1:** The lowest Bid price shall be the lowest Base Bid price without consideration of the Bidder's prices on the Alternates.

☐ **Award Method #2:** The lowest Bid price shall be the lowest total of the Base Bid price and the following Alternates that will be used for the purpose of determining the lowest Bid price:

1.
2.
3.
4.
5.

☐ **Award Method #3:** The lowest Bid price shall be the lowest total of the Base Bid price and the following Alternates taken in the order as shown below which, when the Bidder's amount for the Alternate is added to or deducted from such Base Bid price, are less than, or equal to, the funding amount publicly disclosed by the County before the first Bid is opened:

1.
2.
3.
4.
5.

☐ **Award Method #4:** The lowest Bid price shall be determined in a manner that will prevent any information that would identify any of the Bidders or any of their Subcontractors from being revealed to the County before the ranking of Bidders from lowest to highest has been determined.

4.5.4 Bid Escrow Provisions. The following provisions apply only if Subparagraph 4.5.4.1, below, provides that a Bid Escrow will be used for the Project.

.1 Bid Escrow. A Bid Escrow ☐ will ☒ **will not be used for the Project.**

.2 Escrow Bid Documents. Escrow Bid Documents, as that term is defined in the General Conditions, shall: (1) be in English; (2) be legible; (3) be detailed and comprehensive, showing a complete breakdown of quantities, prices, productivity calculations, crew sizes, direct and repair labor, plant and equipment usage, general conditions (i.e., direct overhead) costs, indirect overhead and profit and contingencies, and all other numerical factors used to compute the Bid (provided, however, with respect to Bid items having an estimated cost under \$10,000, estimated unit costs are acceptable without detailed cost estimates provided that the indirect costs, contingencies and markups are shown and allocated); (4) if estimates are based, in whole or in part, on a Geological Baseline Report (GBR) or other report on surface or subsurface conditions at the Site, clearly reference any statements, data, opinions or recommendations used or relied upon from the GBR or such other report; and (5) if the Bidder's Bid is based on a price from a Sub-Bidder that exceeds five percent (5%) of the Bid Amount, provide documentation and electronic files from such Sub-Bidder relating to its bid submitted to Bidder that comply with all of the requirements herein for Escrow Bid Documents, in which case such documents and electronic files from such Sub-Bidder shall be considered and submitted by Bidder as part of the Escrow Bid Documents that are required to be submitted pursuant to this Paragraph 4.5.4.

.3 Deposit with County. Each of the Bidders submitting the apparent three (3) lowest Bid prices shall place its Escrow Bid Documents in a sealed container, marked on the outside with (1) the words "Escrow Bid Documents", (2) the name of the Project, (3) Bidder's name and (4) the date of submission. The sealed container with the Escrow Bid Documents shall be delivered by such Bidders to the County, at the place for submission of Bids, within twenty-four (24) hours after the Bid Closing Deadline.

.4 Review by County. County will review the Escrow Bid Documents of the apparent successful Bidder to ensure that the Escrow Bid Documents comply with the requirements of this Paragraph 4.5.4, and any other requirements of the Bidding Documents relating to use of a bid escrow. Such review shall not constitute approval or acceptance by County of the proposed means, methods, techniques or procedures of the Bidder, confirmation by County that the Escrow Bid Documents comply with the Bidding Documents, nor shall such review or alter any term or condition of the Contract Documents.

.5 Noncompliance by Bidder. Failure by Bidder to comply with any of the requirements of this Paragraph 4.5.4 or any other requirements of the Bidding Documents relating to use of a bid escrow shall be grounds for County to determine that the Bidder's Bid is non-responsive. Without limitation to the foregoing, County shall have the right, in the exercise of its sole and absolute discretion, if it finds that the Escrow Bid Documents submitted by a Bidder do not so comply to: (1) direct that the Bidder submit the required documentation and electronic files within twenty-four (24) hours of written request by County; and/or (2) discuss with the Bidder any questions that may exist concerning the Escrow Bid Documents in an effort to clarify and reconcile the information contained in the Escrow Bid Documents.

.6 Escrow Procedure. The Escrow Bid Documents of the successful Bidder receiving the Award shall be placed and held in storage at a safe and secure location, at the expense of County, for the duration of the performance of the Work and until the later of (1) ninety (90) Days after Final Completion is achieved or (2) final resolution by settlement or final judgment in legal proceedings of all disputes relating to the Construction Contract or Work (the "Escrow Bid Documents Storage Period"). Escrow Bid Documents of the unsuccessful Bidders will be returned to them within sixty (60) Days following Award. Upon expiration of the Escrow Bid Documents Storage Period, County shall destroy or return to Bidder, and shall not retain, copies of that Bidder's Escrow Bid Documents. County will take reasonable steps to protect and preserve the Escrow Bid Documents from damage; however, County shall not be liable for damage or loss occasioned by circumstances beyond the reasonable control of County, such as, without limitation, fire or Acts of God.

.7 Bidder's Warranty and Representation. Submission by a Bidder of its Escrow Bid Documents shall constitute a warranty and representation by such Bidder that it has no other written documents or electronic files containing information used in computing its Bid that are within the definition of Escrow Bid Documents as defined in the Bidding Documents and that Bidder agrees, in the event it receives Award of the Construction Contract, that it shall have no right to submit or offer into evidence in any legal proceedings in support of any request for Contract Adjustment, Claim or other request for any

legal remedy or relief, any documentation or electronic files constituting Escrow Bid Documents that were not included in the Escrow Bid Documents submitted by Bidder.

.8 Not Contract Documents. The contents of the Escrow Bid Documents shall not be considered part of the Contract Documents.

.9 Property Rights, Confidentiality. The Escrow Bid Documents are, and shall always remain, the property and confidential information of the Bidder, subject to rights of review by the County and Bidder and other Permitted Uses as further described below. To the maximum extent permitted by Applicable Laws, County shall safeguard the Escrow Bid Documents, and all information contained therein, against disclosure and in so doing shall not disclose the Escrow Bid Documents to anyone who is not an employee, attorney or consultant of the County having a reason and need to review the Escrow Bid Documents in connection with one or more of the Permitted Uses.

.10 Permitted Uses. The Escrow Bid Documents may be opened, examined and used at any time by County or Bidder (including, without limitation, admission into evidence in any legal proceedings) for the purposes of aiding in an evaluation by County or Bidder, or a resolution by negotiation, settlement or legal proceedings, of a dispute between County and Bidder involving: (1) the submission or content of the Escrow Bid Documents submitted by Bidder; (2) a request by Bidder for relief from its Bid or for relief from any other obligation of Bidder in connection with the bidding process; (3) questions or disputes over the Bidder's right to, or the terms of, a Contract Adjustment; or (4) a Claim or other demand by County or Bidder for a legal remedy or recovery of money ("Permitted Uses"). Escrow Bid Documents shall not be used for any other purpose.

.11 Examination. Examination of the Escrow Bid Documents shall be in the presence of a representative of both County and Contractor unless a party fails, after reasonable notice from the party seeking to examine the Escrow Bid Documents, to arrange for a representative to be present, in which case the examination may take place by the requesting party alone. Copies of any portion of the Escrow Bid Documents may be made by either County or Bidder at the time of examination.

ARTICLE 5 CONSIDERATION OF BIDS

5.1 OPENING OF BIDS

All Bids shall be publicly opened and read aloud at the location for receipt of Bids on the Day of the Bid Closing Deadline. Without limitation to the County's right to reject all Bids, if two or more responsive Bids from responsible Bidders are the same and lowest, then the successful Bidder may be chosen by the County.

5.2 REJECTION OF BIDS

5.2.1 Rejection of Bid. Any Bid that is in any way incomplete or irregular is subject to rejection by County.

5.2.2 Rejection of All Bids. The County has the right to reject all Bids, with or without extending the opportunity to any Bidder to re-bid.

5.3 WAIVER OF IRREGULARITIES

The County has the right to waive informalities and irregularities in a Bid received or in the bidding process.

5.4 AWARD

5.4.1 Basis of Award. It is the intent of the County to Award the Construction Contract to the responsible Bidder submitting a Bid in accordance with the requirements of the Bidding Documents for the lowest Bid Amount.

5.4.2 Notice of Award. Within fourteen (14) Days following public opening and reading of Bids, the County will issue a Notice of Intent to Award identifying the name of the Bidder to whom the County intends to Award the Construction Contract. Such notice will be mailed to all Bidders submitting a Bid. The County may, in its sole and absolute discretion, elect to extend the time for its issuance of its Notice of Intent to Award.

5.4.3 Bid Protests. Any Bidder submitting a Bid to the County may file a protest of the County's proposed Award of the Construction Contract provided that each and all of the following are complied with:

.1 The bid protest is in writing.

.2 The bid protest is both: (1) filed with and received by the Clerk of the Board at the following address, 4080 Lemon St. 1st Floor Riverside, CA 92501, not more than five (5) Days following the date of issuance of the Notice of Intent to Award. Failure to timely file and serve the bid protest as aforesaid shall constitute grounds for the County's denial of the bid protest without consideration of the grounds stated therein.

.3 The written bid protest sets forth, in detail, all grounds for the bid protest, including without limitation all facts, supporting documentation, legal authorities and argument in support of the grounds for the bid protest. Any grounds not set forth in the bid protest shall be deemed waived. All factual contentions must be supported by competent, admissible and credible evidence. Any bid protest not conforming to the foregoing shall be rejected as invalid.

.4 Provided that a bid protest is filed in conformity with the foregoing, the Director of Facilities Management, such individual(s) as may be designated by the Director of Facilities Management in his/her discretion, shall review and evaluate the basis of the bid protest, and shall provide a written decision to the Bidder submitting the bid protest, either concurring with or denying the bid protest. The written decision of the Director of Facilities Management or his/her designee shall be final, unless overturned by the Board of Supervisors.

ARTICLE 6 POST- AWARD

6.1 POST- AWARD SUBMITTALS

6.1.1 Construction Contract. The Bidder identified in the Notice of Intent to Award as the successful Bidder to receive Award by the County shall execute the Construction Contract and return it to the County within **Ten (10) Days** after issuance by County to Bidder of the Construction Contract from the County and prior to execution of the Construction Contract by County.

6.1.2 Other Post-Award Submittals. Within the time periods set forth below, the Bidder identified in the Notice of Intent to Award as the successful Bidder shall submit the following additional Post-Award Submittals, completed and signed in the manner required by the Bidding Documents, to the County at **3450 14th Street, Suite 200, Riverside, CA 92501**:

.1 within ten (10) Days after issuance by County to Bidder of the Notice of Intent to Award and prior to commencement of the Work, such Bidder shall submit to County the following:

- (1) Performance Bond and Payment Bond (issued by Surety);
- (2) Evidence of Insurance, in the form specified in the Bidding Documents;
- (3) Workers' Compensation Certificate, in the form specified in the Bidding Documents;
- (4) Declaration of Sufficiency of Funds (required only if the Bidder has not entered into a collective bargaining agreement covering the workers to be employed for performance of the Work), in the form specified in the Bidding Documents;

.2 within twenty-one (21) Days after issuance by County to Bidder of the Notice of Intent to Award, such Bidder shall submit to the County the following:

- (1) Construction Schedule, prepared by Bidder in the manner required by Section 3.9 of the General Conditions and of the Specifications; and
- (2) Schedule of Values, prepared by Bidder in the manner required by Section 9.3 of the General Conditions of the Specifications.

6.1.3 Failure to Submit. Failure of the successful Bidder to submit any the Post-Award Submittals specified in Paragraphs 6.1.1 and 6.1.2, above, within the time periods specified therein shall be deemed to be a failure or refusal to execute the Construction Contract and shall be cause for forfeiture of such Bidder's Bid Security.

6.2 BIDDER RESPONSIBILITY

County reserves the right to request that any Bidder submit, as a condition of Award, information demonstrating that the Bidder and/or any of the Subcontractors listed in the Designation of Subcontractors submitted by Bidder, is financially and in all other respects possessed of the attributes of trustworthiness, as well as quality, fitness, capacity and experience, to satisfactorily perform under the terms and conditions of the Bidding Documents, Contract Documents and its Bid. Bidder shall comply with such request by submitting the information requested within five (5) Days of receipt of County's request. Failure to do so may be treated by County as a grounds to reject Bidder's Bid. Failure by the County to make such a request shall not constitute a waiver of its right to determine that Bidder or any such Subcontractor is not responsible to perform the Work.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

7.1.1 Performance and Payment Bonds. The successful Bidder will be required to furnish: (1) a Performance Bond in the form included in the Bidding Documents guaranteeing faithful performance of all obligations under the Construction Contract; and (2) a Payment Bond that complies with the requirements of Civil Code Section 9554 in the form included in the Bidding Documents. The penal sums of the Performance Bond and Payment Bond shall each be initially in the amount of one hundred percent (100%) of the Contract Price. The penal sum shall be increased for Contract Adjustments increasing the Contract Price that are authorized by Change Order or Unilateral Change Orders.

7.1.2 Cost of Bonds. The cost of Performance Bonds and Payment Bonds shall be deemed included in the amount of a Bidder's Bid.

7.1.3 Surety. Both the Performance Bond and Payment Bond shall be issued by an Admitted Surety. The Surety on the Performance Bond shall have an A.M. Best's Insurance Rating of A:VIII (A:8) or better.

7.2 TIME OF DELIVERY AND FORM OF BONDS

7.2.1 Submission by Bidder. Within the time period set forth in Subparagraph 6.1.2.1, above, the successful Bidder shall deliver the required Performance Bond and Payment Bond to the County fully executed and issued by the Bidder's Surety(ies).

7.2.2 Execution of Bonds. Notary acknowledgements of the signatures of the Bidder and Surety(ies) is required. The attorney-in-fact who executes the required Performance Bond or Payment Bond on behalf of a Surety shall affix thereto a certified and current copy of the power of attorney authorizing such attorney-in-fact to execute same on behalf of such Surety.

ARTICLE 8 CONSTRUCTION CONTRACT

8.1 EXECUTION OF CONTRACT

The successful Bidder shall execute the Construction Contract in the form included in the Bidding Documents.

8.2 BOARD APPROVAL

The Construction Contract shall not be binding upon the County until it has been awarded by the Director of Facilities Management or Board of Supervisors, and executed by the Board Chair, or designee.

BID FORM

TO THE GOVERNING BOARD OF THE COUNTY OF RIVERSIDE:

Date: _____

Bidder: _____

The undersigned Bidder, having carefully examined the Bidding Documents for the following Project:

Flood Control and Water Conservation District Office Tenant Improvement (project no. FM08947014286)

including, without limitation, the Plans and Specifications made part thereof, and taking into consideration all matters disclosed thereby, all matters of which Bidder is charged with knowledge by the terms thereof and all matters that are reasonably ascertainable by Bidder in the exercise of its duties of inquiry or investigation created by the terms set forth in the Bidding Documents (including, without limitation, the terms of Section 3.2 of the General Conditions, proposes, agrees to furnish in strict accordance with the Contract Documents all of the following:

- labor, materials, equipment, services, transportation;
- permits, licenses and taxes,
- **Builder's Risk (Course of Construction) Insurance coverage in accordance with the terms of Subparagraph 11.1.1.5 of the General Conditions;** and
- all other work, services and other things necessary for the undersigned to perform its obligations under the Contract Documents, excepting only those that are expressly stated in the Bidding Documents to be the responsibility of County,

for the total Base Bid price of (state in figures) \$_____ (state in words) _____ dollars
and _____ cents.

The foregoing Base Bid is submitted based upon and taking into consideration all of modifications and additions to the Bid Documents and other information set forth in each Addendum listed below, receipt and review of which is hereby acknowledged by Bidder (state below each and every Addendum number and date):

Addendum No.		Date:	
Addendum No.		Date:	
Addendum No.		Date:	
Addendum No.		Date:	
Addendum No.		Date:	
Addendum No.		Date:	
Addendum No.		Date:	

Subject to County's acceptance of such Alternate(s) in the manner set forth in the Instructions to Bidders, the foregoing Base Bid shall be adjusted as hereinafter stated for the following Alternates set forth in the Bidding Documents and/or the above-listed Addenda:

State Amount (in words and figures)		State if Amount is an "Add" or "Deduct" to Base Bid or, if Base Bid is Not Affected, Enter "No Change"
Alternate 1: Course of Construction Insurance		
Figures: \$ _____		☐ Add ☒ Deduct ☐ No Change
Words: _____		
_____ Dollars _____ Cents		
Alternate 2: <u>insert description here</u>		
Figures: \$ _____		☐ Add ☐ Deduct ☐ No Change
Words: _____		
_____ Dollars _____ Cents		
Alternate 3: <u>insert description here</u>		
Figures: \$ _____		☐ Add ☐ Deduct ☐ No Change
Words: _____		
_____ Dollars _____ Cents		
Alternate 4: <u>insert description here</u>		
Figures: \$ _____		☐ Add ☐ Deduct ☐ No Change
Words: _____		
_____ Dollars _____ Cents		
Alternate 5: <u>insert description here</u>		
Figures: \$ _____		☐ Add ☐ Deduct ☐ No Change
Words: _____		
_____ Dollars _____ Cents		

THE UNDERSIGNED BIDDER HEREBY MAKES THE FOLLOWING REPRESENTATIONS AND COVENANTS:

1. Except as otherwise permitted by the Instructions to Bidders, this Bid shall remain open for a period of sixty (60) Days after the Bid Closing Deadline (as defined in the Bidding Documents) and during that period of time shall not, without the written consent of County, be modified, withdrawn or canceled by the Bidder.

2. Bidder adopts and incorporates into this Bid all of the representations set forth in the Instructions to Bidders and hereby warrants that all such representations are true and correct.

3. The Bid Security submitted by Bidder is given as a guarantee that if Award of the Construction Contract that is the subject of this Bid is made to Bidder that Bidder will execute the Construction Contract and furnish the Performance Bond, Payment Bonds, evidence of insurance and other documents that Bidder is required to submit under the terms of the Bidding Documents, and in the event that the Bidder fails or refuses to execute and deliver same, such Bid Security shall be charged with the all losses and damages suffered by County as a result thereof and permitted by Applicable Law, including, without limitation, the difference between the amount of the Bid and amount for which the County may legally contract with another party to perform the Project (if such latter amount be greater than the Bid), costs of publication, and all other Losses suffered by County (including, without limitation, those associated with Delay to the Project).

4. Capitalized terms used in this Bid Form shall have the meanings assigned to them in the Bidding Documents.

Individual Bidder

Name of Bidder: _____

By: _____
(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

Corporation Bidder

Corporate Name
of Bidder: _____

State of Incorporation: _____

By: _____
(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

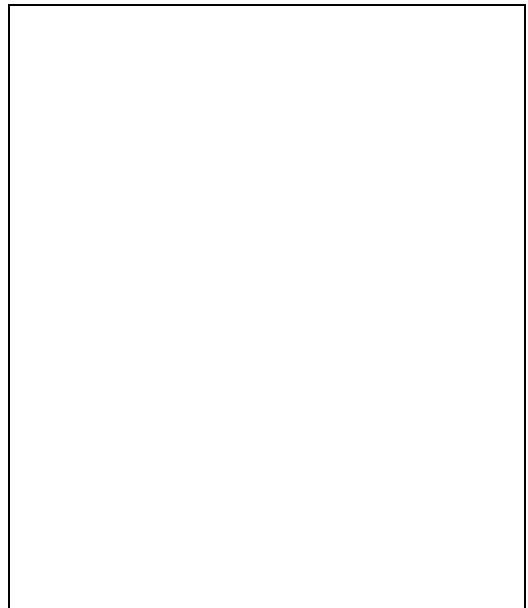
Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

Space for Corporate Seal and Attestation



Partnership Bidder

Name of Bidder: _____

By: _____
(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

If additional partners are signing, attach additional sheets setting forth the above signature information for each signing partner.

If the partner or partners signing on behalf of the Bidder is/are a corporation, then for each such corporate partner complete the following (attach additional sheets, if necessary):

Corporate Name
of Partner: _____

State of Incorporation: _____

By: _____
(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

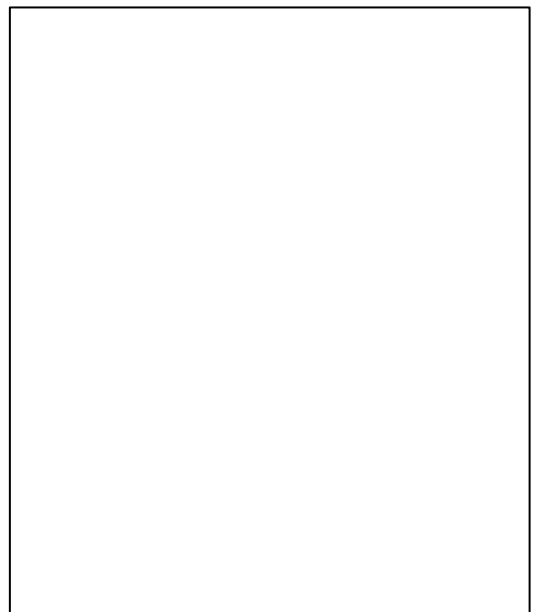
Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

Space for Corporate Seal and Attestation



Joint Venture Bidder

Name of Bidder: _____

By: _____

(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

If additional joint venture partners are signing, attach additional sheets setting forth the above signature information for each signing joint venture partner.

If the joint venture partner or partners signing on behalf of the Bidder is/are a corporation, then for each such corporate joint venture partner complete the following (attach additional sheets, if necessary):

Corporate Name
of Partner: _____

State of Incorporation: _____

By: _____

(Signature)

Print Name: _____

Title: _____

Date: _____

Business Address: _____

Business Telephone: _____

Business Fax: _____

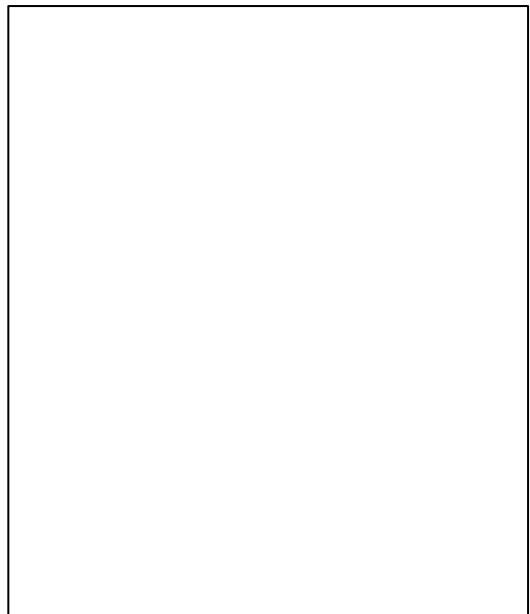
Business E-mail: _____

Contractor's License: _____

Dept. of Industrial Relations

Registration No: _____

Space for Corporate Seal and Attestation



Project No. FM08947014286

Bond No. _____

BID BOND

(Public Work – Public Contract Code Section 20129 (a))

KNOW ALL MEN BY THESE PRESENTS THAT:

WHEREAS, The undersigned _____ (“Principal”) is herewith submitting to the County of Riverside (“County”) a Bid dated _____ 20__, in the amount of (\$ _____) [Enter amount of Principal’s Bid Amount, as defined in the Instructions to Bidders] (“Bid Amount”) for the award by County to Principal of a contract (“Contract”) for the following: **Flood Control and Water Conservation District Office Tenant Improvement** (“Project”);

AND, WHEREAS, Principal is obligated as a condition of said Bid to submit security pursuant to Public Contract Code Section 20129 (a) in the amount of ten percent (10%) of the Bid Amount, which security may be in the form of a Bid Bond issued by an admitted surety insurer pursuant to Code of Civil Procedure Section 995.120 (“Admitted Surety”);

NOW THEREFORE, the Principal and _____ (“Surety”), an Admitted Surety, are held and firmly bound unto the County in the penal sum of _____ (\$ _____) for the payment of which sum in lawful money of the United States, well and truly to be made, we, Principal and Surety, bind ourselves, our executors, administrators, successors, heirs and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if Principal is awarded the Contract upon such Bid and thereafter within the period of time specified in County’s bidding documents governing the bidding process applicable to such Bid (“Bidding Documents”) enters into the Contract with County on the terms and conditions required by the Bidding Documents and furnishes the performance and payment bonds, evidence of insurance and other documents that Principal is required to submit under the terms of the Bidding Documents, then this obligation shall be null and void; otherwise, it shall remain in full force and effect and the sum guaranteed by this bond shall, at the option of County, be forfeited to County to pay all losses and damages suffered by County as a result thereof and permitted by applicable law, including, without limitation, the difference between the Bid Amount and amount for which the County may legally contract with another party to perform the Work (if such latter amount be greater than the Bid Amount), costs of publication, and all other losses and damages suffered by County (including, without limitation, those associated with delay to the Project); provided, however, that Surety’s liability shall not exceed the penal amount of this bond.

Surety, for value received, hereby agrees that no change, extension of time, alteration or addition to the terms of the Contract or the Bidding Documents, or to the work to be performed thereunder, nor any withdrawal of the Bid in a manner not permitted by the requirements of the Bidding Documents shall in any way

impair or affect Surety's obligation under this bond, and Surety does hereby waive notice of any such changes, extensions of time, alterations or additions.

IN WITNESS WHEREOF the undersigned parties have executed this instrument under their several seals this day of _____, 20__, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Affix Seal if Corporation

(Firm Name – Principal)

(Business Address)

By _____
(Original Signature)

(Title)

(Corporation Name – Surety)

Affix Corporate Seal

(Business Address)

By _____
(Original Signature)
ATTORNEY-IN-FACT

Note: Notary acknowledgment for Surety's signature and Surety's Power of Attorney must be included or attached

BID SECURITY RECEIPT

The undersigned Bidder has submitted as Bid Security for its Bid in the form of (check appropriate box):

- ☐ Bid Bond executed by an Admitted Surety, made payable to the County of Riverside,
- ☐ cash,
- ☐ cashier's check payable to the order of the County of Riverside, or
- ☐ certified check payable to the order of the County of Riverside,

in the amount of _____
dollars/_____ cents (\$_____), which amount is equal to ten percent (10%) of
the Bidder's Bid Amount, as defined in the Instructions to Bidders.

Signature

Print Name of Bidder

Print Name of Signer

DESIGNATION OF SUBCONTRACTORS

In compliance with the Subletting and Subcontracting Fair Practices Act (Chapter 4, commencing at Section 4100, Division 2, Part 1 of the Public Contract Code of the State of California) and any amendments thereto ("Act"), Bidder sets forth below the information required by the Act for those Subcontractors who are required to be listed by Bidder pursuant to the provisions of the Act [Insert information requested. Attach additional sheets, if needed.]:

<u>Portion of Work</u>	<u>Subcontractor Name</u>	<u>License No.</u>	<u>DIR No.</u>	<u>Location</u>

Date: _____

(Name of Bidder)

By: _____
(Signature of Bidder)

Address: _____

Phone: _____

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

(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder.

All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price of 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, 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 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.

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 of Declarant]

[Printed Name of Person Signing]

[Name of Bidder]

[Office or Title]

Iran Contracting Act

(Public Contract Code sections 2200-2208)

In accordance with Public Contract Code Section 2204(a), prior to bidding on, submitting a proposal or executing a contract or renewal for a County of Riverside contract for goods or services of \$1,000,000 or more, a Contractor must either:

- a) Certify it 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 is 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; or
- b) Demonstrate it has been exempted from the certification requirement for that solicitation or contract pursuant to Public Contract Code section 2203(c) or (d).

To comply with this requirement, please insert your Contractor or financial institution name and Federal ID Number (if available) and complete one of the options below. Please note: California law establishes penalties for providing false certifications, including civil penalties equal to the greater of \$250,000 or twice the amount of the contract for which the false certification was made; contract termination; and three-year ineligibility to bid on contracts. (Public Contract Code section 2205.)

Option #1 – Certification

I, the official named below, certify I am duly authorized to execute this certification on behalf of the Contractor/financial institution identified below, and the Contractor/financial institution identified below is **not** on the current list of persons engaged in investment activities in Iran created by DGS and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person/vendor, for 45 days or more, if that other person/vendor 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.

<i>Contractor Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date Executed</i>	<i>Executed in</i>	

Option #2 – Exemption

Pursuant to Public Contract Code sections 2203(c) and (d), a public entity may permit a Contractor/financial institution engaged in investment activities in Iran, on a case-by-case basis, to be eligible for, or to bid on, submit a proposal for, or enters into or renews, a contract for goods and services.

If you have obtained an exemption from the certification requirement under the Iran Contracting Act, please fill out the information below, and attach documentation demonstrating the exemption approval.

<i>Contractor Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date Executed</i>	<i>Executed in</i>	

ECONOMIC SANCTIONS IN RESPONSE TO RUSSIA'S ACTIONS IN UKRAINE

The Contractor must certify that it is not a target of economic sanctions imposed in response to Russia's actions in Ukraine imposed by the United States government or the State of California. The Contractor is required to comply with the economic sanctions imposed in response to Russia's actions in Ukraine, including with respect to, but not limited to, the federal executive orders identified in California Executive Order N-6-22, located at <https://www.gov.ca.gov/wp-content/uploads/2022/03/3.4.22-Russia-Ukraine-Executive-Order.pdf> and the sanctions identified on the United States Department of the Treasury website at (<https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/ukraine-russia-related-sanctions>).

The Contractor is required to comply with all applicable reporting requirements regarding compliance with the economic sanctions, including, but not limited to, those reporting requirements set forth in California Executive Order N-6-22 for all parties with one or more agreements with the State of California, the County of Riverside, or any other local agency, with a value of Five Million Dollars (\$5,000,000) or more. Notwithstanding any other provision in these documents, failure to comply with the economic sanctions and all applicable reporting requirements may result in disqualification or termination of the Construction Agreement, if awarded. For contractors with an agreement value of Five Million Dollars (\$5,000,000) or more with the State of California, the County of Riverside, or any other local agency, reporting requirements include, but are not limited to, information related to steps taken in response to Russia's actions in Ukraine, including but not limited to:

1. Desisting from making any new investments or engaging in financial transactions with Russian institutions or companies that are headquartered or have their principal place of business in Russia;
 2. Not transferring technology to Russia or companies that are headquartered or have their principal place of business in Russia; and
 3. Direct support to the government and people of Ukraine.
- To comply with this requirement, please insert your Contractor name and Federal ID Number (if available) on the Certification Form on Page XXI, execute by a duly authorized representative for the contractor and return with the bid proposal.

**COMPLIANCE WITH ECONOMIC SANCTIONS IN RESPONSE TO RUSSIA'S ACTIONS IN UKRAINE
(Bidders)**

Prior to bidding on, submitting a proposal, or executing a contract, a contractor must certify: 1) it is not a target of economic sanctions and 2) in compliance with economic sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as any requirements related to the Russian sanctions imposed by the California Governor's Executive Order N-6-22 issued on March 4, 2022 and under state law, if any.

To comply with this requirement, please insert the contractor name and Federal ID Number (if available), complete the information described below and execute by an authorized representative of the contractor.

CERTIFICATION

I, the authorized representative for contractor named below, certify I am duly authorized to execute this certification on behalf of the contractor below, and the contractor identified below has conducted a good faith review of existing contracts. I attest that the contractor is not a target of economic sanctions, and that contractor is in compliance with the economic sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as any requirements related to the Russian sanctions imposed by the California Governor's Executive Order N-6-22 issued on March 4, 2022 and under state law, if any.

<i>Contractor Name (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date</i>		

Project No. FM08947014286

Bond No. _____

PAYMENT BOND

(Public Work - Civil Code Sections 9550 et seq.)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the County of Riverside ("County") by action of the Board of Supervisors has awarded Construction Contract Number _____ ("Contract") to the undersigned _____ as Principal ("Principal") to perform the work ("Work") for the following project: **Flood Control and Water Conservation District Office Tenant Improvement;**

AND, WHEREAS, said Principal is required by the Contract and/or by Division 3, Part IV, Title XV, Chapter 7 (commencing at Section 9550) of the California Civil Code to furnish a payment bond in connection with the Contract;

NOW THEREFORE, we, the Principal and _____ ("Surety"), an admitted surety insurer pursuant to Code of Civil Procedure, Section 995.120, are held and firmly bound unto County in the penal sum of _____ Dollars (\$ _____), this amount being not less than one hundred percent (100%) of the total sum payable by County under the Contract at the time the Contract is awarded by County to the Principal, lawful money of the United States of America, for the payment of which sum well and truly to be made, we, Principal and Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if Principal, its heirs, executors, administrators, successors, or assigns approved by County, or its subcontractors, of any contracting tier, shall fail to pay any person or persons named in California Civil Code, Section 9554, then Surety will pay for the same, in or to an amount not exceeding the penal amount hereinabove set forth.

Surety, for value received, agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the Work to be performed thereunder, nor any rescission or attempted rescission of the Contract or this bond, nor any conditions precedent or subsequent in the bond or Contract attempting to limit the right of recovery of any claimant otherwise entitled to recover under the Contract or this bond shall in any way impair or affect Surety's obligation under this bond, and Surety does hereby waive notice of any such changes, extensions of time, alterations or additions.

Surety is not released from liability to those for whose benefit this bond has been given, by reason of any breach of the Contract by County or Principal.

Surety's obligations hereunder are independent of the obligations of any other surety for the

performance of the Contract, and suit may be brought against Surety and such other sureties, joint and severally, or against any one or more of them or against less than all of them, without impairing County's rights against the others.

Affix Seal if Corporation

(Firm Name – Principal)

(Business Address)

By _____
(Original Signature)

(Title)

(Corporation Name – Surety)

Affix Corporate Seal

(Business Address)

By _____
(Signature – Attached Notary's Acknowledgment)

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

Note: Notary acknowledgment of signatures of Bidder and Surety, and Surety's Power of Attorney, must be included or attached

Project No. FM08947014286

Bond No. _____

PERFORMANCE BOND

(Public Work – Public Contract Code Section 20129 (b))

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the County of Riverside ("County") by action of the Board of Supervisors has awarded Construction Contract Number _____ ("Contract") to the undersigned _____ as Principal ("Principal") to perform the work ("Work") for the following project: **Flood Control and Water Conservation District Office Tenant Improvement**, which Contract is by this reference hereby incorporated herein and made a part hereof;

AND, WHEREAS, said Principal is required by the Contract and/or by California Public Contract Code, Section 20129 (b) to furnish a performance bond for the faithful performance of the Contract;

NOW THEREFORE, we, the Principal and _____ ("Surety"), an admitted surety insurer pursuant to Code of Civil Procedure, Section 995.120, are held and firmly bound unto County in the penal sum of _____ Dollars (\$_____), this amount being not less than one hundred percent (100%) of the total sum payable by County under the Contract at the time the Contract is awarded by County to the Principal, lawful money of the United States of America, for the payment of which sum well and truly to be made, we, Principal and Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if Principal, its heirs, executors, administrators, successors or assigns approved by County, shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions and agreements in the Contract, including, without limitation, all obligations during the original term and any extensions thereof as may be granted by County, with or without notice to Surety thereof (including, without limitation, the obligation for Principal to pay liquidated damages), all obligations during the period of any warranties and guarantees required under the Contract and all other obligations otherwise arising under the terms of the Contract (such as, but not limited to, obligations of indemnification), all within the time and in the manner therein designated in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

Whenever Principal shall be, and is declared by County to be, in default under the Contract, the Surety shall promptly either remedy the default, or, if the Contract is terminated by County or the Principal's performance of the Work is discontinued, Surety shall promptly complete the Contract through its agents or independent contractors, subject to acceptance of such agents or independent contractors by County as

hereinafter set forth, in accordance with its terms and conditions and to pay and perform all obligations of Principal under the Contract (including, without limitation, all obligations with respect to payment of liquidated damages) less the "Balance of the Contract Price" (as hereinafter defined); subject to the penal amount of this bond as set forth above. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by County under the Contract and any modifications thereto, less the amount previously paid by County to the Principal and less amounts that County is authorized to withhold under the terms of the Contract.

If County determines that completion of the Contract by Surety or its agents or independent contractors must be performed by a lowest responsible bidder selected pursuant to a competitive bidding process, then Surety shall comply with such processes in accordance with the requirements of County and applicable laws. Unless otherwise approved by District, in the exercise of its sole and absolute discretion, Surety shall not utilize Principal in completing performance of the Work.

No right of action shall accrue on this bond to or for the use of any person or entity other than County or its successors or assigns.

Correspondence or claims relating to this bond shall be sent to Surety at the address set forth below.

Surety, for value received, agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder, shall in any way impair or affect Surety's obligation under this bond, and Surety does hereby waive notice of any such changes, extensions of time, alterations or additions.

Surety's obligations hereunder are independent of the obligations of any other surety for the performance of the Contract, and suit may be brought against Surety and such other sureties, joint and severally, or against any one or more of them or against less than all of them, without impairing County's rights against the others.

Affix Seal if Corporation

(Firm Name – Principal)

(Business Address)

By _____
(Original Signature)

(Title)

(Corporation Name – Surety)

Affix Corporate Seal

(Business Address)

By _____
(Signature – Attached Notary's Acknowledgment)

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

Note: Notary acknowledgment of signatures of Bidder and Surety, and Surety's Power of Attorney, must be included or attached

CONTRACTOR'S CERTIFICATE REGARDING WORKERS' COMPENSATION

Labor Code Section 3700 states:

"Every employer except the state shall secure the payment of compensation in one or more of the following ways:

(a) By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state.

(b) By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employee.

(c) For any county, city, city and county, municipal corporation, public district, public agency, or any political subdivision of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof satisfactory to the director of ability to administer workers' compensation claims properly, and to pay workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which, on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702.

For purposes of this section, 'state' shall include the superior courts of California."

I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

(Name of Contractor)

By:

(Name of Signer)

(Signature)

(In accordance with Article 5 (commencing at Section 1860), Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any work under this contract.)

DECLARATION OF SUFFICIENCY OF FUNDS

(California Labor Code Section 2810)

I, the undersigned, an authorized representative of _____ ("Bidder") with authority to make the statements contained in this Declaration on behalf of Bidder, hereby declare the following:

1. The Bidder's employer identification number for state tax purposes is _____.
2. The Bidder's workers' compensation insurance policy number is _____ and the name, address, and telephone number of the insurance carrier providing said insurance is: _____.

3. The following information is provided concerning any and all vehicles that are owned by the Bidder and that will be used for transportation in connection with any service provided for the performance of the Work that is the subject of the Bidder's Bid [Insert information requested. Attach additional sheets, if needed.]:

Vehicle	Vehicle ID #	Vehicle. Liability Insurance Policy Number (of policy covering vehicle)	Name, Address and Telephone Number of Vehicle Liability Insurance Carrier (issuing policy covering vehicle)

4. The following is the address of any real property that will be used to house workers in connection with the performance of the Work that is the subject of the Bidder's Bid [If no such housing will be provided, enter "none"]: _____.

5. The actual or estimated number of workers that will be employed to perform the Work that is the subject of the Bidder's Bid, the total amount of wages to be paid to said workers, and the dates on which said wages will be paid are as follows [Attach additional sheets, if needed.]:

<i>Total Number of Workers</i>	<i>Total Amount of Wages</i>	<i>Date(s) for Payment of Wages</i>

6. Check only one of the following boxes, as applicable:

☐ The statement of number of workers declared in Paragraph 5, above, is a statement of the actual number of workers that will be employed.

☐ The actual number of workers requested in Paragraph 5, above, is unknown and therefore the statement of number of workers declared therein is based on the Bidder's best estimate available at the time of submitting its Bid, rather than the actual number of workers that will be employed and if and when the actual number of workers and the other information requested above is available, it will be reported to the County of Riverside by Bidder in writing.

7. The actual or estimated total number of persons who will be utilized as independent contractors to perform the Work of the Project that is the subject of the Bidder's Bid (together with their known, current local, state, and federal contractor license identification numbers that each is required to have under local, state or federal laws or regulations) are as follows [Attach additional sheets, if needed.]:

<i>List of Independent Contractors</i>	<i>Current, local, state and federal contractor license identification number</i>

8. Check only one of the following boxes, as applicable:

☐ The statement of number of independent contractors declared in Paragraph 7, above, is a statement of the actual number of independent contractors that will be utilized.

☐ The actual number of independent contractors requested in Paragraph 7, above, is unknown and therefore the statement of number of independent contractors declared therein is based on the Bidder's best estimate available at the time of submitting its Bid, rather than the actual number of independent contractors that will be utilized, and if and when the actual number of independent contractors

and the other information requested above is available, it will be reported to the County of Riverside by Bidder in writing.

I, the undersigned, declare under penalty of perjury that the foregoing statements are within my personal knowledge and are true and correct. Executed on this _____ day of _____, in the year 20__ at _____, California.

(signature)

Type Name of Signer:

Type Name of Bidder:

SUBSTITUTION REQUEST FORM

ONLY ONE (1) REQUEST FOR SUBSTITUTION FOR EACH PRODUCT WILL BE CONSIDERED.
USE A SEPARATE SUBSTITUTION REQUEST FORM FOR EACH PROPOSED SUBSTITUTION.

TO: COUNTY OF RIVERSIDE
PROJECT: Flood Control and Water Conservation District Office Tenant Improvement
PROJECT NO.: FM08947014286

Bidder requests Substitution of the following material, product, thing or service:

Specification Section	Article No.
Specified Item	Address
Manufacturer's Name	Model or Catalog Number
Trade Name of Product	Specified Fabricators and Suppliers

For each proposed Substitution, list below where in the Specifications the item to be replaced is currently specified, the item specified in the Specifications and that is proposed to be replaced by the Substitution and a brief description of the proposed Substitution:

Specification Reference	Specified Item	Proposed Substitution

Respond to each of the following questions, attaching additional sheets if required:

In the case of a manufactured material, product or thing,
does the manufacturer certify that the proposed
Substitution is appropriate for use as an "equal" to
the material, product, or thing specified?

☐ **Yes** ☐ **No**

If so, attach such certification.

Are maintenance services available?

☐ **Yes**

☐ **No**

If so, describe scope and terms, including any limitations on maintenance services: _____

Are replacements materials, products or things, and all parts thereof, available?

☐ **Yes**

☐ **No**

Contractor agrees to provide specified item in the event this Substitution Request is denied?

☐ **Yes**

☐ **No**

Does the Substitution affect dimensions shown On Drawings?

☐ **Yes**

☐ **No**

If so, clearly describe changes: _____

Will you pay for changes to the building design, including architectural, engineering and detailing costs caused by the acceptance of the requested Substitution?

☐ **Yes**

☐ **No**

Would the Substitution, if used, affect any other trades?

☐ **Yes**

☐ **No**

If so, describe each affect: _____

Would the Substitution, if used, affect your ability to meet The time periods for construction required by the Bidding Documents?

☐ **Yes**

☐ **No**

If so, describe each affect: _____

Are there any differences between Substitution and specified item?

☐ **Yes**

☐ **No**

If so, describe each difference: _____

Are the manufacturer's guarantees and warranties of the Substitution and the specified item the same?

☐ **Yes**

☐ **No**

If so, describe each difference or attach copy of all written guarantees and warranties provided for the Substitution : _____

Attach complete product data, including but not limited to laboratory tests, approval numbers, research report numbers, listings, and approved assembly descriptions as specified in Section _____ of the Specifications or as required by Governmental Authorities under Applicable Laws.

Contractor

County

By

Reviewed by:

Date

Date

Remarks

Design Consultant

Reviewed by:

SPACE RESERVED FOR COUNTY USE ONLY:

Decision on Substitution Request:

☐ **Grant**

☐ **Deny**

**SECTION 000110
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- 000110 - Table of Contents
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- 007000 - General Conditions of the Standard Form Construction Contract Between
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SECTION 024100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. 006000 - County of Riverside Document - Specifications and Contract Documents
- B. 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor

1.03 DEFINITIONS

- A. Demolish: Dismantle, raze, destroy, or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove other items indicated, for salvage, relocation, and recycling.
- B. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 - 7. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 - 8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. Hazardous Materials:
 - 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction types applicable to the requirements .
- C. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

3. Verify that abandoned services serve only abandoned facilities before removal.
 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
1. Prevent movement of structure. Provide shoring and bracing as required.
 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch to match new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

**SECTION 033000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete reinforcement.
- D. Joint devices associated with concrete work.
- E. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.
- C. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI PRC-308 - Guide to External Curing of Concrete; 2016.
- F. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).
- G. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- H. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
- J. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2024a.
- K. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2024.
- L. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2025.
- M. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- N. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.
- O. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.
- P. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2025a.
- Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2025.
- R. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- S. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2024.

- T. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).
- U. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI PRC-347 to provide formwork that will produce concrete complying with tolerances of ACI SPEC-117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches (38 mm) of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch (1.29 mm).
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:

1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.06 BONDING AND JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2-inch (13 mm) thick, height equal to slab thickness, with removable top section forming 1/2-inch (13 mm) deep sealant pocket after removal.
- B. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches (150 mm) on center; ribbed steel stakes for setting.

2.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.
- D. Normal Weight Concrete:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch (20.7 MPa).
 2. Water-Cement Ratio: Maximum 40 percent by weight.
 3. Maximum Aggregate Size: 5/8 inch (16 mm).

2.08 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R.
- E. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
- F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete for floor slabs in accordance with ACI PRC-302.1.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.
- E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).
 - 2. Under Seamless Resilient Flooring: 1/4 inch (6 mm) in 10 feet (3 m).
 - 3. Under Carpeting: 1/4 inch (6 mm) in 10 feet (3 m).
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
 - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards (76 cu m) or less of each class of concrete placed.
- E. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 064100
PLASTIC-LAMINATE-CLAD ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated Compact Plastic Laminated and High Pressure Plastic Laminated millwork units.
- B. Countertops.
- C. Hardware.
- D. Factory finishing.

1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- C. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

1.03 SUBMITTALS

- A. See Section 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor
- B. Shop Drawings
 - 1. Submit shop drawings in conforming to the requirements of the *North American Architectural Woodwork Standards*.
 - 2. Furnish a Woodwork Institute Certified Compliance Label on the first page of the shop drawings
 - 3. On casework and countertop elevations show the location of backing required for attachment within walls.
- C. Product Data: Provide data for hardware accessories.
- D. Samples:
 - 1. Submit three samples of each laminate specified.
 - 2. Submit a sample in the specified finish of each hardware item that will be visible at exposed surfaces when the job is complete.
- E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.04 QUALITY ASSURANCE

- A. Work shall be in accordance with the Grade or Grades specified of the *North American Architectural Woodwork Standards*.
- B. Certified Compliance
 - 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. 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.
 - 3. 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.

1.05 MOCK-UPS

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. Locate where directed.
- C. Approved mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store all materials in a protected and dry environment.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINE

- A. Quality Standard: Custom Grade, in accordance with AWMAC/WI (NAAWS).
- B. Cabinets:
- C. Laminate Faced medium-density fiberboard Cabinets:
 - 1. Finish - Exposed Interior Surfaces: CPL or HPPL as scheduled on drawings.
 - 2. Finish - Concealed Surfaces: Manufacturer's option.
 - 3. Door and Drawer Front Retention Profiles: Fixed panel.
 - 4. Casework Construction Type: Type A - Frameless.
 - 5. Cabinet and door interface: Flush overlay
 - 6. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
 - 7. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Custom Grade: Doors, drawer fronts and false fronts with wood grain design to run and match vertically within each cabinet unit.
 - 8. Adjustable Shelves:
 - a. 3/4-inch plywood cores with Melamine surfaces, unless otherwise noted.
 - b. Shelf Loading: 40 psf.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 PANEL CORE MATERIALS

- A. Manufacturer's choice of sheet products meeting WI Architectural Woodwork Standards requirements for Custom Grade or better

2.04 LAMINATE MATERIALS

- A. Manufacturers: As scheduled on drawings
 - 1. Substitutions: See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

2.05 COUNTERTOPS

- A. Countertops: Materials as scheduled and detailed on drawings.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
- C. Fasteners: Size and type to suit application.

2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as scheduled or, if not indicated, provide per WI standards for Custom Grade as recommended by fabricator.
- B. Adjustable Shelving
- C. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- D. Drawer and Door Pulls: "U" shaped metal wire pulls, 4 inch centers, "U" shaped wire pull, steel with chrome finish, 4 inch centers ("U" shaped wire pull, steel with chrome finish, 100 mm centers).
- E. Sliding Door Pulls: Circular shape for recessed installation, steel with satin finish.
- F. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
- G. Hinges:
 - 1. Manufacturers: Rockford Process Control; RPC-376
 - a. Heavy duty, 5-knuckle institutional hinge
 - b. Mill ground with hospital tips
 - c. Minimum 270-degree opening

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
 - 1. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Mechanically fasten back splash to countertops with steel brackets at 16 inches (400 mm) on center.
- F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Verify that mechanical, electrical, plumbing and other building components affecting work in this section are in place and ready.

3.02 FIELD QUALITY CONTROL

- A. Provide Woodwork Institute Certified Seismic Installation Program inspection reports and certification as required in Part 1 of this Section.

3.03 INSTALLATION

- A. Install all work in conformance with the North American Architectural Woodwork Standards, latest edition.
 - 1. Installation shall conform to the NAAWS Grade of the items being installed.
- B. Set and secure all work in place, assuring that they are rigid, square, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.

- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- F. Mechanical fasteners used at exposed and semi-exposed surfaces, excluding installation attachment screws and those securing cabinets end to end, shall be countersunk.
- G. Cut equipment cutouts shown on plans using templates provided by the general contractor.
- H. Seal between countertops and wall.
- I. Install backsplashes at countertops.
- J. Drawer bottoms to be fully let-in, glued and blocked.
- K. All joinery must be lapped and mitered, no butt joints.
- L. All material must be acclimated prior to installation.

3.04 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.
- B. Fill and retouch all nicks, chips and scratches. Replace damaged items that cannot be repaired.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 078400 FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

- A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2024.
- C. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.
- D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.
- E. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus; 2025.
- F. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023a, with Editorial Revision (2024).
- G. ITS (DIR) - Directory of Listed Products; Current Edition.
- H. FM 4991 - Approval Standard of Firestop Contractors; 2013.
- I. FM (AG) - FM Approval Guide; Current Edition.
- J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- K. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- L. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD) or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

- B. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 2. Verification of minimum three years documented experience installing work of this type.
 - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 4. Licensed by local authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
 - 3. CEMCO; HOTROD Type-X Compressible Firestopping: www.cemcosteel.com/#sle.
 - 4. Fire Shield, LLC; Barri-Ring: www.fireshieldlv.com/#sle.
 - 5. Hilti, Inc: www.hilti.com/#sle.
 - 6. Specified Technologies Inc: www.stifirestop.com/#sle.
 - 7. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
- E. Acoustically Rated Firestopping: Provide system tested in accordance with ASTM E90 with STC rating of 50, minimum.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Install labeling required by code.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

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SECTION 079200 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- B. Section 093000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

- A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2024.
- C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.
- E. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- F. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor. .
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Backing material recommended by sealant manufacturer.
 - 4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 5. Substrates the product should not be used on.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- B. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver sufficient samples to manufacturer for testing.

5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
- C. Field Quality Control Plan:
 1. Visual inspection of entire length of sealant joints.
 2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
- D. Field Adhesion Test Procedures:
 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 2. Have a copy of the test method document available during tests.
 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- E. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Nonsag Sealants:
 1. Bostik Inc: www.bostik-us.com/#sle.
 2. Dow: www.dow.com/#sle.
 3. Henry, a Carlisle Company: www.henry.com/#sle.
 4. QUIKRETE Companies: www.quikrete.com/#sle.
 5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 6. Sika Corporation: usa.sika.com/#sle.
 7. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 8. W. R. Meadows, Inc: www.wrmeadows.com/#sle.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints:
 - a. Seal open joints except open joints indicated on drawings as not sealed.
 2. Interior Joints:
 - a. Seal open joints except specific open joints indicated on drawings as not sealed.
 3. Do Not Seal:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be covered with expansion joint cover assemblies.
 - c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
 - d. Joints where sealant installation is specified in other sections.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.

- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in section 1.05 Quality Assurance.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.
- B. Section 099000 - Painting

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- H. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- J. ITS (DIR) - Directory of Listed Products; Current Edition.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2024.
- M. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.
- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
- R. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 4. Or Approved Equal

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Edge Profile: Manufacturers standard for application indicated.
 - 4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 5. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire-Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
 - 2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- C. Fire-Rated Doors:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.

- d. Door Face Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
- 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
- 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
- 4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Interior Door Frames, Non-Fire Rated: _____.
 - 1. Frame Finish: Factory primed and field finished.
- C. Door Frames, Fire-Rated: Knock-down type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
 - 3. Frame Finish: Factory primed and field finished.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Louvers: Roll formed steel with overlapping frame; finish same as door components ; factory-installed.
 - 1. Style: Sightproof inverted Y blade.
 - 2. Louver Free Area: 50% percent.
 - 3. Manufacturers:
 - a. Trademark Hardware; 800core: tmhardware.com..
 - b. Activar; 700TL: activarcpg.com..
 - c. Or Approved Equal..
- B. Astragals for Double Doors: Specified in Section 087100.
- C. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 087100.
- E. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

**SECTION 081116
ALUMINUM DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazed aluminum doors.
- B. Aluminum frames.
- C. Flush door panels.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between door frames and adjacent construction.
- B. Section 081416 - Flush Wood Doors: Wood doors to be installed in aluminum frames specified in this section.
- C. Section 087100 - Door Hardware: Hardware for aluminum doors.
- D. Section 099000 - Painting: Field finishing.

1.03 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum; 2025.
- B. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.
- C. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- H. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.
- C. Shop Drawings: Include elevations of each opening type.
- D. Selection Samples: Complete set of color and finish options, using actual materials, for Architect's selection.
- E. Test Report: Certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum components in manufacturer's standard protective packaging, palletted, crated, or banded together.

- B. Inspect delivered components for damage and replace. Repaired components will not be accepted.
- C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.
- D. Protect materials and finish from damage during handling and installation.

1.06 FIELD CONDITIONS

- A. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.

1.07 WARRANTY

- A. Manufacturer Warranty: Provide 5-year manufacturer warranty for defects in workmanship and materials. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glazed Aluminum Doors:
- B. Aluminum Frames:
 - 1. AG Doors by Condoor: www.condoor.ca/#sle.
 - 2. Arcadia, Inc: www.arcadiainc.com/#sle.
- C. Fire-Rated Aluminum Door Frames:
 - 1. AG Doors by Condoor: www.condoor.ca/#sle.

2.02 DOORS AND FRAMES

- A. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Glazed Aluminum Doors: Extruded aluminum tube frame, full glazed, with middle rail; factory glazed.
 - 1. Thickness: 1-3/4 inches (44 mm), nominal.
 - 2. Finish: Class I - Natural anodized.
 - 3. Seals: Manufacturer's standard.
- C. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, non-thermally broken hollow or C-shaped sections; no steel components.
 - 1. Finish: Same as doors.
- D. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
 - 1. Provide vision lites as indicated on drawings.
 - 2. Provide the following clearances:
 - a. Hinge and Lock Stiles: 1/8 inch (3.2 mm).
 - b. Between Meeting Stiles: 1/4 inch (6.4 mm).
 - c. At Top Rail and Bottom Rail: 1/8 inch (3.2 mm).

2.03 COMPONENTS

- A. Flush Door Panels: Without visible seams on face sheet.
 - 1. Framing and Hardware Backup: Extruded aluminum tubing, 1/8 inch (3.2 mm) minimum thickness.
 - 2. Perimeter Edges: Extruded aluminum cap.
 - 3. Laminating Adhesive: Manufacturer's standard low-VOC materials.
- B. Frames: Extruded aluminum shapes, not less than 0.062 inch (1.6 mm) thick, reinforced at hinge and strike locations.
 - 1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.
 - 2. Trim: Extruded aluminum, not less than 0.062 inch (1.6 mm) thick, removable snap-in type without exposed fasteners.

- C. Vision Lites: Extruded aluminum framed, gasket glazed.
- D. Additional Door Hardware: See Section 087100.

2.04 PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf (359 Pa).

2.05 MATERIALS

- A. Aluminum Sheet: ASTM B209/B209M, alloy 5005, temper H14, stretcher leveled.
- B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.06 FINISHES

- A. Class I Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A41, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch (0.018 mm).
- B. Class I Color Anodized Finish: Electrolytically deposited colored anodic coating; AAMA 611 AA-M12C22A44, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch (0.018 mm).
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.07 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.
- C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil (0.76 mm) thickness per coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.
- B. Replace components with damage to exposed finishes.
- C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.
- B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.
- C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.

- D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.
- B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
- B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

**SECTION 081416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 087100 - Door Hardware.
- C. Section 088000 - Glazing.
- D. Section 099000 - Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2024.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.06 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
- B. High Pressure Decorative Laminate (HPDL) Faced Doors:

2.02 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
 3. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
1. Provide solid core doors at each location.
 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 3. High pressure decorative laminate (HPDL) finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: _____, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with slip match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
- B. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
1. Exception: Doors to be field finished.
- E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Sheen: Flat.
 2. Opaque:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Color: As selected by Architect.
 - c. Sheen: Flat.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 081113.
- B. Glazed Openings:
1. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
- C. Door Window Frames: Door window frames with glazing securely fastened within door opening.
1. Size: As indicated on drawings.

- 2. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
- D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
- E. Door Hardware: See Section 087100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

SECTION 084313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.

1.02 RELATED REQUIREMENTS

Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

Section 087100 - Door Hardware: Hardware items other than specified in this section.

Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 WARRANTY

- A. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
 - 1. Arcadia, Inc: www.arcadiainc.com/#sle.
 - 2. Kawneer North America: www.kawneer.com/#sle.
 - 3. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.

2.02 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Finish: Class I color anodized.

- a. Factory finish all surfaces that will be exposed in completed assemblies.
- 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
- 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
- 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
- 7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
- 8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements
 - 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 - 2. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Glazing Stops: Flush.
- B. Swing Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches (43 mm).
 - 2. Top Rail: 4 inches (100 mm) wide.
 - 3. Bottom Rail: 10 inches (254 mm) wide.
 - 4. Glazing Stops: Square.
 - 5. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

- A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: As selected by Architect from manufacturer's standard range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 HARDWARE

- A. For each door, include weatherstripping and threshold.
- B. Other Door Hardware: See Section 087100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

END OF SECTION

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SECTION 087100 DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, and hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Electrically operated and controlled hardware.

1.02 RELATED REQUIREMENTS

- A. Section 064100 - Plastic-Laminate-Clad Architectural Wood Casework: Cabinet hardware.
- B. Section 081113 - Hollow Metal Doors and Frames.
- C. Section 081116 - Aluminum Doors and Frames.
- D. Section 081416 - Flush Wood Doors.
- E. Section 281000 - Access Control: Electronic access control devices.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- E. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- G. UL (DIR) - Online Certifications Directory; Current Edition.
- H. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

1.05 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Provide complete description for each door listed.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).

2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

- A. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.
1. Closers: Five years, minimum.
 2. Locksets and Cylinders: Three years, minimum.
 3. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Applicable provisions of NFPA 101.
 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR) as suitable for application indicated.
 6. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
1. See Section 281000 for additional access control system requirements.
- E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.
- F. Fasteners:
1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 2. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 FINISHES

- A. Finishes: See drawings for Door Hardware Schedule.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
- E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

- A. Protect finished Work.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

SECTION 088000 GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.

1.02 RELATED REQUIREMENTS

- A. Section 084313 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.
- B. Section 088723 - Safety and Security Window Films.

1.03 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.
- C. GANA (GM) - GANA Glazing Manual; 2022.
- D. GANA (SM) - GANA Sealant Manual; 2008.
- E. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.
- F. T24, CCR - Title 24, California Code of Regulations, Chapter 24.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Samples: Submit two samples 12 by 12 inch size of glass units.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), and GANA (LGRM) for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degree F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers, subject to matching bases of design products.
 - 1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 - 2. Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 3. Pilkington North America Inc: www.pilkington.com/na/#sle.
 - 4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
- B. Product Options: Obtain glass and glazing materials from one source for each product indicated. Coatings and finished assemblies, such as insulating units, to be manufactured by the same fabricator in order to have a single source of warranty.

2.02 GLASS MATERIALS

2.03 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Spacer Color: Black.
 - 3. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and structural silicone sealant as secondary seal applied around perimeter.
 - b. Color: Black.

2.04 BASES OF DESIGN - GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 - 1. Applications: As scheduled.
 - 2. Glass Type: float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch nominal.

2.05 ACCESSORIES

- A. Glazing Materials:
 - 1. Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 - a. Setting Blocks: 100% Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II.
- B. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 088723
SAFETY AND SECURITY WINDOW FILMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazing film applied to new glazing assemblies.
- B. Section 084313 - Aluminum-Framed Storefront
- C. Section 088000 - Glazing

1.02 REFERENCE STANDARDS

- A. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2018.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.03 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.
- C. Specimen Warranty.

1.04 QUALITY ASSURANCE

1.05 FIELD CONDITIONS

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

1.06 WARRANTY

- A. Provide 15 year limited product warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. 3M Safety and Security Window Film; Ultra S600: www.solutions.3m.com.
- B. Substitutions: See Section 016000 - Product Requirements.

2.02 SAFETY AND SECURITY GLAZING FILM

- A. Description: Multilayer constructed, shatter resistant and abrasion resistant film designed to be adhesively applied to the interior glass surface of the window assembly.
- B. Impact Resistance for Safety Glazing: The film, when applied to either side of the window glass, shall pass a 400 ft-lb impact when tested according to 16 CFR CPSC Part 1201 (Category 2) and ANSI Z97.1 (Class A, Unlimited) and shall pass the accelerated weathering test requirements for both tensile strength and peel strength.
- C. Bomb Blast Mitigation:
 - 1. GSA Rating of "3A" (Very Low Hazard) with minimum blast load of 11 psi overpressure and 55 psi*msec blast impulse.
 - 2. GSA Rating of "3B" (Low Hazard) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse.

2.03 MATERIALS

- A. Glazing Film:
 - 1. Thickness: 0.0059 inch, minimum.
 - 2. Color: Optically Clear.
 - 3. Adhesive Type: Pressure sensitive acrylic.

4. Tensile Strength: 30,000 psi minimum when tested in accordance with ASTM D882.
5. Breaking Strength: 30,000 psi when tested in accordance with ASTM D882.
6. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84 (Class A).
7. Light Transmission of Film Applied on 1/4 inch Thick Clear Annealed Glass:
 - a. Visible Light Transmittance: 73 percent.
 - b. Visible Light Reflectance: 18 percent
 - c. Glare Reduction: 8 percent
 - d. Heat Loss Reduction: 0 percent
 - e. Solar Energy:
 - 1) 0.68 solar heat gain coefficient
 - 2) 0.47 U Value
 - 3) 99 percent UV Block
 - 4) 3 percent Solar Heat Reduction
- B. Adhesive System: The film shall be supplied with a high mass pressure sensitive weatherable acrylate adhesive applied uniformly over the surface opposite the abrasion resistant coated surface. The adhesive shall be essentially optically flat and shall meet the following criteria:
 1. Viewing the film from a distance of ten feet at angles up to 45 degrees from either side of the glass, the film itself shall not appear distorted.
 2. It shall not be necessary to seal around the edges of the applied film system with a lacquer or other substance in order to prevent moisture or free water from penetrating under the film system.
- C. Accessory Materials: As recommended or required by film manufacturer.
- D. Glass Cleaner: As recommended by glazing film manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field -Applied Film: Verify that existing conditions are adequate for proper application and performance of film.
- B. Examine glass and frames. Verify that existing conditions are adequate for proper application and performance of film.
- C. Verify glass is not cracked, chipped, broken, or damaged.
- D. Verify that frames are securely anchored and free of defects.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.
- B. Immediately prior to applying film, thoroughly wash glass with neutral cleaning solution.
- C. Protect adjacent surfaces.
- D. Do not begin installation until substrates have been properly prepared.

3.03 INSTALLATION

- A. Do not apply glazing film when surface temperature is less than 40 degrees F or if precipitation is imminent.
- B. Install in accordance with manufacturer's instructions, without air bubbles, wrinkles, streaks, bands, thin spots, pinholes, or gaps, as required to achieve specified performance.
- C. Accurately cut film with straight edges to required sizes allowing 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required by anchorage method.

- D. Seams: Seam film only as required to accommodate material sizes; form seams vertically without overlaps and gaps; do not install with horizontal seams.
- E. Clean glass and anchoring accessories following installation. Remove excess sealants and other glazing materials from adjacent finished surfaces.
- F. Remove labels and protective covers.

3.04 PROTECTION

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

3.05 SCHEDULE

- A. Areas of application:
 - 1. Where the building is the "fence line" and windows and storefront doors are below 8 feet in height.
 - 2. Window and storefront doors that are public facing and below 8 feet in height.
 - 3. Classroom storefront main entry doors.

END OF SECTION

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**SECTION 090561
COMMON WORK RESULTS FOR FLOORING PREPARATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient Flooring.
 - 2. Tiling
 - 3. Tile Carpeting
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Patching compound.
- G. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2024.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Visual Observation Report: For existing floor coverings to be removed.
- C. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- D. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.

1. Certificate: Manufacturer's certification of compatibility with types of flooring applied over remedial product.
 2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 3. Manufacturer's installation instructions.
 4. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.
- E. Testing Agency's Report:
1. Description of areas tested; include floor plans and photographs if helpful.
 2. Summary of conditions encountered.
 3. Moisture and alkalinity (pH) test reports.
 4. Copies of specified test methods.
 5. Recommendations for remediation of unsatisfactory surfaces.
 6. Product data for recommended remedial coating.
 7. Certificate: Include certification of accuracy by authorized official of testing agency.
 8. Submit report to Architect.
 9. Submit report not more than two business days after conclusion of testing.
- F. Adhesive Bond and Compatibility Test Report.
- G. Copy of RFCI (RWP).

1.05 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Contractor's Responsibility Relating to Independent Agency Testing:
 1. Provide access for and cooperate with testing agency.
 2. Confirm date of start of testing at least 10 days prior to actual start.
 3. Allow at least 4 business days on site for testing agency activities.
 4. Achieve and maintain specified ambient conditions.
 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.

2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating, Two-Component: Single-layer coating resistant to water vapor transmission meeting flooring manufacturer's emission limits, resistant to alkalinity (pH) level found, and suitable for flooring adhesion without further treatment.
 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 2. Use product recommended by testing agency.
- D. Remedial Floor Coating, Single Component: Resistant to water vapor transmission meeting flooring manufacturer's emission limits; single or double layer; resistant to alkalinity (pH) level found, and suitable for flooring adhesion without further treatment.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 1. Preliminary cleaning.
 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 5. Specified remediation, if required.
 6. Patching, smoothing, and leveling, as required.
 7. Other preparation specified.
 8. Adhesive bond and compatibility test.
 9. Protection.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.

- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

**SECTION 092116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall, ceiling, & soffit framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- B. Section 093000 - Tiling

1.03 REFERENCE STANDARDS

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2023.
- D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2024.
- J. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.
- K. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.
- L. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- M. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2022, with Editorial Revision (2023).
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.
- O. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

- P. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- Q. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- R. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

1.05 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data:
 - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Shop Drawings: Indicate special details associated with fireproofing.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- B. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies complying with applicable code.

2.02 METAL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
- B. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. CEMCO: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 3. SCAFCO Corporation: www.scafco.com/#sle.
- C. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Studs: C-shaped with knurled or embossed faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
- D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.
- E. Preformed Top of Wall Firestop Gasket:

1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems of fire rating and movement required.
- F. Preformed Bottom of Wall Firestop Track Seal:
1. Provide components UL-listed for use in UL-listed fire-resistance-rated bottom of partition joint systems of fire rating and movement required.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: www.americangypsum.com/#sle.
 2. CertainTeed Corporation: www.certainteed.com/#sle.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 4. Gold Bond Building Products, LLC provided by National Gypsum Company: www.goldbondbuilding.com/#sle.
 5. USG Corporation: www.usg.com/#sle.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness:
- C. Backing Board For Wet Areas:
1. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) Custom Building Products: www.custombuildingproducts.com/#sle.
 - 2) PermaBASE Building Products, LLC provided by National Gypsum Company; PermaBase Cement Board: www.goldbondbuilding.com/#sle.
 - 3) USG Corporation; Fiberock Brand Aqua-Tough AR Interior Panels Regular 1/2 in. (12.7 mm): www.usg.com/#sle.
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Edges: Tapered.
 5. Products:
 - a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
 - b. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
 - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board: www.gpgypsum.com/#sle.
 - d. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
 - e. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
 2. Edges: Tapered.
 3. Products:
 - a. CertainTeed Corporation; Interior Ceiling Drywall: www.certainteed.com/#sle.
 - b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond High Strength LITE Gypsum Board: www.goldbondbuilding.com/#sle.

- c. USG Corporation; Sheetrock Brand UltraLight Panels www.usg.com/#sle.

2.04 GYPSUM BOARD ACCESSORIES

- A. Acoustic Sound Attenuation Batts: preformed mineral-fiber, friction fit type, unfaced; thickness to fill stud depth..
 - 1. Manufacturer and Product
 - a. Owens Corning Corporation; Pink Next Gen SAB
 - b. Or Approved Equal
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Corner Beads: Low profile, for 90 degree outside corners.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- E. Finishing Compound: Surface coat and primer.
 - 1. Products:
 - a. CertainTeed Corporation; Quick Prep Plus Interior Prep Coat: www.certainteed.com/#sle.
 - b. Or Approved Equal.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C1007/AISI S220.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.06 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.08 PROTECTION

- A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 093000 TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic trim.
- D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 090561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.
- C. Section 092116 - Gypsum Board Assemblies: Backing Board.

1.03 REFERENCE STANDARDS

- A. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.
- B. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2023.
- C. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2023.
- D. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.
- E. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- E. Installer's qualification statement.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile:
 - 1. American Olean Corporation: www.americanolean.com/#sle.
 - 2. Dal-Tile Corporation: www.daltile.com/#sle.

3. Emser Tile, LLC: www.emser.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Setting Materials:
1. Bostik Inc: www.bostik.com/#sle.
 2. Custom Building Products: www.custombuildingproducts.com/#sle.
 3. LATICRETE International, Inc: www.laticrete.com/#sle.
 4. Mapei Corporation: www.mapei.com/#sle.
- C. Grout:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
 2. Custom Building Products: www.custombuildingproducts.com/#sle.
 3. LATICRETE International, Inc: www.laticrete.com/#sle.
 4. Mapei Corporation: www.mapei.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

- A. Floor Tile: Provide tile for flooring applications with minimum wet Dynamic Coefficient of Friction (DCOF) of 0.42 when tested in accordance with ANSI A326.3.

2.03 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
1. Manufacturers: Same as for tile.
- B. Non-Ceramic Trim: Brushed stainless steel, style and dimensions as indicated on drawings, set with tile mortar or adhesive.

2.04 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
- C. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
- D. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.

2.05 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use where indicated on drawings and where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 3. Color: As selected by Architect from manufacturer's full line.
- C. Standard Grout: ANSI A118.6 standard cement grout.
1. Applications: Use where indicated on drawings and where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 3. Color: As selected by Architect from manufacturer's full line.
- D. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Use where indicated on drawings.
 2. Color: As selected by Architect from manufacturer's full line.

2.06 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, modified silane polymer, or urethane sealant; moisture- and mildew-resistant type.
1. Applications: Between tile and plumbing fixtures.

2. Color: As selected by Architect from manufacturer's full line.
- B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 1. Composition: Water-based colorless silicone.
 2. Color: As selected by Architect from manufacturer's full line.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.
- B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
 1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.02 PREPARATION

- A. Vacuum clean surfaces and damp clean.
- B. Seal substrate surface cracks with filler.
- C. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to feather edge.
- D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108/A118/A136, manufacturer's instructions, and TCNA (HB) or TCNA (HB-GP) recommendations, as applicable.
- B. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated on drawings. Use standard grout unless otherwise indicated on drawings.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, on ground, with standard grout, unless otherwise indicated on drawings.

3.05 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244C, at toilet rooms.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

**SECTION 095100
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2024a.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.03 SUBMITTALS

- A. Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two full size samples illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.04 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
 - 2. Certainteed Architectural: www.certainteed.com/ceilings-and-walls/#sle.
 - 3. USG Corporation: www.usg.com/#sle.
- B. Suspension Systems:
 - 1. Same as for acoustical units.
 - 2. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
 - 3. Certainteed Architectural: www.certainteed.com/ceilings-and-walls/#sle.
 - 4. Rockfon: www.rockfon.com/#sle.
 - 5. USG Corporation: www.usg.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D, E, or F and complying with the following:
 - 1. Local authorities having jurisdiction.

2.03 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.

2.04 SUSPENSION SYSTEMS

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold-down clips, stabilizer bars, clips, and splices as required.

2.05 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.
- E. Perimeter Moldings: Same metal and finish as grid.
- F. Metal Edge Trim for Suspension Systems: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.
- G. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions, as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch clearance between grid ends and wall.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

3.05 CLEANING

- A. Clean surfaces.
- B. Replace damaged or abraded components.

END OF SECTION

**SECTION 096500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 090561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- D. ASTM F2034 - Standard Specification for Sheet Linoleum Floor Covering; 2018 (Reapproved 2025).
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.04 SUBMITTALS

- A. Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Verification Samples: Submit two samples, 6 by 9 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Linoleum Sheet Flooring: Homogeneous wear layer bonded to backing, with color and pattern through wear layer thickness.
 - 1. Manufacturers:
 - a. Forbo Flooring, Inc: www.forboflooringna.com/#sle.
 - b. Gerflor USA, Inc; DLW Linoleum Landscape Collection: www.gerflorusa.com/#sle.
 - c. Tarkett Flooring: www.tarkett.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F2034, Type corresponding to type specified.
 - 3. Backing: Jute fabric.
 - 4. Thickness: 0.100 inch, minimum, excluding backing.

5. Sheet Width: 79 inch, minimum.
6. Color: As indicated on drawings.

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; style as scheduled.
 1. Manufacturers:
 - a. Flexco Corporation; Base Sculptures: www.flexcofloors.com/#sle.
 - b. Mannington Commercial: www.manningtoncommercial.com/#sle.
 - c. Roppe Corporation; Contours Profiled Wall Base System: www.roppe.com/#sle.
 2. Height: 4 inches.
 3. Thickness: 0.125 inch.
 4. Color: As indicated on drawings.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 096813 TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Removal of existing carpet tile.

1.02 RELATED REQUIREMENTS

- A. Section 090561 - Common Work Results for Flooring Preparation
- B. Section 096500 - Resilient Flooring: Wall base.

1.03 REFERENCE STANDARDS

- A. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

1.04 SUBMITTALS

- A. Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of design: Milliken Commercial Flooring; Collective Mind Collection: www.milliken.com.
- B. Or Approved Equal

2.02 GENERAL CARPET TILE PERFORMANCE

- A. Construction: Tufted, textured loop + cut pile.
- B. Fiber: WearOn Nylon, Type 6.
- C. Dye Method: Digital/PrintWorks.
- D. Gauge: 1/12;
- E. Stitches per inch: 9.5
- F. Tufts: 114/in²
- G. Tile Size: 25 cm x 1 m.
- H. Backing: WellBAC Comfort, PVC-Free.
- I. Tufted Face Weight: 16.3 oz/yd².
- J. Finished Pile Thickness: 0.112 inches
- K. Flammability (Radiant Panel ASTM-E-648): ≥ 0.45 (Class I)

- L. Smoke Density (NFPA-258-T or ASTM-E-662): ≤ 450

2.03 CARPET TYPE C1

- A. Pattern: Union.
- B. Color: As scheduled on drawings.
- C. Description: Bolder, bark-inspired textural pattern.
- D. Installation: Vertical Ashlar.

2.04 CARPET TYPE C2

- A. Pattern: Enlighten
- B. Color: As scheduled on drawings.
- C. Description: Striated, canyon-inspired flowing lines.
- D. Installation: Vertical Ashlar.

2.05 ACCESSORIES

- A. Subfloor Filler: Type recommended by flooring material manufacturer.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

2.06 WARRANTY

- A. Provide manufacturers Lifetime Warranties for Face Fiber Wear, Antistatic, Floor Compatibility, Color Pattern Permanency, Floor Release, Cushion Resiliency, Moisture Resistance, Delamination of Backing, Dimensional Stability, Tuft Bind, and Edge Ravel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 090561.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces after installation.

3.05 PROTECTION

- A. Protect finished installation until turnover.

END OF SECTION

SECTION 099000 PAINTING

PART 1 — GENERAL

1.01 SECTION INCLUDES

- A. Field application of paints.
- B. Scope: Painting finish surfaces exposed to view, unless fully factory-finished or otherwise noted.

1.02 RELATED SECTIONS

- A. 092116 - Gypsum Board Assemblies

1.03 SUBMITTALS

- A. Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product data: Submit manufacturer product data.
- C. Samples: Submit paint brush-outs for all colors and sheens proposed for use on project.
- D. Closeout: Submit final schedule of colors with formulas for each paint color and sheen at project closeout.

1.04 WARRANTY

- A. Require unconditional 2-year installation warranty in addition to the manufacturer warranty.
- B. Require a site review with the designated District representative prior to expiration of warranty as a condition to end installation warranty period.
- C. Require manufacturer's standard warranties.

1.05 EXTRA STOCK

- A. One gallon of each color used, clearly marked with manufacturer label and mix design.

PART 2 — PRODUCTS

2.01 MANUFACTURER

- A. Bases of Design: Dunn Edwards <http://www.dunnedwards.com/>
- B. Acceptable Manufacturers
 - 1. Frazee
 - 2. Vista
 - 3. Or District Approved Equal

2.02 REQUIREMENTS

- A. Good flow and brushing properties capable of drying or curing free of streaks or sags.

2.03 ACCESSORY MATERIALS

- A. All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.04 FINISHES

- A. Refer to drawings for finish schedule.

2.05 PAINT SYSTEMS

- A. Product numbers listed are as manufactured by Dunn Edwards unless indicated otherwise.
- B. Descriptions in schedule apply to new and previously painted surfaces. Number of coats listed is a minimum, additional coat may be required to provide suitable uniform finish.

2.06 SCHEDULE — EXTERIOR SURFACES

- A. Ferrous Metal (Semi-Gloss Enamel) Completely re-prime all shop primed items in field.
 - 1. 1st coat — Dunn-Edwards Bloc-Rust Primer BRPROO-1 Series

2. 2nd and 3^d coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- B. Metal Deck (underside) and Supporting Structural Steel Members
 1. 1st coat — Dunn-Edwards Bloc-Rust Primer BRPROO-1 Series
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- C. Galvanized Metal Railings (Gloss Urethane Enamel)
 1. 1st coat — Metal Clean and Etch SCME-01
 2. 2nd coat — Dunn-Edwards Ultragrip Multisurface Primer UGPROO
 3. 3rd and 4th coats - Dunn-Edwards Evershield EVSH50 Semi-Gloss
- D. Galvanized Metal Non-Railings (Misc. Galvanized metals, underside of metal decking, flashings, etc.) (Semi-Gloss Enamel)
 1. 1st coat — Metal Clean and Etch SCME- 01
 2. 2nd coat — Dunn-Edwards Ultragrip Multisurface Primer UGPROO
 3. 3rd and 4th coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- E. Cement Plaster and Exposed Concrete (Semi-Gloss below 48" and Flat above)
 1. 1st coat — Dunn-Edwards Eff-Stop Select ESSLOO
 2. 2nd and 3^d — Dunn-Edwards Evershield Flat EVSH10
- F. Wood (Flat)
 1. 1st coat — Dunn-Edwards E-Z Prime Premium EZPROO
 2. 2nd and 3rd coats — Dunn-Edwards Evershield Flat EVSH10
- G. Wood (Semi-gloss)
 1. 1st coat — Dunn-Edwards E-Z Prime Premium EZPROO
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- H. New Concrete Block (Semi-Gloss below 48" and Flat above) 1st coat — Dunn-Edwards Blocfil Select SBSLOO
 1. 2nd and 3rd coats — Dunn-Edwards Evershield Flat EVSH10
- I. Existing Concrete Block (Semi-Gloss below 48" and Flat above) 1st coat — Dunn-Edwards Eff-Stop Select ESSLOO
 1. 2nd and 3rd coats — Dunn-Edwards Evershield Flat EVSH10
- J. Aluminum In-Fill Panels:
 1. 1st coat — Factory Prime coat (Touch up if abraded)
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- K. Cementitious Siding (Semi-Gloss below 48" and Flat above): 1st coat — Dunn-Edwards Eff-Stop Select ESSLOO
 1. 2nd and 3^d coats — Dunn-Edwards Evershield Flat EVSH10

2.07 SCHEDULE — INTERIOR SURFACES

- A. New Gypsum Board (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at other Ceilings, Enamel)
 1. 1st coat — Dunn-Edwards Vinylastic Select VNSLOO
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls) Dunn-Edwards Evershield EVSH60 (for gloss ceilings) Dunn-Edwards Spartawall Flat SWLL10 (for flat ceilings)
- B. Existing Gypsum Board (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at Ceilings, Enamel)
 1. 1st coat — Dunn-Edwards Interkote Premium IKPROO or B-I-N Primer- Sealer Stain-Killer if necessary.
 2. 2nd and 3^d coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls) Dunn-Edwards Evershield EVSH60 (for gloss ceilings) Dunn-Edwards Spartawall Flat SWLL10 (for flat ceilings)
- C. New or Existing Painted Wood (Semi-Gloss Enamel)

1. 1st coat — Dunn-Edwards Interkote Premium IKPROO or B-I-N Primer- Sealer Stain-Killer if necessary.
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- D. New Wood to Receive Transparent Finish (Stain and Lacquer)
1. 1st coat — Dunn Edwards Valpro Sanding Sealer NAS 2750
 2. 2nd and 3rd coats — Dunn Edwards Valpro Satin Lacquer NAF 2752
- E. Existing Stained Wood (Varnish Finish) 1st coat — Minwax Stain
1. 2nd and 3rd coats — Defthane Polyurethane Satin Varnish
 2. Existing Stained Wood (Lacquer Finish)
 - a. 1st coat — Stain to provide uniform finish, match existing tone Valspar Zenith Stain
 - b. 2nd and 3rd coats — Dunn Edwards Valpro Satin Lacquer NAF 2752
- F. Ferrous Metal (Semi-Gloss Enamel) - Re-prime all shop primed items in field. Typical paint system at all hollow metal doors and frames.
1. 1st coat — Dunn-Edwards BLOC-Rust Premium BRPROO-1 series
 2. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
- G. Cement Plaster and Exposed Concrete (Semi-Gloss at Walls, Gloss at Kitchen and Restroom Ceilings, and Flat at Ceilings, Enamel)
1. 1st coat — Dunn-Edwards Ultra Grip Premium UGPROO series
 - a. or B-I- N Primer-Sealer Stain-Killer if necessary.
 2. 2nd and 3rd coats:
 - a. Dunn-Edwards Evershield EVSH50 Semi-Gloss (for walls)
 - b. Dunn-Edwards Evershield EVSH60 (for gloss ceilings)
 - c. Dunn-Edwards Spartawall Flat SWLL10 (for flat ceilings)
 3. Acoustical Ceiling Tiles (Flat)
 - a. 1st coat — Dunn-Edwards Ultra Grip Premium UGPROO series
 - 1) or B-I- N Primer-Sealer Stain-Killer if necessary.
 - b. 2nd and 3'd coats — Dunn-Edwards Acoustikote W615
 4. Galvanized and Zinc Alloy Metal, (Semi-Gloss Enamel).
 - a. 1st coat — Metal Clean and Etch SCME-01
 - b. 2nd coat — Dunn-Edwards Ultra Grip Premium UGPROO series
 - c. 3rd and 4th coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss
 5. Concrete Block (Semi-Gloss)
 - a. 1st coat — Dunn-Edwards Blocfil Select SBSLOO
 - b. 2nd and 3rd coats — Dunn-Edwards Evershield EVSH50 Semi-Gloss

PART 3 EXECUTION

3.01 PREPARATION

- A. All existing surfaces to be repaired and prepared prior to painting.
- B. Acid wash all galvanized materials. Etch and prime prior to finish painting and rinse thoroughly.
- C. Interior surface preparation of existing walls to include TSP cleaning, sanding and patching of all interior surfaces.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

3.02 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions
- B. Do not paint over existing transparent finishes. Existing transparent finishes shall be refinished to match existing. Specify finish compatible with existing.
- C. Three coat system over existing paint or new primed finishes to consist of one prime coat and two finish coats.
 1. All shop-primed items are to be fully re-primed in the field.

2. Color-tint sealers and undercoats within general color range of finish color. Vary color of successive coats sufficiently to distinguish between coats.
3. Interior Surfaces
 - a. Wood to be semi-gloss painted, or stained, polyurethane clear finish, for decorative wood doors and casework.
 - b. Doors and frames to be one color, gloss enamel paint.
- D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.03 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.04 PROTECTION

- A. Touch-up damaged finishes after Substantial Completion.
- B. Protect planting adjacent to buildings.

END OF SECTION

SECTION 102113
STAINLESS STEEL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments including the following:
 - 1. Floor mounted overhead-braced toilet compartments.
 - 2. Urinal screens

1.02 RELATED REQUIREMENTS

- A. Section 102800 - Restroom Accessories.

1.03 REFERENCE STANDARDS

- A. United States EPA (Environmental Protection Agency) Registration - Bactericidal Surfaces Registered with the U.S. EPA to Legally Make Claims that these Materials Kill Infectious Bacteria.
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2025.

1.04 REGULATORY REQUIREMENTS

- A. Accessible Toilet Compartments:
 - 1. Wheelchair accessible compartment shall comply with **CBC Section 11B-604.8.1**.
 - 2. Toe clearance for at least one side partition of a wheelchair accessible compartment shall comply with **CBC Section and Figure 11B-604.8.1.4**. Toe clearance shall be 9" high minimum above the finish floor and 6" deep minimum beyond the compartment side face of the partition, exclusive of partition support members. It shall be 12" high minimum above the finish floor for children's use. Partition components at toe clearances shall be smooth without sharp edges or abrasive surfaces. Toe clearance at the side partition is not required in a compartment greater than 66" wide.
 - 3. Ambulatory accessible compartments shall be provided where there are six or more toilet compartments, or where the combination of urinals and water closets totals six or more fixtures. Such compartments shall be provided in the same quantity as wheelchair accessible compartments per **CBC Section 11B-213.3.1** and shall comply with **CBC Section 11B-604.8.2**.
 - 4. Door and door hardware for accessible compartments shall be self-closing and shall comply with **CBC Section 11B-404** except that if the approach is to the latch side of an ambulatory compartment door, clearance between the door side of the compartment and any obstruction shall be 44" minimum. **CBC Figure 11B-604.8.2**.
 - 5. A door pull complying with **CBC Section 11B-404.2.7** shall be placed on both sides of the accessible compartment door near the latch.
 - 6. A door pull complying with **CBC Section 11B-404.2.7** shall be placed on both sides of the accessible compartment door near the latch.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls.

1.06 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Installation Instructions

- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings, and type of hardware required.
- D. Samples: Submit two samples of partition panels, 4" by 4" inch in size illustrating panel finish, color, and sheen.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

1.08 WARRANTY

- A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bobrick, www.bobrick.com
 - 1. Product: Privada Series
 - a. Type: As detailed on Drawings
- B. Scranton Products, www.scrantonproducts.com.
 - 1. Product: Hiny Hiders
 - a. Type: As detailed on Drawings
- C. Substitutions: See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.

2.02 MATERIAL

- A. Stainless Steel Castings: ASTM A167, Type 304.

2.03 ACCESSORIES

- A. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
- B. Hinges: Anodized aluminum, manufacturer's standard finish.
 - 1. Continuous-type hinge, self closing.
- C. Door Hardware: Stainless steel, manufacturer's standard finish.
 - 1. Door Latch: Slide type.
 - 2. Door Strike and Keeper with Rubber Bumper.
 - 3. Door pull: for ADA compliant doors.
- D. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in full closed position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

**SECTION 102800
RESTROOM ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.
- C. Diaper changing stations.

1.02 REFERENCE STANDARDS

- A. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.
- B. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.04 SUBMITTALS

- A. See Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Restroom Accessories:
 - 1. Bobrick - Design-based manufacturer. For the purpose of establishing the type and quality, restroom accessories with model numbers are scheduled on drawings.
 - 2. Or Approved Equal
- B. Diaper Changing Stations:
 - 1. Koala Kare Products; as scheduled on drawings: www.koalabear.com/#sle.
 - 2. Or Approved Equal.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide keys for each accessory to Owner; master key lockable accessories.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Specified in 224000 - Plumbing Fixtures.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.

- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

**SECTION 122100
WINDOW ROLLER SHADE**

PART 1 — GENERAL

1.01 SECTION INCLUDES

- A. Window shades and accessories.

1.02 SUBMITTALS

- A. Reference Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: showing floor plan and elevations of each window, and anchorage. Include location of the pull chain.
- D. Samples: Provide 3 samples of the specified fabrics.

1.03 WARRANTY

- A. Provide unconditional 2-year installation warranty in addition to the manufacturer standard warranty.
- B. Schedule a site review with the designated District representative prior to expiration of warranty as a condition to end installation warranty period.
- C. Manufacturer's Warranty: Provide manufacturer's warranty for interior shading. Complete forms in Owner's name and register with manufacturer. Ensure warranty covers the following:
 - 1. Shade Hardware: 10 years.
 - 2. Shade Fabric: 25 years

PART 2 — PRODUCTS

2.01 MANUFACTURERS

- A. Bases of Design: MechoShade Systems <http://mechoshade.com/>
- B. Skyco <http://www.skycoshade.com/>
- C. Draper <http://www.draperinc.com/WindowShades/index.asp>
- D. Or Approved Equal

2.02 PRODUCT

- A. Fabric: SoHo 1600 Series 3% open
 - 1. Color: 1602 Cornsilk
 - 2. Fire Classification: NFPA 701
- B. Rollers and Housing
 - 1. Electro-galvanized or epoxy primed steel or extruded aluminum tube and wall thickness of appropriate diameter and gauge to not sag over required spans.
 - 2. No plastic hardware allowed.
 - 3. Assembly must be easy to remove for replacement of material.
- C. Brackets
 - 1. Galvanized or zinc-plated steel.
- D. Operators
 - 1. Manual: stainless steel chain pulls.
 - a. Manual chains to be located within 48 inches of finish floor.

2.03 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings.

3.04 CLEANING

- A. Replace shades that cannot be cleaned to "like new" condition at no extra cost to Owner.

3.05 PROTECTION

- A. Protect installed products from subsequent construction operations.

END OF SECTION

**SECTION 124813
WALK-OFF MAT CARPET TILE**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide the finish floor covering and accessories of this section where scheduled, indicated on drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related Requirements: General provisions of the Contract Documents to be included but not necessarily limited to General Conditions and Supplementary Conditions of this Project Manual.
- C. Section Includes:
 - 1. Tufted Carpet Tile
 - 2. Installation Adhesive

1.02 RELATED REQUIREMENTS

- A. Section 096813 - Tile Carpeting

1.03 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. 2010 ADA Standards for Accessible Design
 - 2. American Association of Textile Chemist and Colorists (AATCC)
 - 3. American Society for Testing and Materials (ASTM)
 - 4. Bentley Installation Guidelines – AFIRMA II – LuxFelt – NexStep Tile
 - 5. Bentley Maintenance Guidelines – Broadloom and Carpet Tile
 - 6. The Carpet and Rug Institute's (CRI) Green Label Plus Program
 - 7. CRI 104, Carpet Installation Standard for Commercial Carpet
 - 8. AATCC 16, Option 3, Colorfastness to Light
 - 9. AATCC 134, Electrostatic Propensity of Carpet
 - 10. AATCC 171, Carpets Cleaning: Hot Water Extraction Method
 - 11. AATCC 175, Stain Resistance: Pile Floor Covering
 - 12. ASTM D2858 / CPSC FF1-70, Surface Flammability of Carpets and Rugs
 - 13. ASTM D5252, Hexapod Tumble Drum Tester
 - 14. ASTM D7330, Assessment of Surface Appearance Change in Pile Floor covering
 - 15. ASTM E648 / NFPA 253, Critical Radiant Flux of Floor Covering
 - 16. ASTM E662, Optical Density of Smoke
- B. Provide adequate numbers of skilled personnel who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.

1.04 SUBMITTALS

- A. RefereDocument 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to acknowledge compliance with the specified requirements.
 - 3. Shop Drawings showing location of seams and locations and types of carpet transitions and accessories.
 - 4. Samples of the full range of colors and patterns of carpet and of exposed accessories available from the proposed manufacturers in the specified quantities.
 - 5. Manufacturer's recommended installation procedures which will become the basis for accepting or rejecting actual finished installation.
 - 6. Manufacturer's recommended maintenance guidelines.

- B. After the Designer/Owner has selected the color and pattern, submit three samples of each specified color and patterns. Installer to verify color and pattern of delivered material prior to installation.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage and handling shall be in accordance with the manufacturer's specifications.
- B. Protect from damage, dirt, stains and moisture. In event of any damages, immediately make all repairs and replacements to accepted satisfaction of Owner.

1.06 JOB CONDITIONS

- A. Do not install carpet until the building is entirely closed in, wet work and painting completed, and HVAC system in operation.

1.07 GUARANTEES

- A. Installer to provide a signed, written guarantee to Owner to correct conditions due to faulty installation
- B. Manufacturer to provide 15 year minimum written warranty for carpet tile.

PART 2 – PRODUCT

2.01 TUFTED CARPET TILE - CUSHION

- A. Basis of Design Manufacturer: Bentley Mills, Inc.
 - 1. Style: Rough Idea
 - 2. Construction: Tufted Tip-Sheared
 - 3. Yarn: 100% Premium Nylon 6 or Nylon 6,6 – No Mill Extruded Fiber, No Non-durable Topical Treatments
 - 4. Dye Method: Solution Dye
 - 5. Yarn Weight: 24 oz/yd²
 - 6. Machine Gauge: 5/64"
 - 7. Total Weight: 88 oz/yd²
 - 8. Total Thickness: 0.375 in.
 - 9. Secondary Backing: LuxFelt PET Cushion Tile. No PVC.
- B. Or Approved Equal
 - 1. Products submitted shall meet or exceed the performance and physical characteristics of the basis of design products. Reference Document 007000 - General Conditions of the Standard Form Construction Contract Between County and Contractor.

2.02 PERFORMANCE REQUIREMENTS

- A. Flammability: pass ASTM D2858 / CPSC FF1-70
- B. Critical Radiant Flux: Class I, > 0.45 W/cm², ASTM E648 / NFPA 253
- C. Optical Density of Smoke: < 450 dmc flaming, ASTM E662
- D. Colorfastness to Light: 4 minimum @ 160 AFU's, AATCC 16, Option 3
- E. Electrostatic Propensity: < 3.5 kV, Step, AATCC 134
- F. Resistance to Staining: 8 minimum, AATCC 175 after 2 cycles of AATCC 171 Hot Water Extraction to remove any non-durable topical treatments.
- G. Texture Appearance Retention Rating (TARR): 3.5 Severe Traffic, Hexapod, ASTM D5252, 12,000 cycles, 8.4 lb commercial heavy ball, Grading to ASTM D7330.
- H. Dimensional Stability: ASTM D7570, + 0.20% maximum
- I. Must be NSF/ANSI 140 Gold Certified
- J. Must have Product Specific 3rd party verified Environmental Product Declaration (EPD)
- K. Must Not Contain: PVC, PFAS, or Antimicrobial Treatments.

2.03 REGULATORY REQUIREMENTS

- A. ADA Requirements: Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. Carpet shall have a level loop, textured loop, level cut pile, level cut/uncut pile texture. Pile height shall be 1/2 inch (12.7 mm) maximum. Exposed edges of carpet shall be fastened to floor surfaces and shall have trim on the entire length of the exposed edge per CBC, Title 24, Part 2, Section 11B-302.2. Carpet edge trim shall comply with Section 11B-303.

2.04 OTHER MATERIALS

- A. Provide supplementary materials as required for securing carpet to substrate per carpet manufacturer's installation guidelines.
 - 1. Carpet Adhesive, type recommended by carpet manufacturer, as required to maintain manufacturer's warranty:
 - a. For Carpet Tile: Bentley Healthbond 2399 Releasable Adhesive
 - 2. Seam Adhesive and Tape
 - a. Not applicable for carpet tile
 - 3. Crack Filler
 - 4. Floor Leveling Compound
- B. Carpet Accessories:
 - 1. Carpet Reducer and Base: as selected by the Contractor.
 - 2. Transition Strips: as selected by the Contractor.
- C. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SURFACE PREPARATION

- A. Immediately prior to installation of the work of this Section, thoroughly clean substrate and remove oil, grease, paint, varnish, hardeners, and other items which would adversely affect the bond of adhesive.
- B. Make substrate level and free from irregularities, filling low spots and grinding high spots as required.

3.03 INSTALLATION

- A. General:
 - 1. Follow Manufacturer's Installation Instructions and the Carpet & Rug Institute's Installation Guideline for Commercial Carpet, CRI 104. Manufacturer's Installation Instructions supersede all others.
 - a. Bentley Installation Guidelines – AFIRMA II-LuxFelt-NexStep Tile
 - 2. Glue carpet directly to the floor. Do not use additional underlayment.
 - 3. Lay all carpet tiles in the manufacturer approved installation method, i.e. monolithic, quarter turn, ashlar, brick, herringbone, etc.
 - 4. Ensure one constant floor height after carpet is installed.
- B. Seams:
 - 1. Carpet tile will inherently show seams. Minimize visual seam appearance by ensuring carpet tiles are installed tightly with no trapped yarn between the tiles.
 - 2. For patterned carpet tile, move tiles around as necessary to avoid two dark or two light edges lining up next to each other creating a streak or band.

- C. Extend carpet under open-bottomed obstructions, and under removable flanges or obstructions. Extend carpet into closets and alcoves of rooms to be carpeted unless another floor finish is indicated for such spaces. Extend carpet under all furniture and equipment, unless otherwise indicated.
- D. Fire Assembly Doors: Break carpet at scheduled fire door opening saddle. Install prior to installation of carpet.
- E. Finished installation: Shall be free of wrinkles or other visible defects.

3.04 CLEANING AND PROTECTION

- A. Remove wrinkles, spots and debris from installation. Vacuum carpet prior to final acceptance of work. Follow Manufacturer's Maintenance guidelines if additional cleaning is necessary.
- B. Protect areas which are carpeted until time for scheduled acceptance by Owner. Provide and maintain in direction of traffic a type of non-staining protective covering recommended by the carpet manufacturer.
- C. Installer shall be responsible for repairing and/or replacing damages caused prior to acceptance by the Owner
- D. Provide Manufacturer's Maintenance Guidelines for recommended maintenance schedule.
 - 1. Bentley Maintenance Guidelines – Broadloom and Carpet Tile

END OF SECTION

SECTION 220010
BASIC PLUMBING REQUIREMENTS

PART 1. GENERAL

1.01 SECTION INCLUDES

- A. Basic Plumbing Requirements specifically applicable to Division 22 Sections, in addition to Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor.

1.02 DESCRIPTION

- A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 REFERENCES

- A. Section 230801 - Commissioning of Building Systems

1.04 WORK INCLUDED

- A. The complete Plumbing systems (including Fire Protection systems), including but not limited to these major items.
 - 1. Coordinate work of this Section with related trades.
 - 2. Verify applicable dimensions and location of existing utilities at the jobsite.
 - 3. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
 - 4. Soil waste and vent system inside and outside the building including connections to fixtures, equipment, sewer connections, clean-outs.
 - 5. Water piping systems inside and outside the building, including connections to fixtures, equipment, water meters and vaults; pressure regulating stations, backflow preventers.
 - 6. Interruptible and non-interruptible fuel gas systems inside and outside the building, including connections, gas meters, earthquake valves, and pressure regulating stations.
 - 7. Plumbing fixtures, carriers, fittings, trim, hose bibs, wall hydrants, and accessories.
 - 8. Installation and connection of Owner furnished equipment.
 - 9. Natural gas piping system including connections to equipment and site.
 - 10. Water heating systems, including water heating equipment, circulating pumps, connections.
 - 11. Shop drawings.
 - 12. Equipment identification.
 - 13. Equipment and systems adjustments and balancing.
 - 14. Written operating and maintenance instructions.
 - 15. Record drawings.
 - 16. Guarantee

1.05 WORK SPECIFIED ELSEWHERE

- A. Concrete, Rough Carpentry, Joint Sealants, Sheet Metal, Flashing and Trim, access doors and Frames, Door Hardware, Paints and Coatings, Mechanical and Electrical.

1.06 SITE INSPECTION

- A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.07 ORDINANCES, REGULATIONS AND CODES

- A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
1. AFI - Air Filter Institute
 2. AMCA - Air Moving & Conditioning Association
 3. ARI - Air Conditioning & Refrigeration Institute
 4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
 5. ASME - American Society of Mechanical Engineers
 6. ASTM - American Society of Testing Materials
 7. AWS - American Welding Society Code
 8. ANSI - American National Standards Institute
 9. CBC - California Building Code
 10. CCR - California Code of Regulations
 11. CEC - California Electrical Code
 12. CFC - California Fire Codes
 13. CMC - California Mechanical Code
 14. CPC - California Plumbing Code
 15. FIA - Factory Insurance Association
 16. NAFM - National Association of Fan Manufacturers
 17. NEMA - National Electrical Manufacturer's Association
 18. NFPA - National Fire Protection Association
 19. ORS - Office of Regulatory Services
 20. SCAQMD - South Coast Air Quality Management District
 21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 22. UFC - Uniform Fire Code
 23. UL - Underwriter's Laboratories
 24. UPC - Uniform Plumbing Code
- B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.
- C. Codes and Standards:
1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
 2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
 3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
 4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
 5. National Fire Protection Associations - National Fire Code.
- D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.
- E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.
- F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.08 PERMITS, FEES AND INSPECTIONS

- A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.09 DRAWINGS AND SPECIFICATIONS

- A. The Architect's decision will be final on interpretation of the Drawings and Specifications.

- B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.
- C. Piping and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.
- D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.
- E. Alternate support or seismic detail proposed by contractor shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.10 SUBMITTALS

- A. Before starting work, the Contractor shall furnish for the review of the Architect and Engineer. Provide Shop Drawings and Submittals with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.
- B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.
- C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified.
- D. Submittals shall include, but not necessarily be limited to the following which are mandatory:
 - 1. Draw Equipment Layouts to 1/4" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
 - 2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
 - 3. Specialties, valves, gauges and thermometers of all types.
 - 4. Foundations, supports, hangers, inserts.
 - 5. Earthquake supports and calculations.
 - 6. Insulation.
 - 7. Shop fabrication drawings and installation drawings of piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping to finish floor level.
 - 8. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
 - 9. Automatic control system diagrams.
 - 10. Access panels.
 - 11. Clean-outs
 - 12. Fixture carriers.
 - 13. Hangers, inserts, supports, anchors.
 - 14. Hose bibs.
 - 15. Hot water circulators.
 - 16. Pipe, fittings and specialties.
 - 17. Pipe isolators.
 - 18. Plumbing fixtures, fittings, trim, drains and receptors.
 - 19. Pressure regulators.
 - 20. Roof flashing.
 - 21. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
 - 22. Strainers
 - 23. Water hammer arrestors.
 - 24. Water heating equipment.
 - 25. Expansion joints, guides and anchors.

- 26. Shop fabrications drawings and calculations.
- 27. Special and miscellaneous products furnished under this section and not listed herein.

1.11 RECORD DRAWINGS AND MANUALS

- A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.
- B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.
- C. Final Record Drawings: Conform to Division 1 requirements.
- D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.
- E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.
- F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.
- G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:
 - 1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
 - 2. Specifications
 - 3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
 - 4. Grouting requirements.
 - 5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
 - 6. Start-up and beginning operation procedures.
 - 7. Operational procedures.
 - 8. Shutdown procedures.
 - 9. Maintenance and calibration procedures
 - 10. Parts lists
 - 11. Name, address and telephone number of each manufacturer's local representative.
- H. "As-Built" drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.12 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

- A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.13 SEISMIC DESIGN

- A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support

or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:

1. In accordance with Title 24, 2022 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.
 - a. Exception: Attachments of equipment weighing less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.
3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2022 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.14 SUBSTITUTIONS AND CHANGES

- A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.
- B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.
- C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.
- D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.
- E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor.

1.15 SUBMITTAL REVIEWS

- A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.16 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

- A. Immediately after award of the Contract and after the final review of submittals by the Architect and / or Engineer, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time to meet construction schedule. The contractor shall deliver to the Architect and Owner a complete list of equipment

and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.17 LOCATIONS AND ACCESSIBILITY

- A. Drawings show piping diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping to best suit field conditions after coordinating with other trades. Run exposed piping parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.
- B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.
- C. Installation at valves, thermometers, gauges, clean outs, controls, steam and water specialties, access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.
- D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.
- E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.
- F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.
- G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.18 COORDINATION OF TRADES

- A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.
- B. No extras will be allowed for changes made necessary by interference or coordination between trades.
- C. Submit Composite Coordination Drawings in accordance with Special Conditions. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Coordination Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor. Do not start installation of work involved under Composite Coordination Drawings until the Architect and Engineer reviews applicable submittal. Discrepancies between the Drawings and Composite Coordination Drawings shall be specifically noted and identified on the Composite Coordination Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Coordination Drawings.
 - 1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.

2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
4. Concrete: Conform to Concrete Section of the Specifications.

1.19 GUARANTEES

- A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.
- B. Guarantee included in this section to cover:
 1. Faulty or inadequate design of equipment or material installed
 2. Improper assembly or erection
 3. Defective workmanship or material
 4. Incorrect or inadequate operation or other failure
- C. The Contractor shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise
- D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period
- E. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.
- F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty and proof of shipment date or purchase date per terms of warranty to the Owner, who shall be named as beneficiary.

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.21 CLOSING-IN OF UN-INSPECTED WORK

- A. Contractor shall not allow or cause any of the work, specifically piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, shall at their own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.22 BUILDING FOOTING CLEARANCES

- A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.23 DAMAGE BY LEAKS

- A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.24 EQUIPMENT LABELS

- A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.25 EXCAVATION, TRENCHING AND BACK FILLING

- A. Excavating, trenching and back filling for utilities within the building area shall be done in conformity with Division 31 - Site work. Piping shall be installed promptly after excavation in order to keep the trenches open as short a time as possible.
- B. Excavating, trenching and back filling for utilities outside the building area shall be done in conformity with Division 31 - Earth work.
- C. Any existing underground piping and conduit that is encountered shall be properly shored and protected from damage. Active piping shall be left intact and undamaged.

1.26 PRELIMINARY OPERATION

- A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.27 MAINTAINING EXISTING SERVICES

- A. The premises and existing building at the site will be in use at the time the work of this Section is in progress. Contractor shall conduct his work so as to cause no inconvenience or danger to the personnel on the premises.
- B. He shall maintain continuity of service to the existing mechanical systems, except for designated intervals during which connections can be made. The scheduling of the shut down period shall be at a time directed by the Architect.
- C. In some instances, it may be necessary to defer work in certain areas and locations until such time as existing facilities can be relocated or rearranged by the Owner. Therefore, whenever it becomes necessary for the Contractor to perform work under this contract in areas in which the Owner's work is being performed. This contractor shall advise the Architect relative to this requirement and shall follow closely the directive issued by the Architect insofar as time and procedure are concerned. Allow Owner 72 hours prior notice.
- D. This contractor shall include in his bid all premium time to which he may be subjected for performing work in such procedure and at such time as may be necessary to cause the least interference with the function of the Owner.

1.28 ELECTRICAL WORK

- A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.
- B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.
- C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.
- D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.
- E. All interconnecting power wiring and conduits shall be provided by Division 26.
- F. Control wiring shall be provided by Division 22, unless otherwise indicated on the drawings.

G. Conduit for control wiring shall be provided by Division 26.

END OF SECTION

SECTION 220518
ESCUTCHEONS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

2.02 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.

3.02 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

SECTION 220523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Brass ball valves.
 - 2. Bronze ball valves.
 - 3. Iron, single-flange butterfly valves.
 - 4. Bronze swing check valves.
 - 5. Iron swing check valves.
 - 6. Iron swing check valves with closure control.
 - 7. Bronze gate valves.
 - 8. Iron gate valves.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.03 QUALITY ASSURANCE

- A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valves shall be provided on all supplies to equipment and fixtures.
- C. Obtain each type of valve from single source from single manufacturer.
- D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- E. Bronze valves shall be made with dezincification-resistant materials. bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 8 (DN 200) and larger.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Hand lever: For quarter-turn valves NPS 6 (DN 150) and smaller except plug valves.
- H. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: With extended neck.

- I. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.

2.02 BRASS BALL VALVES

- A. One-Piece, Reduced-Port, Brass Ball Valves with Brass Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nibco
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 400 psig (2760 kPa).
 - c. Body Design: One piece.
 - d. Body Material: Forged brass.
 - e. Ends: Threaded.
 - f. Seats: PTFE or TFE.
 - g. Stem: Brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Reduced.
- B. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 400 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Forged brass.
 - f. Ends: Threaded or Solder.
 - g. Seats: PTFE or TFE.
 - h. Stem: Brass.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.
- C. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Forged brass.
 - f. Ends: Threaded.

- g. Seats: PTFE or TFE.
- h. Stem: Brass.
- i. Ball: Chrome-plated brass.
- j. Port: Regular.

2.03 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded or Solder.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass or Stainless Steel.
 - j. Port: Full.

2.04 BRONZE SWING CHECK VALVES

- A. Class 125, Bronze Swing Check Valves with Bronze Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze.

2.05 IRON SWING CHECK VALVES

- A. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Stockham Division.
 - c. NIBCO, INC
 - 2. Description:

- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig (1380 kPa).
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, nickel iron with bolted bonnet.
- e. Ends: Flanged.
- f. Trim: Composition.
- g. Seat Ring: Bronze.
- h. Disc Holder: Bronze.
- i. Disc: ASTM A351.
- j. Gasket: Asbestos free.

2.06 BRONZE GATE VALVES

- A. Class 125, NRS Bronze Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Division.
 - e. Hammond Valve.
 - f. Milwaukee Valve Company.
 - g. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Stainless Steel.
- B. Class 125, RS Bronze Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Hammond Valve.
 - e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Stainless Steel.

PART 3 EXECUTION

3.01 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Shut-off valves shall be provided in main branches, runs to risers and where indicated on drawings
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.
- F. Install on operators for butterfly valves NPS 4 (DN 100) and larger and more than 96 inches (2400 mm) above floor. Extend chains to 60 inches (1520 mm) above finished floor.
 - 1. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

3.02 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.03 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball or butterfly valves.
 - 2. Throttling Service: ball, or butterfly valves.
 - 3. Pump-Discharge Check Valves:
 - a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze disc.
 - b. NPS 2-1/2 (DN 65) and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring.
 - c. NPS 2-1/2 (DN 65) and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
 - 4. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
 - 5. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 6. For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.

3.04 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 (DN 50) and Smaller:
 - 1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Bronze Angle Valves: Class 125, bronze disc.
 - 3. Ball Valves: Two piece, full port, brass or bronze with brass trim.
 - 4. Bronze Swing Check Valves: Class 125, bronze or nonmetallic disc.
 - 5. Bronze Gate Valves: Class 125, NRS.
- B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4 (DN 65 to NPS 100): May be provided with threaded ends instead of flanged ends.
2. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.
3. Iron Swing Check Valves: Class 125, nonmetallic-to-metal seats.
4. Iron Swing Check Valves with Closure Control: Class 125, lever and spring.
5. Iron Gate Valves: Class 125 OS&Y.
6. Iron Globe Valves: Class 125.

3.05 SANITARY-WASTE AND STORM-DRAINAGE VALVE SCHEDULE

- A. Pipe NPS 2 (DN 50) and Smaller:
 1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 2. Ball Valves: Two piece, full port, brass or bronze with brass trim.
 3. Bronze Swing Check Valves: Class 125, bronze disc.
 4. Bronze Gate Valves: Class 125, NRS.
- B. Pipe NPS 2-1/2 (DN 65) and Larger:
 1. Iron Valves, NPS 2-1/2 to NPS 4 (DN 65 to NPS 100): May be provided with threaded ends instead of flanged ends.
 2. Iron Swing Check Valves: Class 125, nonmetallic-to-metal seats.
 3. Iron Swing Check Valves with Closure Control: Class 125, lever and spring.
 4. Iron Gate Valves: Class 125, OS&Y.

END OF SECTION

SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe positioning systems.
 - 6. Equipment supports.

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7
 - 1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.
 - 4. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying and undue strain.
 - 5. Piping subjected to vertical movement when operating temperatures exceed ambient temperatures shall be supported by variable spring hangers and supports or by constant support hangers.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Stainless Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- C. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.02 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts. The total load of piping components imposed on trapeze spans shall not exceed manufacturer's design load rating. Load calculation and detail of each unit shall include a safety factor of two times the expected load.

2.03 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa), ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.04 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.05 PIPE STANDS

- A. General Requirements for Pipe Stands: shop or field fabricated assemblies made of manufactured corrosion-resistant components of support roof-mounted piping.

- B. Compact pipe stand:
 - 1. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 - 2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
 - 3. Hardware: Galvanized steel or polycarbonate.
 - 4. Accessories: Protection pads.
- C. Single-Base, Single-Pipe Stand:
 - 1. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
 - 2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
 - 3. Vertical Members: Two galvanized steel, continuous thread, 1/2 inch rods.
 - 4. Horizontal Member: Adjustable horizontal, galvanized steel pipe support Channel.
 - 5. Pipe Supports: Roller
 - 6. Hardware: Galvanized steel
 - 7. Accessories: Protection pads.

2.06 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.07 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.08 ACOUSTICAL NOISE AND VIBRATION ISOLATION

- A. Acoustical Isolation System: Consisting of loop hangers, J-hangers, through-stud isolators, pipe clamps, riser clamp pads, neoprene and felt lining material, associated support bracket, and fire stop sleeve devices. For applications requiring acoustical isolation of tubing, piping, and equipment from building elements, such as floors, walls, and framing members.

2.09 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Stainless Steel: ASTM A240/A240M.
- C. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Stand Installation:
 - 1. Pipe Stand Types: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
- F. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- J. Install lateral bracing with pipe hangers and supports to prevent swaying.
- K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- N. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
 - e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.

5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- O. Protect tubing and piping from damage caused by abrasion when passing through studs, joist, and similar framing using abrasion protection isolators.
 - P. Prevent damage to piping and tubing caused by contact between dissimilar metals using insert system designed specifically for this application.

3.02 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.03 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.05 PAINTING

- A. Touch up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touch up: Cleaning and touch up painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting." And Section 099123 "Interior Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.06 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
 - 4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 - 5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 - 7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb (340 kg).
 - b. Medium (MSS Type 32): 1500 lb (680 kg).
 - c. Heavy (MSS Type 33): 3000 lb (1360 kg).
 8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
 2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.
- E. Ceiling tacks.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.04 SUBMITTALS

- A. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.
- B. Product Data: For each type of product indicated, provide manufacturer's standard product data sheets. Data sheets must detail compliance with applicable standards for color and size and clearly define durability of no less than 4 years.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch diameter and higher.

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.

2.03 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.
- B. Description: Laminated piece with up to three lines of text.
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving minimum 1/16 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Letter Height: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 - 4. Background Color: Black.
 - 5. Maximum Temperature: Able to withstand temperatures up to 200 deg F.
- C. Equipment Nameplate Content: Each nameplate shall include equipment's Drawing designation or unique equipment number, consistent with the drawings.

2.04 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Brimar Industries, Inc: www.pipemarker.com.
 - 4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 5. Seton Identification Products: www.seton.com.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges. The content of each tag shall include a 1/4 inch top-line abbreviation identifying the system Terminology shall match drawings. Content, second line shall include a unique sequential 1/2 inch number to identify the valve.
- C. Tag Material: Brass, 0.032 inch or stainless steel 0.032 inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
- D. Fasteners: Brass or stainless steel S-hook.

2.05 STENCILS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.
- B. Stencils shall be identified as indicated below including direction of flow
 - 1. Gravity Condensate - G.C.
 - 2. Domestic Cold Water - D.C.W.
 - 3. Domestic Hot Water - D.H.W.
 - 4. Domestic Hot Water Return - D.H.W.R.
 - 5. Natural Gas - GAS
- C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.
- D. Stencil Ink: Interior stencil ink shall be compatible with interior surfaces and finishes.

2.06 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/.
 - 2. Craftmark Pipe Markers: www.craftmarkid.com.
 - 3. Seton Identification Products: www.seton.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. General Requirements for Manufactured Pipe Labels: Identify the content and directional flow of piping systems. Whenever possible select manufacturers standard preprinted, color-coded, pipe markers. Pipe marker sizes and colors shall comply with ANSI / ASME A13.1.
- C. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- D. Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

2.07 CEILING TACKS

- A. Manufacturers:
 - 1. Craftmark: www.craftmarkid.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Seton Identification Products: www.seton.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.

- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
 - 1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints and encapsulate.

3.02 INSTALLATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.
- D. Install tags in clear view and align with axis of piping
- E. Identify valves in main and branch piping with tags.
- F. Identify piping, concealed or exposed, with stenciled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet 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 220719.11

UNDER-LAVATORY PIPE AND SUPPLY COVERS - PLUMBEREX

PART 1 GENERAL

1.01 SECTION INCLUDES SECTION INCLUDES

- A. Insulating Covers for Accessible Lavatory / Sink Piping.

1.02 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- E. ASTM D635 - Standard for Test for Surface Burning Characteristics of Polymeric Materials; Current Edition, Including All Revisions.
- F. ASTM G21 and G22 - Standard for Test for Determining Resistance of Synthetic Polymeric Materials to Fungi and Determining Resistance of Plastics to Bacteria; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness. Inspect for damage.
- B. Protect from damage by securing areas and by leaving factory packaging in place until usage.

PART 2 - PRODUCTS

2.01 INSULATING COVERS FOR ACCESSIBLE LAVATORY / SINK PIPING

- A. Insulating Covers for Exposed Trap and Drainage Piping, Hot-Water Supplies, and Cold-Water Supplies.
 - 1. Manufacturer:
 - 2. Manufacturer:
 - a. Plumberex Specialty Products, Inc.
 - b. IPS Corporation.

3. Descriptions: Manufactured plastic insulating covers for trap and drainage piping, hot-water supplies and cold-water supplies. Thermal insulating properties protect from burns, cold temperature thermal shock, abrasions, or other physical harm from contact with exposed piping under accessible lavatories and sinks. Comply with Americans with Disabilities Act (ADA) and ANSI A117.1 accessibility requirements.
4. Comply with microbial and fungal resistance of "Zero growth" when tested in accordance with ASTM G21.
5. Comply with CBC Chapter 11 - Accessibility - General.
6. Comply with CPC Chapter 3 - General Regulations - Section: Washroom and Toilet Room Requirements - Subsection : Interior finish. Interior finish surfaces of toilet rooms shall comply with the California Building Code.
7. Comply with CPC Chapter 4 - Fixtures, Faucets and Fixture Fittings - Section: Accessible Plumbing Facilities - Subsection: Exposed Pipes and Surfaces.
8. Comply with CPC Chapter 4 - Plumbing Fixtures and Fixture Fittings - Section: Fixtures and Fixture Fittings for Persons with Disabilities - Subsection: Exposed Pipes and Surfaces.
9. Comply with ASTM C1822, Insulating Covers on Accessible Lavatory Piping.
10. The insulating cover shall be manufactured in a form suitable for application: no adhesive tapes shall be allowed as method for covering exposed piping.
11. Color as selected by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces: free of voids throughout the length of piping, including fittings, valves, and specialties.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Install insulation on piping accessories requiring future re-occurring access and service with factory fabricated insulation covers that are easily removed and reapplied
- E. Install manufactured preformed insulating cover around hot-water supplies, and cold-water supplies including supply stops, butted up to bottom surface of lavatory / sink, or up inside between wall and upper lavatory / sink cavity. Ensure a straight precision cut fit and finish.
- F. Secure all covers with fasteners provided. Do not use cable tie fasteners, adhesives, or adhesive tapes for attachments. Do not use adhesives as a component to support the fastening system.
- G. Do not use adhesives in any part of the method of construction of the insulation coverings.

END OF SECTION

SECTION 221005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, above grade.
- D. Sanitary sewer and vent.
- E. Pipe flanges, unions, and couplings.
- F. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

- A. ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing; 2019.
- B. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- F. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
- G. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.
- H. ASME B31.1 - Power Piping; 2024.
- I. ASME B31.9 - Building Services Piping; 2020.
- J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- K. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- L. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- M. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- N. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- O. ASTM B32 - Standard Specification for Solder Metal; 2020.
- P. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
- Q. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- R. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- S. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- T. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.

- U. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings; 2022.
- V. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- W. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- X. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.
- Y. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings; 2022.
- Z. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter; 2022.
- AA. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- BB. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings; 2021.
- CC. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- DD. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2020.
- EE. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- FF. ASTM F628 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core; 2023.
- GG. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- HH. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- II. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
- JJ. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
- KK. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.
- LL. AWWA C606 - Grooved and Shouldered Joints; 2022.
- MM. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In. (100 mm through 1500 mm); 2022.
- NN. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- OO. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.
- PP. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- QQ. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- RR. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- SS. NSF 372 - Drinking Water System Components - Lead Content; 2022.

TT. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

UU. ASME - Boiler and Pressure Vessel Code

VV. AGA - American Gas Association Code

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Valve Repacking Kits: One for each type and size of valve.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with State of California, standards.
 - 1. Maintain one copy on project site.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX. Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.
- E. Piping materials shall bear label, stamp, or other markings fo specified testing agency.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- E. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping in accordance with requirements of authorities having jurisdiction.
- F. Protect and store PE pipes and valves from direct sunlight.
- G. Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations. Replace all damaged or defective items.

1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.
- B. Interruption of Existing Utility Service: Do not interrupt service to facilities occupied by owner or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:
 - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Construction Manager's written permission.
- C. Become familiar with details of the scope of work, verify dimensions in the field, and advise the Architect / Engineer of any discrepancy prior to performing any work.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 14, NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.
- C. Sanitary Waste and Vent Systems: Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "FSF-DWV" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

2.02 SANITARY SEWER AND VENT PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. ABS Pipe: ASTM F628, Schedule 40.
 - 1. ABS Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste and vent patterns.
 - 2. Joints: Solvent welded with ASTM D2235 cement.
 - a. Solvent cement shall have a VOC content of 325 g/L or less.
 - b. Solvent cement shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. PVC Schedule 40 DWV Pipe per ASTM D1785 and ASTM D 2665
 - 1. Fittings: PVC DWV per ASTM D 2665
 - 2. Joints: Solvent cement weld per ASTM F 656 and solvent cement per ASTM D2564
 - a. Solvent cement shall have a VOC content of 510 g/L or less.
 - b. Adhesive primer shall have a VOC content of 550 g/L or less.
 - c. Adhesive primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.03 SANITARY SEWER AND VENT PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A888, CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron, ASTM A888 or CISPI 301.
 - 2. Sovent Stack fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.
 - 3. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
 - 4. CISPI, Hubless-Piping Couplings:
 - a. Standards: ASTM C 1277 and CISPI 310.
 - b. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices: and ASTM C 564, rubber sleeve with integral, center pipe stop.
 - 5. Cast-Iron, Hubless-Piping Couplings:
 - a. Standards: ASTM C 1277 and ASTM C 1540.
 - b. Description: Stanless-steel shield with stainless-steel bands and tightening devices: and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
 - a. Manufacturers:

- 1) Anvil International: www.anvilintl.com/#sle.
- 2) Apollo Valves: www.apollovalves.com/#sle.
- 3) Grinnell Products: www.grinnell.com/#sle.
- 4) Viega LLC: www.viega.us/#sle.

2.05 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 inch and Under:
 1. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 1. Dimensions and Testing: In accordance with AWWA C606.
 2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- C. No-Hub Couplings:
 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 2. Gasket Material: Neoprene complying with ASTM C564.
 3. Band Material: Stainless steel.
 4. Eyelet Material: Stainless steel.
- D. Grooved and Shouldered Pipe End Couplings:
 1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 2. Sealing gasket: "C" shape composition sealing gasket.

2.06 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
 1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
- C. Plumbing Piping - Water:
 1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.

2.07 BALL VALVES

- A. Manufacturers:
 1. Tyco Flow Control: www.tycoflowcontrol.com.
 2. Apollo Valves: www.apollovalves.com.
 3. Nibco, Inc: www.nibco.com/#sle.
 4. Uponor, Inc: www.uponorengineering.com/#sle.
 5. Viega LLC: www.viega.us/#sle.

6. Stockham: www.stockham.com

- B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.
- C. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

2.08 PRESSURE RELIEF VALVES

- A. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

2.09 STRAINERS

- A. Size 2 inch and Smaller:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- B. Size 2-1/2 inch to 4 inch:
 - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Shut-off valves shall be provided on all main branches, runs to risers and where shown on drawings. Locate shut-off valves over T-Bar Ceiling when possible. Provide access panels when shut-off valves are located over hard lid ceilings.
- I. Provide access where valves and fittings are not exposed.
- J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Color to be specified by architect.
- K. Exposed, unfinished pipe, fittings, supports, and accessories shall be painted.

- L. Exterior piping, fittings, supports and accessories shall have approved UV protection
- M. Install valves with stems upright or horizontal, not inverted. See Section 220523.
- N. Provide stem extension on all valves for piping requiring insulation to ensure valve can be cycled without damaging pipe insulation.
- O. Install water piping to ASME B31.9.
- P. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- Q. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

3.04 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install globe valves for throttling, bypass, or manual flow control services.
- E. Provide spring-loaded check valves on discharge of water pumps.
- F. Provide flow controls in water recirculating systems where indicated.

3.05 FIELD TESTS AND INSPECTIONS

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B. Domestic Water Systems:
 - 1. Perform hydrostatic testing for leakage prior to system disinfection.
 - 2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
 - 3. General:
 - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.
- C. Gas Distribution Systems:
 - 1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
 - 2. General Systems:
 - a. Inject a minimum of 10 psi of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
 - b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound.
 - 3. Welded Pipes or Systems with Service Pressures Above 14 in-wc:
 - a. Inject a minimum of 60 psi of compressed air into the piping system for a duration of 30 minutes and verify with a gauge that no perceptible pressure drop is measured.
 - b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound with 1 psi increments.

- D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with local jurisdiction. Potable water systems shall be disinfected and flushed prior to use by water-chlorination solution and have bacteriological examination made by an approved agency per 2019 California Plumbing Code section 609.9 and as prescribed in AWWA C651. Methods of cleaning / disinfecting for new or repair piping as described in C651 or NFPA 24.
- B. Prior to starting work, verify system is complete, flushed, and clean.

3.07 INSTALLATION OF FLOW CONTROL VALVES

- A. Install automatic flow control valve in each hot water recirculating loop, and elsewhere as indicated. Install a shutoff valve and strainer upstream and a union, check valve and shutoff valve downstream of each automatic flow control valve.
- B. Set flow control valve flow rate as follows:
1. Preliminary Procedures For Hot Water Return System Balancing:
 - a. Before operating the system perform these steps:
 - 1) Open Valves at recirculation pump and flow control valves to full open position.
 - 2) Remove and clean all strainers.
 - 3) Check recirculation pump rotation.
 - 4) Set water heater temperature as indicated on the drawings.
 2. Procedures For Hot Water Return System Balancing:
 - a. Refer to the drawings for required flow rate for each flow control valve.
 - b. Provide required instrumentation to obtain proper measurements. Instruments shall be properly maintained and protected against damage.
 - c. Apply instrument as recommended by the manufacturer.
 - d. Take readings with the eye at the level of the indicated valve to prevent parallax.
 - e. Mark flow control valve setting with memory stop. Mark with paint or other suitable, permanent identification materials.
 - f. Retest, adjust, and balance systems subsequent to significant systems modifications, and resubmit test results.
- C. Reports: Prepare hot water return system balancing reports signed and submit to the architect upon completion of the project. Include the following information:
1. Valve tag number and description of location
 2. Valve body size
 3. Differential pressure reading from instrument in psi
 4. Actual flow rate derived from the manufacturer's charts and tablets for the valve size and measured differential pressure.

3.08 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
 2. Provide 18 gauge, 0.0478-inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

END OF SECTION

SECTION 221006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Washing machine outlet boxes.
- E. Ice maker outlet boxes.
- F. Backwater valves.
- G. Backflow preventers.
- H. Double check valve assemblies.
- I. Water hammer arrestors.
- J. Trap Primer
- K. Sanitary waste interceptors.
- L. Mixing valves.
- M. Exterior penetration accessories.
- N. Fire-rated enclosures.
- O. Flexible connectors.

1.02 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor Drains; 2022.
- B. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2022.
- C. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.
- D. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2021.
- E. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies; 2021.
- F. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies; 2021.
- G. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.
- H. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- I. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- J. PDI-WH 201 - Water Hammer Arresters; 2017.

1.03 SUBMITTALS

- A. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Certificates: Certify that grease interceptors meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.
- B. Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations. Replace all damaged or defective items.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Josam Company: www.josam.com.
 - 2. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 - 3. Zurn Industries, LLC: www.zurn.com.
 - 4. Mifab: www.mifab.com
- B. Drain Assemblies
 - 1. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.
- C. Floor Drain:
 - 1. Standard: ASME A112.6.3.
 - 2. Description: Lacquered cast iron two piece body with double drainage flange, invertible non-puncturing flashing collar with weep holes and threaded to receive adjustable strainer.
 - 3. Body: Lacquered cast iron with sump.
 - 4. Outlet: Bottom no-hub outlet, reefer to plans for size.
 - 5. Trap primer connection: 1/2 inch.
 - 6. Strainer: Round adjustable nickel-bronze.
- D. Shower Drain Round:
 - 1. Standard: ASME A112.6.3.
 - 2. Description: Lacquered cast iron two piece body with double drainage flange, invertibel non-puncturing flashing collar with weep holes and threaded to receive adjustable strainer.
 - 3. Body: Lacquered cast iron with sump.
 - 4. Outlet: Bottom no-hub outlet, refer to plans for size.
 - 5. Strainer: Round adjustable nickel-bronze.
- E. Shower Drain Linear:
 - 1. Standard: ASME A112.6.3.
 - 2. Description: Fabricated stainless steel 3-1/2inch wide plus flange, with anchor tabs and leveling feet, and brushed finish perforated grate.
 - 3. Body: Stainless steel type 304.
 - 4. Outlet: Bottom no-hub outlet, refer to plans for size.
- F. Trench Drain:
 - 1. Standard: ASME A112.6.3
 - 2. Description: Trench drain system assembled from factory fabricated, standard lengths and variable depths, with integral joint flanges and integral grating support rails; includes joint gaskets and grating. End outlets, bottom outlets, end caps, and corner / T-connectors.
 - 3. Body: Sheet molding compound / glass reinforced polyester.
 - 4. Outlet: Bottom no-hub outlet, refer to plans for size.

5. Trap Primer: 1/2 inch connection.
 6. Load Class: Class C, heavy duty.
 7. Grate: Heel-proof perforated grate.
- G. Floor Sink:
1. Standard: ASME A112.6.7
 2. Description: Cast iron 8 inch square, 6 inch deep flanged receptor with seepage holes, loose set acid resistant coated cast iron grate.
 3. Body: Cast iron with acid-resistant coated interior.
 4. Outlet: Bottom no-hub, refer to drawings for size.
 5. Strainer: Aluminum dome.
 6. Trap Primer: 1/2 inch connection.
 7. Grate Coverage Area: Half grate
- H. Floor Sink:
1. Standard: ASME A112.6.7.
 2. Description: Cast iron 16 inch square, 12 inch deep flanged receptor with seepage holes, loose set acid resistant coated cast iron grate.
 3. Body: Cast iron with acid-resistant coated interior.
 4. Outlet: Bottom no-hub, refer to drawings for size.
 5. Strainer: Aluminum dome.
 6. Trap primer: 1/2 inch connection.
 7. Grate Coverage Area: Half grate.
- I. Planter Drains:
1. Standard: ASME A112.6.4.
 2. Description: Planter drain with coated cast iron drain assemblies, perforated PVC standpipe and stainless steel mesh covered domes.
 3. Body: Coated cast iron
 4. Drain Receiver: Under deck camp, stainless steel mesh covered cast iron dome, clamp collar with gravel guard.
 5. Outlet: Bottom no-hub outlet, refer to plans for size.

2.03 CLEANOUTS

- A. Cast-Iron Cleanout
1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 - b. Josam Company: www.josam.com.
 - c. Zurn Industries, LLC: www.zurn.com.
 - d. Mifab: www.mifab.com
 2. Standard: ASME A 112.36.2M.
 3. Size: Same as connected drainage piping
 4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping
 5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 6. Frame and Cover: Round, stainless steel

2.04 HOSE BIBBS

- A. Manufacturers:
1. Woodford: www.woodfordmfg.com.
 2. Zurn Industries, LLC: www.zurn.com.
 3. Mifab: www.mifab.com
- B. Exposed Hose Bibbs:
1. Standard: ASME A112.18.1.

2. Description: Wall mounted hose bibb with integral mounting flange, chrome plated with metal handwheel, and operating tee key.
 3. Body Material: Bronze with chrome finish
 4. Supply Connections: 3/4 inch.
 5. Vacuum Breaker: Integral, non-removable, hose-connection vacuum breaker complying with ASSE 1011.
- C. Recessed Hose Bibbs:
1. Standard: ASME A112.18.1.
 2. Description: Wall mounted hose bibb with lockable recessed box, chrome plated with metal hand wheel and operating tee key.
 3. Body Material: Bronze with chrome finish
 4. Supply Connections: 3/4 inch.
 5. Vacuum Breaker: Integral, non-removable, hose-connection vacuum breaker complying with ASSE 1011.
 6. Recessed Box: Brass or chrome lockable box.
- D. Roof Hose Bibbs:
1. Standard: ASME A112.18.1.
 2. Description: Roof mounted hose bibb, chrome plated with metal hand wheel and operating tee key.
 3. Body Material: Bronze with chrome finish.
 4. Supply connections: 3/4 inch.
 5. Vacuum Breaker: Integral, non-removable, hose-connection vacuum breaker complying with ASSE 1011.
- E. Hot and Cold Hose Bibbs:
1. Standard: ASME A112.18.1.
 2. Description: Wall mounted hose bibb with integral mounting flange, with dual metal hand wheels and operating tee keys.
 3. Body Material: Bronze with chrome finish.
 4. Supply Connections: 3/4 inch hot, 3/4 inch cold.
 5. Vacuum Breaker: Integral, non-removable, hose-connection vacuum breaker complying with ASSE 1011.
 6. Recessed Box: Brass or chrome lockable box.

2.05 WASHING MACHINE OUTLET BOXES

- A. Manufacturers:
1. IPS Corporation/Water-Tite: www.ipscorp.com.
 2. Oatey Supply Chain Services, Inc: www.oatey.com.
 3. Viega LLC: www.viega.us.
- B. Washing Machine Box:
1. Mounting: Recessed
 2. Material and Finish: PVC box and faceplate.
 3. Faucet: Separate hot water and cold water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets. Provide water hammer arrestors on all supply connections.
 4. Supply Shutoff Fittings: 1/2 inch quarter turn ball valves and 1/2 inch copper waer tubing.
 5. Drain: 2 inch standpipe and P-trap for direct waste connection to drainage piping.
- C. Fire Rated Washing Machine Box:
1. Mounting: Recessed
 2. Material and Finish: PVC box with UL classified firewrap insulation and faceplate.

3. Faucet: Separate hot water and cold water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets. Provide water hammer arrestors on all supply connections.
4. Supply Shutoff Fittings: 1/2 inch quarter turn ball valves and 1/2 inch copper water tubing.
5. Drain: 2 inch standpipe and P-trap for direct waste connection to drainage piping.
6. Fire Rating: 2-hour

2.06 ICE MAKER OUTLET BOXES

- A. Box Manufacturers:
 1. IPS Corporation/Water-Tite: www.ipscorp.com.
 2. Oatey Supply Chain Services, Inc: www.oatey.com.
 3. Viega LLC: www.viega.us.
- B. Manufacturers:
 1. IPS Corporation/Water-Tite: www.ipscorp.com.
 2. Viega LLC: www.viega.us.
 3. Zurn Industries, LLC: www.zurn.com.
- C. Refrigerator Valve and Recessed Box:
 1. Standards: NSF 61 section 9.
 2. Mounting: Recessed
 3. Description: Plastic preformed rough-in box with faceplate cover.
 4. Faucet: Valved fitting complying with ASME A112.18.1. Include 1/2 inch or smaller copper tube outlet.
 5. Supply Shutoff Fitting: 1/2 inch quarter turn brass ball valve.
- D. Fire Rated Refrigerator Valve and Recessed Box:
 1. Standards: ASTM E814
 2. Mounting: Recessed
 3. Description: Caulk molded compound (BMC) thermoset fire-rated plastic, UL classified fire wrap insulation material, adjustable galvanized steel mounting bracket, and faceplate cover.
 4. Faucet: Valved fitting complying with ASME A112.18.1. Include 1/2 inch or smaller copper tube outlet.
 5. Supply Shutoff Fitting: 1/2 inch quarter turn brass ball valve.

2.07 BACKWATER VALVES

- A. Manufacturers:
 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 2. Josam Company: www.josam.com.
 3. Zurn Industries, LLC: www.zurn.com.
- B. Cast Iron Back Water Valve:
 1. Standard: ASME A112.14.1
 2. Size: same as connected piping.
 3. Body Material: Cast iron.
 4. Cover: Cast iron with threaded access check valve.
 5. End Connections: No hub.
 6. Check Valve: Removable, bronze, swing check, factory assembled.
 7. Extension: ASTM A74, Service class; full-sized, cast-iron soil-pipe extension to field-installed cleanout at floor, replaces backwater valve cover.

2.08 BACKFLOW PREVENTERS

- A. Manufacturers:
 1. Conbraco Industries, Inc: www.apollovalves.com.

2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
 3. Zurn Industries, LLC: www.zurn.com.
- B. Reduced Pressure Backflow Preventer Assembly:
1. Standard: ASSE 1013.
 2. Operation: Continuous pressure applications.
 3. Pressure Loss: 13 psi maximum, through middle third of flow range.
 4. Size: Refer to plans.
 5. Body: 2 inches and smaller bronze body assembly, 2-1/2 inches and larger a stainless steel body. All sizes with corrosion resistant internal parts and stainless steel springs.
 6. End Connections: Threaded full port ball valves for 2 inches and smaller, flanged gate valves for 2-1/2 inches and larger.
 7. Size: assembly with threaded gate valves.
 8. Accessories:
 - a. Valves 2 inches and smaller: Ball type with threaded ends on inlet and outlet.
 - b. Valves 2-1/2 inches and larger: Outside screw and yoke-gate type with flanged ends on inlet and outlet.
 - c. Air gap fitting, lead-free Y-strainer, and test cocks.

2.09 DOUBLE CHECK-VALVE ASSEMBLIES

- A. Manufacturers:
1. Apollo Valves: www.apollovalves.com.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
 3. Zurn Industries, LLC: www.zurn.com.
- B. Double Check Valve Assembly:
1. ASSE 1012; cast bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.
 2. Size: 3/4 to 2 inch, NPS assembly with threaded full port ball valves.
- C. Double Check Valve Assembly:
1. Standard: ASSE 1015 and NSF 61.
 2. Operation: Continuous pressure applications unless otherwise indicated.
 3. Size: Refer to plans.
 4. Body: 2 inches and smaller bronze body assembly, 2-1/2 inches and larger a stainless steel body. All sizes with corrosion resistant internal parts and stainless steel springs.
 5. End Connections: Threaded full port ball valves for 2 inches and smaller, flanged gate valves for 2-1/2 inches and larger.
 6. Size: assembly with threaded full port ball valves.
 7. Accessories:
 - a. Valves 2 inches and smaller: Ball type with threaded ends on inlet and outlet.
 - b. Valves 2-1/2 inches and larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.10 WATER HAMMER ARRESTORS

- A. Manufacturers:
1. Precision Plumbing Products: www.pppinc.com.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
 3. Mifab: www.mifab.com
- B. Water Hammer Arrestors:
1. Standard: ASSE 1010
 2. Type: Copper tube with piston.
 3. Temperature Range: 33 degrees F to 200 degrees F

4. Systems exceeding 80 PSI shall have a pressure reducing valve installed upstream of the water hammer arrestor units.
5. All concealed water hammer arresters shall be accessible by means of access door or removable panel.
6. Vertical capped pipe columns will not be permitted.

2.11 TRAP PRIMERS

- A. Manufacturers:
 1. Precision Plumbing Products: www.pppinc.com.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
 3. Mifab: www.mifab.com
- B. Pressure Drop Trap Primer
 1. Description: Fully automatic, no adjustment required, activates on 3 PSI pressure differential.
 2. Standard: ASSE 1018.
 3. Pressure Rating: 125 psig minimum.
 4. Body: Bronze.
 5. Cabinet: All concealed trap primers shall be accessible by means of access door or removable panel. Recessed-mounted steel box with stainless-steel cover.
 6. Inlet and Outlet Connection: 1/2 inch threaded or solder joint.
 7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- C. Electronic Trap Primer
 1. Description: Electronic Trap Primer floor drain trap priming device consisting of a solenoid valve, bronze air gap fitting, 3-prong cord, and timer factory set to discharge once every 24 hour period. Add EMS to interface with the facility's energy management system as required. Conforms to UL and CSA Standards. Installed to manufacturer's recommendations.
 2. Standard: ASSE 1044.
 3. Cabinet: All concealed trap primers shall be accessible by means of access door or removable panel. Recessed -mounted steel box with stainless-steel cover.
 4. Inlet and Outlet size: 1/2 inch threaded or solder joint.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for prodding of drainage system.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- E. Pipe relief from backflow preventer to nearest drain.
- F. Install water hammer arrestors complete with accessible isolation valve on supply piping.

END OF SECTION

SECTION 224000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush valve water closets.
- B. Wall hung urinals.
- C. Lavatories.
- D. Sinks.
- E. Under-lavatory pipe supply covers.
- F. Bathtubs and showers.
- G. Showers.
- H. Indoor drinking fountains.
- I. Service sinks.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI Z124.2 - American National Standard for Plastic Shower Units; 1995.
- C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- E. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).
- F. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures; The American Society of Mechanical Engineers; 2008 (R2011).
- G. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2024.
- H. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
- I. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.
- J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- M. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- N. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.03 SUBMITTALS

- A. Product Data: Provide catalog illustrations of fixtures, sizes, flow rate, rough-in dimensions, utility sizes, trim, and finishes.
- B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.04 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. Service Support: The equipment shall be supported by service organizations. These service organizations shall be reasonably convenient to the equipment installation and able to render

satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage. Replace any damaged or defective items.
- 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

2.01 GENERAL REQUIREMENTS

- 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.
- B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 1. Bowl: ASME A112.19.2; 16.5 inches high for ADA compliant water closet, and 15 inches high for standard height water close, and with elongated rim.
 - 2. Flush Volume: 1.28 gallon per flush, maximum.
 - 3. Flush Valve: Exposed (top spud).
 - 4. Flush Operation: Sensor hard wired.
 - 5. Handle height: 44 inches or less. Mounted height of flush valve shall not interfere with the hand rail in the ADA stalls.
 - 6. Color: White.
 - 7. Operating Pressure: Minimum 35 psi
 - 8. Provide: Wax bowl ring including plastic sleeve.
 - 9. Water closet must be Water Sense certified.
 - 10. Manufacturers:
 - a. American Standard Inc: www.americanstandard.com
 - b. Sloan Valve Company: www.sloanvalve.com.
 - c. Kohler Company: www.kohler.com.
 - d. Toto USA: www.totousa.com
- B. Flush Valves:
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com.
 - b. Sloan Valve Company: www.sloanvalve.com.
 - c. Zurn Industries, Inc: www.zurn.com.
 - 2. Manual Operated:
 - a. Type: ASME A112.18.1 or ASME A112.19.5; diaphragm type complete with vacuum breaker stops, cover, tailpiece, and accessories.
 - b. Supplied Volume Capacity: 1.28 gal/flush.
 - c. Finish: Polished Chrome
 - 3. Sensor-Operated:
 - a. Mechanism: Electronic motor-actuated operator with hardwired powered with 120 volt transformer infrared sensor, and mechanical over-ride or over-ride push button.
 - b. Supplied Volume Capacity: 1.28 gal/flush.
 - c. Finish: Polished Chrome
 - d. Style: Exposed

- C. Toilet Seats:
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com.
 - b. Bemis Manufacturing Company: www.bemismfg.com.
 - c. Church Seat Company: www.churchseats.com.
 - d. Olsonite: www.olsonite.com.
 - e. Substitutions: See Section 016000 - Product Requirements.
 - 2. Standard: IAPMO/ANSI Z124.5.
 - 3. Material: Solid plastic, antimicrobial.
 - 4. Type: Commercial with extended back.
 - 5. Shape: Elongated rim, open front.
 - 6. Hinge: Self-sustaining hinge.
 - 7. Hinge Material: Noncorroding metal.
 - 8. Seat Cover: Not required.
 - 9. Color: White.
- D. Water Closet Carriers:
 - 1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com.
 - b. JOSAM Company: www.josam.com.
 - c. Zurn Industries, Inc: www.zurn.com.
 - d. Substitutions: See Section 016000 - Product Requirements.
 - 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.

2.03 WALL HUNG URINALS

- A. Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com.
 - 2. Kohler Company: www.kohler.com.
 - 3. Toto: www.totousa.com.
- B. Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
 - 1. Consumption Volume: 0.125 gal per flush, maximum.
 - 2. Flush Style: Washout.
 - 3. Flush Valve: Exposed (top spud).
 - 4. Flush Operation: Sensor operated.
 - 5. Trapway Outlet: Integral.
 - 6. Removable stainless steel strainer.
- C. Flush Valves:
- D. Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com.
 - 2. Sloan Valve Company: www.sloanvalve.com.
 - 3. Zurn Industries, Inc: www.zurn.com.
 - 4. Sensor-Operated:
 - a. Type: ASME A112.19.5; chloramine-resistant, clog-resistant dual-seat diaphragm valve with vacuum breaker, stops and accessories.
 - b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered infrared sensor, and mechanical override or override push button.
 - c. Supplied Volume Capacity: 0.125 gal per flush.
- E. Urinal Carriers:
 - 1. Manufacturers:

- a. Jay R. Smith MFG. Co: www.jrsmith.com.
 - b. JOSAM Company: www.josam.com.
 - c. Zurn Industries, LLC: www.zurn.com.
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.

2.04 LAVATORIES

- A. Manufacturers:
 1. American Standard Inc.: www.americanstandard.com
 2. Kohler Company: www.kohler.com
- B. Wall-Hung Basin:
 1. Vitreous China, Grade A: ASME A112.19.2; white, rectangular commercial-grade sink with predrilled holes, rear-center drain, front overflow, and hanger. Size as indicated on drawings with 4-inch center set spacing.
 2. Carrier:
 - a. 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.
 - b. Manufacturers:
 - 1) Jay R. Smith MFG. Co: www.jrsmith.com.
 - 2) JOSAM Company: www.josam.com.
 - 3) Zurn Industries, LLC: www.zurn.com.
- C. Vitreous China Counter Top Basin:
 1. ASME A112.19.2; vitreous china self-rimming counter top lavatory, size as indicated on drawings with drillings on 4 inch centers, front overflow, seal of putty, calking, or concealed vinyl gasket.
- D. Supply Faucet Manufacturers:
 1. Chicago Faucets, a Geberit company: www.chicagofaucets.com.
 2. Kohler Company: www.kohler.com.
 3. Sloan: www.sloan.com
- E. Metered Faucet:
 1. ASME A112.18.1 chrome plated metered mixing faucet with self-closing, auto-timed metering cartridge, adjustable run time from 2 to 15 seconds, opens with push, 0.20 max gallons per cycle, and cover plate, open grid strainer.
 2. Spout Style: Standard.
 3. Mixing Valve: None, single line for tempered water.
 4. Water Supply: 3/8 inch compression connections.
 5. Aerator: Vandal resistant, 0.5 gpm, non-aerating spray.
- F. Manual Faucet:
 1. ASME A112.18.1; chrome plated, combination supply fitting with open grid strainer, with single lever handle.
 2. Spout Style: Standard.
 3. Mixing Valve: External lever operated.
 4. Water Supply: 3/8 inch compression connections.
 5. Aerator: Vandal resistant, 0.5 gpm, non-aerating spray.
- G. Sensor Operated Faucet:
 1. Spout Style: Standard.
 2. Power Supply:
 - a. Wireless:
 - 1) Battery: Replaceable alkaline or lithium type with 200,000 cycles, minimum.

- 2) Low Battery Warning: Provide red or yellow colored indicator to light periodically at 30 days of remaining capacity and continuously 2 weeks prior to get fully discharged.
 3. Mixing Valve: Internal, automatic.
 4. Water Supply: 3/8 inch compression connections.
 5. Automatic Shut-off: 10 seconds.
 6. Finish: Polished chrome.
- H. Thermostatic Mixing Valve:
1. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.
- I. Accessories:
1. Chrome-plated 17 gauge, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.

2.05 SINKS

- A. Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com.
 2. Kohler Company: www.kohler.com.
 3. Elkay: www.elkay.com.
- B. Single Compartment Bowl:
1. ASME A112.19.3; 25 x 22 x 7 11/16 in outside dimensions, 19 gage thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
 - a. Drain: 1-1/2 inch chromed brass drain.
- C. Double Compartment Bowl:
1. ASME A112.19.3; 33 x 22 x 8 3/16 inch outside dimensions, 19 gage thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
 - a. Drain: 1-1/2 inch chromed brass drain.
- D. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.06 UNDER-LAVATORY PIPE SUPPLY COVERS

- A. Manufacturers:
1. Plumberex Specialty Products, Inc: www.plumberex.com.
 2. Truebro: www.truebro.com
 3. Substitutions: See Section 016000 - Product Requirements.
- B. General:
1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
 2. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
 - a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
 - b. Comply with ICC A117.1.
 3. Color: High gloss white.
 4. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.07 SHOWERS

- A. Trim:
1. ASME A112.18.1; concealed shower supply with pressure balanced mixing valves, integral service stops, bent shower arm with adjustable spray ball joint shower head with maximum 1.5 flow, and escutcheon.
- B. Low-Flow Shower Head:

1. ASME A112.18.1; chrome-plated vandal-proof institutional head with integral wall bracket, built-in 1.5 gpm flow control.
2. ASME A112.18.1; chrome plated vandal-proof institutional head with integral wall bracket, built-in 1.5 gpm flow control.

2.08 SERVICE SINKS

- A. Manufacturers:
 1. American Standard, Inc: www.americanstandard-us.com.
 2. Elkay Manufacturing Company: www.elkay.com.
 3. Just Manufacturing Company: www.justmfg.com.
- B. Bowl: 36 by 24 by 10 inches high, white molded stone, floor mounted, with 1-inch wide shoulders, vinyl bumper guard, stainless steel strainer.
- C. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
- D. Accessories:
 1. Hose clamp hanger.
 2. Mop hanger.

2.09 EMERGENCY EYE WASH

- A. Manufacturers:
 1. Haws Corporation: www.hawsco.com.
 2. Bradley www.bradleycorp.com.
- B. Emergency Wash: ANSI Z358.1; counter top, self-cleaning, non-clogging eye wash with quick opening, full-flow valves, stainless steel eye wash receptor, twin eye wash heads and face spray ring, stainless steel dust cover, copper alloy control valve and fittings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key or integral stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 230010
BASIC MECHANICAL REQUIREMENTS

PART 1. GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor

1.02 DESCRIPTION

- A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 WORK INCLUDED

- A. The complete Heating, Ventilating and Air Conditioning (HVAC) systems, including but not limited to these major items.
 - 1. Coordinate work of this Section with related trades.
 - 2. Verify applicable dimensions and locations of existing utilities, fans, and thermostats at the jobsite.
 - 3. Duct systems; supply, return and exhaust complete with fire dampers, combination fire-smoke dampers, and manual dampers.
 - 4. Diffusers and registers.
 - 5. Exhaust supply, return fans and air curtains.
 - 6. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
 - 7. Duct lining and insulation.
 - 8. Shop drawings.
 - 9. Equipment identification.
 - 10. Equipment and systems adjustments and balancing.
 - 11. Air, water and gas systems testing, adjusting and balancing.
 - 12. Written operating and maintenance instructions.
 - 13. Record drawings.
 - 14. Guarantee

1.04 WORK SPECIFIED ELSEWHERE

- A. Concrete, Rough Carpentry, Joint Sealants, Sheet Metal, Flashing and Trim, Access Door and Frames, Acoustical Ceiling Tile, Door Hardware, Paints and Coatings, Plumbing and Electrical.

1.05 SITE INSPECTION

- A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.06 ORDINANCES, REGULATIONS AND CODES

- A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
 - 1. AFI - Air Filter Institute
 - 2. AMCA - Air Moving & Conditioning Association
 - 3. ARI - Air Conditioning & Refrigeration Institute
 - 4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
 - 5. ASME - American Society of Mechanical Engineers

6. ASTM - American Society of Testing Materials
 7. AWSC - American Welding Society Code
 8. ANSI - American National Standards Institute
 9. CBC - California Building Code
 10. CCR - California Code of Regulations
 11. CEC - California Electrical Code
 12. CFC - California Fire Codes
 13. CMC - California Mechanical Code
 14. CPC - California Plumbing Code
 15. FIA - Factory Insurance Association
 16. NAFM - National Association of Fan Manufacturers
 17. NEMA - National Electrical Manufacturer's Association
 18. NFPA - National Fire Protection Association
 19. ORS - Office of Regulatory Services
 20. SCAQMD - South Coast Air Quality Management District
 21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 22. UFC - Uniform Fire Code
 23. UL - Underwriter's Laboratories
 24. UPC - Uniform Plumbing Code
- B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.
- C. Codes and Standards:
1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
 2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
 3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
 4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
 5. National Fire Protection Associations - National Fire Code.
- D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.
- E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.
- F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.07 PERMITS, FEES AND INSPECTIONS

- A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.08 DRAWINGS AND SPECIFICATIONS

- A. The Architect's decision will be final on interpretation of the Drawings and Specifications.
- B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.
- C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.

- D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.
- E. Alternate support or seismic detail proposed by contractor shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.09 SUBMITTALS

- A. Before starting work, the Contractor shall furnish for the approval of the Architect, Shop Drawings and Submittals with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.
- B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.
- C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified
- D. Submittals shall include, but not necessarily be limited to the following which are mandatory:
 - 1. Draw Equipment Layouts to 1/4" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
 - 2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
 - 3. Specialties, valves, gauges and thermometers of all types.
 - 4. Foundations, supports, hangers, inserts.
 - 5. Earthquake supports and calculations.
 - 6. Insulation.
 - 7. Ventilation and air conditioning equipment, specialties and the air control systems.
 - 8. Fans, fan characteristic curves, fan tests.
 - 9. Dampers, louvers, grilles, registers, diffusers.
 - 10. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
 - 11. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
 - 12. Automatic control system diagrams.
 - 13. Exhaust, supply and return fans.
 - 14. Access panels.
 - 15. Hangers, inserts, supports, anchors.
 - 16. Pipe, fittings and specialties.
 - 17. Pipe isolators.
 - 18. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
 - 19. Expansion joints, guides and anchors.
 - 20. Shop fabrications drawings and calculations.
 - 21. Special and miscellaneous products furnished under this section and not listed herein.

1.10 RECORD DRAWINGS AND MANUALS

- A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.
- B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

- C. Final Record Drawings: Conform to Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor requirements.
- D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.
- E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.
- F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.
- G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:
 - 1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
 - 2. Specifications
 - 3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
 - 4. Grouting requirements.
 - 5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
 - 6. Start-up and beginning operation procedures.
 - 7. Operational procedures.
 - 8. Shutdown procedures.
 - 9. Maintenance and calibration procedures
 - 10. Parts lists
 - 11. Name, address and telephone number of each manufacturer's local representative.
- H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.
- I. "As-Built" drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.11 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

- A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.12 SEISMIC DESIGN

- A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be

designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:

1. In accordance with Title 24, 2019 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
2. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2019 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.13 SUBSTITUTIONS AND CHANGES

- A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.
- B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.
- C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.
- D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.
- E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor.

1.14 SUBMITTAL REVIEWS

- A. The Architect and / or Engineer will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.15 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

- A. Immediately after award of the Contract and after the final review of submittals by the Architect and / or Engineer, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time to meet the construction schedule. The contractor shall deliver to the Architect and Owner a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.16 LOCATIONS AND ACCESSIBILITY

- A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.
- B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.
- C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring

reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.

- D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.
- E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.
- F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.
- G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.17 COORDINATION OF TRADES

- A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.
- B. No extras will be allowed for changes made necessary by interference or coordination between trades.
- C. Submit Composite Coordination Drawings in accordance with Submittal Procedures. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Coordination Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor. Do not start installation of work involved under Composite Coordination Drawings until the Architect reviews applicable submittal. Discrepancies between the Drawings and Composite Coordination Drawings shall be specifically noted and identified on the Composite Coordination Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Coordination Drawings.
 - 1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation subbase and support.
 - 2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
 - 3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
 - 4. Concrete: Conform to Concrete Section of the Specifications.

1.18 GUARANTEES

- A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.
- B. Guarantee included in this section to cover:
 - 1. Faulty or inadequate design of equipment or material installed
 - 2. Improper assembly or erection
 - 3. Defective workmanship or material

- 4. Incorrect or inadequate operation or other failure
- C. The contractor shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise
- D. Furnish the parts and labor to replace any items found to be defective in the mechanical equipment with the guarantee period.
- E. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.
- F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty and proof of shipment date or purchase date per terms of warranty to the Owner, who shall be named as beneficiary.

1.19 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.20 CLOSING-IN OF UNINSPECTED WORK

- A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, he shall at his own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.21 BUILDING FOOTING CLEARANCES

- A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.22 DAMAGE BY LEAKS

- A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.23 EQUIPMENT LABELS

- A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.24 PRELIMINARY OPERATION

- A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.25 ELECTRICAL WORK

- A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.
- B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.

- C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.
- D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.
- E. All interconnecting power wiring and conduits shall be provided by Division 26.
- F. Control wiring shall be provided by Division 23, unless otherwise indicated on the drawings.
- G. Conduit for control wiring shall be provided by Division 26.

END OF SECTION

SECTION 230130.51

HVAC AIR-DISTRIBUTION SYSTEM CLEANING

PART 2 PRODUCTS

1.01 TOOLS AND EQUIPMENT

- A. Vacuum Devices and Other Tools: Exceptionally clean, in good working order, and sealed when brought into the facility.
- B. Vacuum Devices That Exhaust Air Inside Building, Including Hand-Held and Wet Vacuums: Equipped with HEPA filtration with 99.97 percent collection efficiency for minimum 0.3-micron size particles and DOP test number.
- C. Vacuum Devices That Exhaust Air Outside Building, Including Truck- and Trailer-Mounted Types: Equipped with particulate collection including adequate filtration to contain debris removed from the HVAC system; exhausted in manner that prevents contaminant re-entry to building; compliant with applicable regulations as to outdoor environmental contamination.

END OF SECTION

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
 - 1. General duty valves common to most mechanical piping systems.
 - 2. Special purpose valves are specified in individual piping system specifications.
- B. General requirements.
- C. Globe valves.
- D. Ball valves.
- E. Butterfly valves.
- F. Check valves.
- G. Gate valves.
- H. Chainwheels.

1.02 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene diene monomer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.

1.03 SUBMITTALS

- A. Submit in accordance with conditions of Contract and in addition to Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, pressure and temperature classifications, valve design, body material, seating materials, trim material, dimensions, clearances, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
- E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1.04 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from a single manufacturer.

2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
 3. Subject to compliance requirements, provide products from one of the manufacturers listed in Valve Schedule in Part 3.
- B. Valves shall be certified to meet the specified ASTM, ASME, ANSI, and MSS standards in Part 2 Products, and as follows:
1. ASME B31.9 for building services piping.
 2. ASME B31.1 for power piping.
- C. Welding Materials and Procedures: Conform to .

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 2. Protect valve parts exposed to piped medium against rust and corrosion.
 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 5. Secure check valves in either the closed position or open position.
 6. Adjust butterfly valves to closed or partially closed position.
- B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
 3. Store valves off the ground in watertight enclosures when indoor storage is not an option.
- C. Exercise the following precautions for handling:
1. Avoid the use of operating handles or stems as rigging or lifting points.

PRODUCTS

2.01 APPLICATIONS

- A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- B. Provide the following valves for the applications if not indicated on drawings:

2.02 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of the manufacturers listed in the Valve Schedule in Part 3.

2.03 APPLICATIONS

- A. Provide the following valves for the applications if not indicated on Drawings:
1. Throttling (Hydronic): Butterfly, Ball, and Globe.
 2. Isolation (Hydronic): Butterfly, Gate, Ball, and Globe.
 3. Dead-End: Butterfly and Ball.
- B. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- C. Required Valve End Connections for Non-Wafer Types:
1. Steel Pipe:
 - a. 2 NPS and Smaller: Threaded ends.
 - b. 2-1/2 NPS and Larger: Grooved or flanged ends.
 2. Copper Tube:
 - a. 2 NPS and Smaller: Threaded or solder-joint valve ends.

- 1) Exception: Solder ends not acceptable for hot water or steam pipe.
3. 2-1/2 NPS and Larger: Grooved or flanged ends.
- D. Heating Hot Water Valves:
 1. 2 NPS and Smaller:
 - a. Minimum Class: 125.
 - b. Body: Bronze.
 - c. Allowable Valve Types:
 - 1) Ball: Two piece.
 - 2) Lift check.
 - 3) Swing check.
 - 4) Wafer plate-type check.
 - 5) Gate.
 - 6) Globe.
 2. 2-1/2 NPS and Larger:
 - a. Minimum Class: 125.
 - b. Body: Cast iron, except as noted below.
 - c. Allowable Valve Types:
 - d. Ball: 2-1/2 inch to 3 inch: Three piece, bronze, carbon steel, or stainless steel body.
 - e. Butterfly: Ductile iron body.
 - f. Lift check.
 - g. Swing check.
 - h. Wafer plate-type check.
 - i. Gate.
 - j. Globe.

2.04 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Stem Design:
 1. Rising stem or rising outside screw and yoke stems.
 2. Non-rising stem valves may be used on water systems where headroom prevents full extension of rising stems.
- D. Valve Actuator Types:
 1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
 2. Handwheels: Valves other than quarter-turn types.
 3. Hand Lever: Quarter-turn valves 6 NPS and smaller, vinyl-covered.
 4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
- E. Valves in Insulated Piping: Provide stem extensions so valve operator extends a minimum of 1/2 inches outside of the insulation and the following features:
 1. Gate Valves: Rising stem.
 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 3. Butterfly Valves: Extended neck.
 4. Memory Stops: Fully adjustable after insulation is installed.
- F. Valve-End Connections:
 1. Threaded End Valves: ASME B1.20.1.
 2. Flanges: ASME B16.1 for cast iron.

3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5 for steel, ASME B16.24 for bronze.
 4. Solder Joint Connections: ANSI B16.18.
 5. Grooved End Connections: AWWA C606.
- G. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 2. Power Piping Valves: ASME B31.1.
 3. Building Services Piping Valves: ASME B31.9.
- H. Bronze Valves:
1. Fabricate from dezincification resistant material.
 2. Copper alloys containing more than 15 percent zinc are not permitted.
- I. Valve Bypass and Drain Connections: MSS SP-45.
- J. Source Limitations: Obtain each valve type from a single manufacturer.

2.05 BRONZE GLOBE VALVES

- A. Class 125, 200 psig CWP:
1. Comply with MSS SP-80, Type 2, nonmetallic disc to metal seat.
 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
 3. Ends: Threaded or solder joint.
 4. Stem and Disc: Bronze stem, PTFE disc.
 5. Packing: Asbestos free, brass gland.
 6. Operator: Malleable iron handwheel.
- B. IRON GLOBE VALVES
1. Class 125, 200 psig CWP and Class 250, 500 psig CWP:
 2. Comply with MSS SP-85, Type 1.
 3. Body: Gray iron; ASTM A126, with bolted bonnet.
 4. Ends: Grooved or flanged.
 5. Trim: Bronze.
 6. Packing and Gasket: Asbestos free, two-piece backing gland assembly.
 7. Operator: Handwheel or chainwheel.

2.06 BRONZE BALL VALVES

- A. Two Piece, Class 150, for valves 2 inch and smaller:
1. Comply with MSS SP-110.
 2. CWP Rating: 600 psi.
 3. Body: Bronze, ASTM B584.
 4. Trim: Bronze.
 5. Ends: Threaded or solder joint.
 6. Seats and Seals: PTFE.
 7. Stem: Blowout-proof.
 8. Ball: Full port, ASTM A276 Type 316 stainless steel.
 9. Operator: Vinyl-covered steel handle.
- B. Three Piece, Class 150, for valves 2-1/2 inch to 3 inch:
1. Comply with MSS SP-110.
 2. SWP Rating: 150 psig.
 3. CWP Rating: 600 psig.
 4. Body: Bronze, ASTM B584.
 5. Trim: Bronze.
 6. Ends: Threaded or solder joint.
 7. Seats and Seals: PTFE.

8. Stem: Blowout-proof.
 9. Ball: Full port, ASTM A276 Type 316 stainless steel.
 10. Operator: Vinyl-covered steel handle.
- C. BRONZE LIFT CHECK VALVES
1. Class 150:
 2. Comply with MSS SP-80, Type 2, Nonmetallic Disc to Metal Seat.
 3. CWP Rating: 200 psig.
 4. Design: Horizontal or angle pattern, capable of being refitted and ground while valve remains in the line.
 5. Body: Bronze, ASTM B62.
 6. Ends: Threaded.
 7. Spring: Stainless steel.
 8. Disc: PTFE.
- D. BRONZE SWING CHECK VALVES
1. Class 125:
 2. Comply with MSS SP-80, Type 3.
 3. CWP Rating: 200 psig.
 4. Design: Horizontal swing, Y-pattern, capable of being refitted and ground while valve remains in the line.
 5. Body: Bronze, ASTM B62.
 6. Ends: Threaded or solder joint.
 7. Disc: PTFE.
- E. BRONZE GATE VALVES
1. Class 125:
 2. Comply with MSS SP-80, Type I.
 3. CWP Rating: 200 psig.
 4. Body: Bronze, ASTM B62 with integral seat and screwed bonnet.
 5. Trim: Bronze.
 6. Ends: Threaded or solder joint.
 7. Stem: Bronze, RS type. NRS type where exceptions apply.
 8. Disc: Solid wedge; bronze.
 9. Packing: Asbestos free, brass.
 10. Operator: Malleable iron handwheel.

PART 3 PRODUCTS

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. If valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Locate valves for easy access. Provide access doors and fire rated access doors as required.
- C. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

- D. Install shut-off duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
- E. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.
- F. Install three-valve bypass around each pressure reducing valve using throttling-type valves.
- G. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- H. Install valves in a position to allow full stem movement.
- I. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- J. Valves with soldered end connections:
 - 1. Use solder with a melting point as follows:
 - a. Below 840 degrees F for gate, globe, and check valves.
 - b. Below 421 degrees F for ball valves.
- K. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.
 - 3. Orient plate-type into horizontal or vertical position, between flanges.
- L. Provide chainwheels on operators for valves 2-1/2 NPS and larger where located 72 inches or more above finished floor in mechanical rooms, terminating 60 inches above finished floor.

3.03 FIELD QUALITY CONTROL

- A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leak; replace valves if leak persists.

3.04 ADJUSTING AND CLEANING

- A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.
- B. Inspect valves for leaks after piping systems have been tested and put into service, but before final adjusting and balancing. Adjust or replace packing, as required, on valves with leaks. Replace valve if leak persists.

3.05 VALVE SCHEDULE

- A. Bronze Globe Valves, Class 125:

MANUFACTURER	THREADED NRS	THREADED RS	SOLDER RS
Apollo	--	120T	120S
Crane	--	5TF	--
Hammond	--	--	--
Jenkins	--	--	--
Milwaukee	--	--	--
Nibco	--	T-211-Y	S-211-Y
Stockham	B-13T	--	B-14T

- B. Bronze Ball Valves – 2 inch and smaller, Class 150:

- 1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

<u>MANUFACTURER</u>	<u>THREADED ENDS</u>	<u>SOLDER ENDS</u>

Apollo	77C-100	77C-200
Bray	S51	--
Hammond	8301A	8311A
Milwaukee	BA-400	BA-450
Nibco	T-585-70	S-585-70
Watts	LFB6080G2	LFB6081G2

C. Bronze Ball Valves - 2-1/2 inch to 3 inch, Class 150:

1. Model for chrome plated brass ball indicated. Furnish SS ball if specified in Part 2.

<u>MANUFACTURER</u>	<u>THREADED ENDS</u>	<u>SOLDER ENDS</u>

Apollo	82-100	82-200
Bray	5000/6000	--
Hammond	8604	8614
Milwaukee	BA-300	BA-350
Nibco	T-595-Y	S-595-Y

D. Bronze Lift Check Valves, Class 150:

<u>MANUFACTURER</u>	<u>HORIZONTAL</u>

Crane	27TF

E. Bronze Swing Check Valves:

<u>MANUFACTURER</u>	<u>CLASS 125</u>	<u>CLASS 125</u>
	<u>THREADED</u>	<u>SOLDER</u>

Apollo	163T	163S
Crane	41TF	--
Hammond	IB940	--
Jenkins	4037J	--
Milwaukee	509-T	1509-T
Nibco	T-413-Y	S-413-Y
Powell	578	--
Stockham	B-320-T	B-310-T

END OF SECTION

SECTION 230529
HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following hangers and supports for mechanical system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe stands.
 - 7. Pipe positioning systems.
 - 8. Equipment supports.
- B. Related Sections include the following:
 - 1. Division 05 for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Division 21 Section "Fire-Suppression Piping" for pipe hangers for fire-protection piping.
 - 3. Division 23 Section "Mechanical Vibration and Seismic Controls" for vibration isolation devices.
 - 4. Division 23 Section "Pipe Expansion Fittings and Loops" for flexible pipe.
 - 5. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.02 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.03 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
 - 3. Powder-actuated fastener systems. Not allowed for this project.
 - 4. Pipe positioning systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Pipe stands. Include Product Data for components.
 - 4. Equipment supports.
- C. Welding and brazing certificates.

1.05 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." ASME Boiler and Pressure Vessel Code: Section IX.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: ANSI/MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.
- C. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

- A. Description: ANSI/MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.04 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.05 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig-minimum, compressive-strength insulation inserts encased in sheet metal shield.
- B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.
- C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.06 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Before Installation: Verify suitability for use in lightweight concrete or concrete slabs less than 4 inches thick with project structural engineer.

2.07 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
 1. Submit: Calculations and details of each pipe stand unit.
 2. Available Manufacturer: MIRO Industries.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.
- D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 1. Base: Stainless steel.
 2. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 3. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
- E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 1. Available Manufacturer: Portable Pipe Hangers.
 2. Bases: One or more plastic.
 3. Vertical Members: Two or more protective-coated-steel channels.
 4. Horizontal Member: Protective-coated-steel channel.
 5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
- F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.08 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
- B. Available Manufacturer: HOLDRITE Corp.; Hubbard Enterprises.

2.09 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes or struts.

2.10 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Non-staining, non-corrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

- B. Comply with ANSI/MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for bare piping for noise abatement.
- F. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members notching. Provide such members with reinforcement steel straps of Kees Protecta-Plate or equal.
- G. For fastening to wood rafters and beams, or joists, furnish Grinnell figure 128 or 202 or equal pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2 inch x 2 inch x 1/4 inch angle clips 3 inches long, with 2 staggered 10d nails, clinched over joist.
- H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 and larger, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated stationary pipes, NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 9. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 2.
 - 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 8.
 - 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 and larger.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 - 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
- I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, if longer ends are required for riser clamps.
- J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 2. Side-Beam Brackets (MSS Type 34): For sides of wooden beams.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- N. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- P. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
1. Each trapeze pipe hanger requires submittal of calculations and details.
 2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 3. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

1. Each metal framing system requires submittal of calculations and details.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Stand Installation:
 1. Each pipe stand in requires submittal of calculations and details.
 2. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 3. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 for curbs specifications.
- G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.
- H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
 1. Each equipment support requires submittal of calculations and details.
- J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Install lateral bracing with pipe hangers and supports to prevent swaying.
- L. Install building attachments. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping.
- M. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- O. Insulated Piping: Comply with the following:
 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

- d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
- 5. Pipes NPS 8 and Larger: Include wood inserts.
- 6. Insert Material: Length at least as long as protective shield.
- 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.04 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedure for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.06 PAINTING

- A. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements 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.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Piping: Tags.
- C. Thermostats: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC; www.advancedgraphicengraving.com/#sle.
 - 2. Brimar Industries, Inc; www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
 - 5. Letter Color: White.
 - 6. Letter Height: 1/4 inch.
 - 7. Background Color: Black.
 - 8. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving; www.advancedgraphicengraving.com/#sle.
 - 2. Brady Corporation; www.bradycorp.com/#sle.
 - 3. Brimar Industries, Inc; www.pipemarker.com/#sle.
 - 4. Craftmark Pipe Markers; www.craftmarkid.com/#sle.
 - 5. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation;: www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc;: www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers;: www.craftmarkid.com/#sle.
 - 4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com/#sle.
- B. Color: Comply with ASME A13.1.
- C. 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.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- E. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
 - 2. Compressed Air: Blue with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 099123 for stencil painting.

3.02 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 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Identify piping, concealed or exposed, with stenciled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet 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.
- G. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic systems.
- C. Measurement of final operating condition of HVAC systems.
- D. Commissioning activities.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
- C. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2023.

1.03 SUBMITTALS

- A. The contractor shall procure the services of an independent Air Balance and Testing Agency, approved by the Engineer, which specializes in the balancing and testing of heating, ventilating, and air conditioning systems. The independent agency shall be certified and in good standing with the AABC.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Architect.
 - 2. Submit to the Commissioning Authority.
 - 3. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 4. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with Architect and other installers to sufficiently understand the design intent for each system.
 - 5. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Identification and types of measurement instruments to be used and their most recent calibration date.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Expected problems and solutions, etc.
 - g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - h. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.

- i. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - j. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - k. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - l. Method of checking building static and exhaust fan and/or relief damper capacity.
 - m. Time schedule for deferred or seasonal TAB work, if specified.
 - n. False loading of systems to complete TAB work, if specified.
 - o. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - p. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - q. Procedures for formal progress reports, including scope and frequency.
 - r. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Field Logs: Submit at least twice a week to the Commissioning Authority.
- E. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- F. Progress Reports.
- G. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit to the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 6. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 7. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
 - 4. Maintain at least one copy of the standard to be used at project site at all times.

- B. A minimum of two air balance test shall be completed for the project. One shall be completed prior to any demolition is made to test existing systems in scope of work. Second test shall begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Certified by the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.

- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner and / or project inspector.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- 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.
- 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 extend 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. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.02 inches negative static pressure in chemical storage rooms.
- M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.07 COMMISSIONING

- A. Perform prerequisites prior to starting commissioning activities.
- B. Include cost for commissioning requirements in the contract price.
- C. Attend commissioning meetings scheduled by the CxA when requested. TAB will need to be present 2 weeks prior to the start of TAB to review the TAB plan/procedures and weekly/bi-weekly during the on-site TAB work.
- D. Submit the TAB plan/procedures to the CxA for review at least two weeks prior to beginning TAB work.
- E. Notify the CxA a minimum of two weeks in advance of scheduled TAB work.
- F. Where applicable, complete the Certificate(s) of Acceptance per the contract documents.
 - 1. Retain Certificate(s) of Acceptance in a 3-ring binder in an organized fashion. Binder is to remain on the job site
 - 2. Provide copies of all Certificate(s) of Acceptance to the CxA.
 - 3. Certificate(s) of Acceptance shall be conducted by companies who are certified as a Mechanical Acceptance Test Technician employer and only completed by those employees of said company who are certified to complete the respective acceptance test.
- G. Monitor and respond to Resolution Tracking Forms distributed by the CxA in order to expedite corrective actions necessary to achieve design intent.
- H. Participate in the Functional Performance Tests as required to achieve design intent.
- I. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.
- J. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for ____ percent of the air handlers plus a random sample equivalent to ____ percent of the final TAB report data as directed by Commissioning Authority.
 - 1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
 - 2. Use the same test instruments as used in the original TAB work.
 - 3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
 - 4. For purposes of re-check, failure is defined as follows:
 - a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
 - b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
 - c. Temperatures: Deviation of more than one degree F.
 - d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.

- e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
- 5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.
- K. In the presence of the Commissioning Authority, verify that:
 - 1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
 - 2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
 - 3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

3.08 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Plumbing Pumps.
 - 2. HVAC Pumps.
 - 3. Forced Air Furnaces.
 - 4. Air Cooled Water Chillers.
 - 5. Centrifugal Water Chillers.
 - 6. Induced Draft Cooling Tower.
 - 7. Blow Through Cooling Tower.
 - 8. Air Cooled Refrigerant Condensers.
 - 9. Packaged Roof Top Heating/Cooling Units.
 - 10. Packaged Terminal Air Conditioning Units.
 - 11. Unit Air Conditioners.
 - 12. Computer Room Air Conditioning Units.
 - 13. Air Handling Units.
 - 14. Fans.
 - 15. Air Filters.
 - 16. Air Terminal Units.
 - 17. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:

1. Identification/location.
 2. Required driven RPM.
 3. Driven sheave, diameter and RPM.
 4. Belt, size and quantity.
 5. Motor sheave diameter and RPM.
 6. Center to center distance, maximum, minimum, and actual.
- C. Pumps:
1. Identification/number.
 2. Manufacturer.
 3. Size/model.
 4. Impeller.
 5. Service.
 6. Design flow rate, pressure drop, BHP.
 7. Actual flow rate, pressure drop, BHP.
 8. Discharge pressure.
 9. Suction pressure.
 10. Total operating head pressure.
 11. Shut off, discharge and suction pressures.
 12. Shut off, total head pressure.
- D. Combustion Equipment:
1. Boiler manufacturer.
 2. Model number.
 3. Serial number.
 4. Firing rate.
 5. Overfire draft.
 6. Gas pressure at meter outlet.
 7. Gas flow rate.
 8. Heat input.
 9. Burner manifold gas pressure.
 10. Percent carbon monoxide (CO).
 11. Percent carbon dioxide (CO₂).
 12. Percent oxygen (O₂).
 13. Percent excess air.
 14. Flue gas temperature at outlet.
 15. Ambient temperature.
 16. Net stack temperature.
 17. Percent stack loss.
 18. Percent combustion efficiency.
 19. Heat output.
- E. Air Cooled Condensers:
1. Identification/number.
 2. Location.
 3. Manufacturer.
 4. Model number.
 5. Serial number.
 6. Entering DB air temperature, design and actual.
 7. Leaving DB air temperature, design and actual.
 8. Number of compressors.
- F. Chillers:
1. Identification/number.

2. Manufacturer.
 3. Capacity.
 4. Model number.
 5. Serial number.
 6. Evaporator entering water temperature, design and actual.
 7. Evaporator leaving water temperature, design and actual.
 8. Evaporator pressure drop, design and actual.
 9. Evaporator water flow rate, design and actual.
 10. Condenser entering water temperature, design and actual.
 11. Condenser pressure drop, design and actual.
 12. Condenser water flow rate, design and actual.
- G. Cooling Tower:
1. Tower identification/number.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Rated capacity.
 6. Entering air WB temperature, specified and actual.
 7. Leaving air WB temperature, specified and actual.
 8. Ambient air DB temperature.
 9. Condenser water entering temperature.
 10. Condenser water leaving temperature.
 11. Condenser water flow rate.
 12. Fan RPM.
- H. Cooling Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Entering air DB temperature, design and actual.
 7. Entering air WB temperature, design and actual.
 8. Leaving air DB temperature, design and actual.
 9. Leaving air WB temperature, design and actual.
 10. Water flow, design and actual.
 11. Water pressure drop, design and actual.
 12. Entering water temperature, design and actual.
 13. Leaving water temperature, design and actual.
- I. Heating Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Water flow, design and actual.
 7. Water pressure drop, design and actual.
 8. Entering water temperature, design and actual.
 9. Leaving water temperature, design and actual.
 10. Entering air temperature, design and actual.
 11. Leaving air temperature, design and actual.

12. Air pressure drop, design and actual.
- J. Return Air/Outside Air:
1. Identification/location.
 2. Design air flow.
 3. Actual air flow.
 4. Design return air flow.
 5. Actual return air flow.
 6. Design outside air flow.
 7. Actual outside air flow.
 8. Return air temperature.
 9. Outside air temperature.
 10. Required mixed air temperature.
 11. Actual mixed air temperature.
 12. Design outside/return air ratio.
 13. Actual outside/return air ratio.
- K. Exhaust Fans:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Air flow, specified and actual.
 6. Total static pressure (total external), specified and actual.
 7. Inlet pressure.
 8. Discharge pressure.
 9. Sheave Make/Size/Bore.
 10. Number of Belts/Make/Size.
 11. Fan RPM.
- L. Duct Traverses:
1. System zone/branch.
 2. Duct size.
 3. Area.
 4. Design velocity.
 5. Design air flow.
 6. Test velocity.
 7. Test air flow.
 8. Duct static pressure.
 9. Air temperature.
 10. Air correction factor.
- M. Flow Measuring Stations:
1. Identification/number.
 2. Location.
 3. Size.
 4. Manufacturer.
 5. Model number.
 6. Serial number.
 7. Design Flow rate.
 8. Actual/final pressure drop.
 9. Actual/final flow rate.
 10. Station calibrated setting.
- N. Terminal Unit Data:

1. Manufacturer.
 2. Type, constant, variable, single, dual duct.
 3. Identification/number.
 4. Location.
 5. Model number.
 6. Size.
 7. Minimum static pressure.
 8. Minimum design air flow.
 9. Maximum design air flow.
 10. Maximum actual air flow.
 11. Inlet static pressure.
- O. Air Distribution Tests:
1. Air terminal number.
 2. Room number/location.
 3. Terminal type.
 4. Terminal size.
 5. Area factor.
 6. Design velocity.
 7. Design air flow.
 8. Test (final) velocity.
 9. Test (final) air flow.
 10. Percent of design air flow.

END OF SECTION

SECTION 230713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.

1.02 RELATED REQUIREMENTS

- A. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Knauf Insulation: www.knaufinsulation.com.
 - 2. Johns Manville: www.jm.com.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com.
- B. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.

2.03 DUCT LINER

- A. Manufacturers:
 - 1. Knauf Insulation: www.knaufinsulation.com.
 - 2. Johns Manville: www.jm.com.
- B. Note: Choose the liner type - Elastomeric Foam, Glass Fiber, or Phenolic Foam.
- C. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer or acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
 - 1. Apparent Thermal Conductivity: Maximum of .24 at 75 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Finish with tape and vapor barrier jacket.
 - 2. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
- D. Insulated Ducts Conveying Air Above Ambient Temperature:
- E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with calked aluminum jacket with seams located on bottom side of horizontal duct section.
- F. External Duct Insulation Application:
 - 1. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 2. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
- G. Duct and Plenum Liner Application:
 - 1. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 2. Seal and smooth joints. Seal and coat transverse joints.
 - 3. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.03 R-VALUE FOR INSULATION ON DUCTS SHALL BE PER TITLE-24 REQUIREMENTS

END OF SECTION

SECTION 230719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jacketing and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency. Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

2.02 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

2.03 SEALANTS

- A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.
- B. Joint Sealants:
 - 1. Permanently flexible, elastomeric sealant.
 - a. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
 - b. Color: White or gray.
- C. Metal Jacket Flashing Sealants:
 - 1. Fire- and water-resistant, flexible, elastomeric sealant.
 - 2. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
 - 3. Color: Aluminum.

2.04 TAPE

- A. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - 1. Width: 2 inches (50 mm)
 - 2. Adhesion: 100 ounces force/inch (1.1N/mm)
 - 3. Elongation: 5
 - 4. Tensile Strength: 34 lbf/inch (6.2 N/mm)
 - 5. Thickness: 3.7 mils (0.093)

2.05 SECUREMENTS

- A. Bands:
 - 1. Stainless Steel: ASTM A240/A240M, Type 304; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with closed seal.
 - 2. Aluminum: ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with closed seal.
 - 3. Springs: Twin spring set constructed of stainless steel, with ends flat and slotted to accept metal bands. Spring size is determined by manufacturer for application.

2.06 GLASS FIBER, RIGID

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Johns Manville Corporation: www.jm.com.
 - 3. Knauf Insulation: www.knaufinsulation.com.
 - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.

2.07 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Armacell LLC: www.armacell.us.
 - 2. K-Flex USA LLC; K-Flex Titan: www.kflexusa.com.
 - 3. BFG Industries: www.bfg.com.
 - 4. Rubatex: www.rbxcorp.com.

- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.

2.08 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.
- B. Metal Jacket:
 - 1. Aluminum Jacket: Comply with ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - 2. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - a. Thickness: 0.016 inch sheet.
 - b. Finish: Smooth.
 - c. Joining: Longitudinal slip joints and 2 inch laps.
 - d. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - e. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Install insulation continuously through hangers and around anchor attachments.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.
- L. Install multiple layers of insulation with longitudinal and end seams staggered.
- M. Exposed Piping: Locate insulation and cover seams in least visible locations.
- N. Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

- O. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- P. Install insulation on piping accessories requiring future re-occurring access and service with factory fabricated insulation covers that are easily removed and reapplied.
- Q. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- R. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- S. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- T. Insulation Installation at Roof and exterior wall penetrations continuously through penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof or exterior wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof or exterior wall flashing at least 2 inches (50 mm) below top of roof or wall flashing.
 - 4. Seal jacket to roof or wall flashing with flashing sealant.
- U. Insulation Installation at Underground Exterior Wall Penetrations. Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- V. In fire rated and non-fire rated installation install insulation continuously through walls, floors, and partitions.
- W. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- X. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV-resistant finish for flexible elastomeric cellular insulation without jacketing.

END OF SECTION

SECTION 230913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compressed-Air Stations:
- B. Control panels.
- C. Damper Operators:
- D. Wall-, Surface-, and Duct-Mounted Sensors:
 - 1. Static air pressure sensors.
- E. Thermostats:
 - 1. Electric thermostats.
 - 2. Room-mount thermostat accessories.
- F. Pipe-Mounted Sensors and Transmitters:

1.02 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
- B. NEMA BS 31032 - Residential Controls—Electrical Wall-Mounted Room Thermostats; 2025.

1.03 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- C. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Automated Logic.

2.02 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.03 CONTROL PANELS

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

2.04 DAMPER OPERATORS

- A. General:
 - 1. Provide actuators with torque capacity sized for minimum of 20 percent greater than maximum design stream velocity and hold tight seal against maximum system pressures.
 - 2. Provide spring return for two position control and for fail safe operation.
 - 3. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
 - 4. Provide one operator for maximum 36 sq ft damper section.
 - 5. See Section 253513 for field-mount damper actuators and operators.

2.05 WALL-, SURFACE-, AND DUCT-MOUNT SENSORS

A. Temperature Sensors

1. Use thermistor, RTD, or thermocouple type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
 2. Temperature Sensing Device: Compatible with project DDC controllers.
 3. Performance Characteristics:
 - a. RTD:
 - 1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
 - 2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
 - 3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
 - 4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
 - 5) Range: Minus 40 degrees F through 220 degrees F minimum.
 - b. Thermistor:
 - 1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
 - 2) Range: Minus 25 degrees F through 122 degrees F minimum.
 - 3) Heat Dissipation Constant: 2.7 mW per degree C.
 - c. Temperature Transmitter:
 - 1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
 - d. Wire Resistance:
 - 1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
 - e. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
 - f. Temperature Averaging Elements:
 - 1) Use on duct sensors for ductwork 10 sq ft or larger.
 - g. Insertion Elements:
 - 1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
 - 2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.
- B. Static-Air Pressure Sensors:
1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
 2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
 3. Accuracy: One percent of full scale with repeatability 0.3 percent.
 4. Output: 0 to 5 vdc with power at 12 to 28 vdc.

2.06 THERMOSTATS

A. Electric Thermostats:

1. Type: NEMA BS 31032, 24 volts, with setback/setup temperature control.
2. Service: Cooling only.
3. Covers: Locking with set point adjustment, with thermometer.

B. Room-Mounted Thermostat Accessories:

1. Thermostat Covers: Brushed aluminum.
2. Insulating Bases: For thermostats located on exterior walls.
3. Aspirating Boxes: Where indicated for thermostats requiring flush installation.

C. Airstream Thermostats:

1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.

2.07 PIPE-MOUNTED SENSORS AND TRANSMITTERS

1. Self-contained transducer for monitoring of pneumatic, gas, liquid, or steam service with proportional range scaled over selected electronic output.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that systems are ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.
- C. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- D. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- E. Ensure installation of components is complementary to installation of similar components.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats; see Section 262726.
- C. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors.
- D. Mount control panels adjacent to associated equipment on vibration free walls or free-standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- E. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.03 SCHEDULES

- A. Control Valve Schedule
 1. Valve Size
 2. Valve CV
 3. Normal Position
- B. Control Damper Schedule
 1. Drawing Code
 2. Height
 3. Width
 4. Airflow
 5. Air Pressure Drop

END OF SECTION

SECTION 230923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. iBMS: Intelligent-building management system.
- B. BMS: Building management system.
- C. _WS: System workstations and servers.
- D. NSC: Network server controllers.
- E. SDCU: Connected room solutions.
- F. SDCU: BACnet IP controllers.
- G. SDCU: BACnet MS/TP controllers.
- H. Room controllers / thermostats.
- I. I/O: Input-output devices.

1.02 RELATED REQUIREMENTS

- A. Section 220519 - Meters and Gauges for Plumbing Piping.
- B. Section 230519 - Meters and Gauges for HVAC Piping.
- C. Section 230593 - Testing, Adjusting, and Balancing for HVAC.
- D. Section 230800 - Commissioning of HVAC.
- E. Section 230913 - Instrumentation and Control Devices for HVAC - Schneider Electric.
- F. Section 250190 - Diagnostic System for Integrated Automation.
- G. Section 250500 - Common Work Results for Integrated Automation.
- H. Section 250800 - Commissioning of Integrated Automation.

1.03 ABBREVIATIONS AND ACRONYMS

- A. Standard:
 - 1. ASHRAE: American Society Heating, Refrigeration, Air Conditioning Engineers.
 - 2. AHU: Air Handling Unit.
 - 3. BAS: Building Automation System for HVAC, same as BMS.
 - 4. BMS: Building Management System for HVAC, same as BAS.
 - 5. Cx: Commissioning.
 - 6. CxA: Commissioning Agent.
 - 7. DDC: Direct Digital Controller.
 - 8. EIA: Electronic Industries Alliance.
 - 9. FIP: Field Interface Panel.
 - 10. GUI: Graphical User Interface.
 - 11. HMI: Human-Machine Interface, hardware- or software-based interface.
 - 12. HVAC: Heating, Ventilation, and Air Conditioning.
 - 13. iBMS: Intelligent Building Management System or BMS for facility services.
 - 14. IEEE: Institute Electrical Electronic Engineers.
 - 15. MER: Mechanical Equipment Room.
 - 16. PID: Proportional, Integral, and Derivative.
 - 17. VAV: Variable Air Volume Box.
- B. Communications and Protocols:
 - 1. ARP: Address Resolution Protocol.

2. BACnet: Building Automation and Control Networks.
 3. CORBA: Common Object Request Broker Architecture.
 4. CSMA/CD: Carrier Sense Multiple Access/Collision Detect.
 5. DALI: Digital Addressable Lighting Interface.
 6. DDE: Dynamic Data Exchange.
 7. FTP: File Transfer Protocol.
 8. FTT: Free Topology Transceivers.
 9. HTTP: Hyper Text Transfer Protocol.
 10. IIOP: Internet Inter-ORB Protocol.
 11. IP: Internet Protocol.
 12. LAN: Local Area Network.
 13. LON: Echelon Communication – Local Operating Network.
 14. MS/TP: Master Slave Token Passing.
 15. OBIX: Open Building Information Exchange.
 16. ODBC: Open Database Connectivity.
 17. ORB: Object Request Broker.
 18. SNVT: Standard Network Variables Types.
 19. SQL: Structured Query Language.
 20. UDP: User Datagram Protocol.
 21. XML: eXtensible Markup Language.
- C. BMS Controllers:
1. NSC: Network or Supervisory Controller(s).
 2. Server(s) loaded with BMS specific software.
 3. OWS: Workstation(s) loaded with BMS specific software.
 4. EWS: Administration and Programming (Engineering) Workstations.
- D. DDC Types:
1. ASD: Application Specific Device.
 2. AAC: Advanced Application Controller.
 3. ASC: Application Specific Controller.
 4. CAC: Custom Application Controller.
 5. CR: Analog or Digital Chart Recorders.
 6. DCU: Distributed Control Unit.
 7. HRC: Hotel Room Controller.
 8. LCM: Local Control Module.
 9. MC: MicroControllers.
 10. MPC: Multipurpose Controller.
 11. NSC: Network Server Controller.
 12. PEM: Package Equipment Module.
 13. PPC: Programmable Process Controller.
 14. RC: Room controller.
 15. RPC: Room Purpose Controller.
 16. SDCU: Standalone Digital Control Units or DDCs.
 17. SLC: Supervisory Logic Controller.
 18. UEC: Unitary Equipment Controller.
 19. VAVDDC: Variable Air Volume Direct Digital Controller.
- E. Tools and Software:
1. AFDD: Automated Fault Detection and Diagnostic.
 2. APEO: Automated Predictive Energy Optimization.
 3. DR: Demand Response.
 4. CCDT: Configuration, Commissioning and Diagnostic Tool.

5. BPES: BACnet Portable Engineering Station.
6. LPES: LON Portable Engineering Station.
7. POT: Portable Operator's Terminal.
8. PEMS: Power and Energy Management Software.
9. MTBF: Mean Time Between Failure.

1.04 REFERENCE STANDARDS

- A. 21 CFR 11 - Part 11, Electronic Records; Electronic Signatures — Scope and Application; Current Edition.
- B. 47 CFR 15 - Radio Frequency Devices; current edition.
- C. 47 CFR 68 - Connection of Terminal Equipment to the Telephone Network; Current Edition .
- D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata and Amendments (2022).
- E. Bluetooth CS - Bluetooth Core Specification; 2016, Addendum 2017.
- F. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).
- G. IEC 62443-4-1 - Security for Industrial Automation and Control Systems – Part 4-1: Secure Product Development Lifecycle Requirements; 2018.
- H. IEEE 802.3 - IEEE Standard for Ethernet; 2022, with Amendments (2023).
- I. IEEE 802.11 - IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks--Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications; 2020 (Corrigendum 2022).
- J. IEEE 802.15.4 - IEEE Standard for Low-Rate Wireless Networks; 2020, with Corrigendum (2022).
- K. LonMark Interoperability Guide - LonMark Application-Layer Interoperability Guide and LonMark Layer 1-6 Interoperability Guide; Version 3.4; 2005.
- L. Modbus (PS) - The Modbus Organization Communications Protocol.; Latest Update.
- M. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- P. NFPA 92 - Standard for Smoke Control Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Q. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- R. UL 555C - Standard for Safety Ceiling Dampers; Current Edition, Including All Revisions.
- S. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.
- T. UL 864 - Control Units and Accessories for Fire Alarm Systems; Current Edition, Including All Revisions.
- U. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- V. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.

B. Prebid Submittals:

1. Provide for proposed substitute systems or products as specified; submit the data described in this article under the terms given for substitutions.
2. Include manufacturer profile with local installation and service organization.
3. Include description of how the system meets and achieves each specified criteria in terms of configuration, operation, and control.
4. Show system architecture with single line riser diagram showing each component required to meet scope including digital controllers, routers, hubs, and other related products.
5. Show proposed Cx procedure with time required to startup and commission each system.
6. Show proposed approach for project planning and management.
7. Provide duct data for each component, DDC panels, and each accessory listed according to this specification.
8. Provide examples of actual graphic-panel screens from other similar projects.
9. List number and types of DDC panels required for this installation.
10. List number and types of spare points provided with the proposed system.
11. Provide recommended spare parts list with respective price schedules.
12. List of two similar systems in size, point capacity, total installed value installed and commissioned by the local office including listed installers, manufacturers, design team members, and owners contact information for each project.
13. Provide service offerings samples including list of current similar service contracts with respective contact reference information.
14. List and resumes of management and employee teams who will be involved with project design, commissioning, project management, and after installation service. Include copies of manufacturer's certifications for proposed products per resume.
15. Provide reviewed copy of this specification having check marks to the left margin of each paragraph to signify that manufacturer's equipment and software fully conforms to specified requirements otherwise indicate in writing the reasons or limitations to meet intended requirement with proposed alternate.
16. Develop formal presentation concerning proposed system for potential meeting to formally complete the review process prior to make final decision.

C. Submittals:

1. Product Data:
 - a. Include manufacturer's data for hardware and software products required to complete specified work.
 - b. Develop and include schedules for valves, dampers, and air flow stations indicating location, size, configuration, capacity, and accessories.
2. Shop Drawings:
 - a. Develop drawings using Visio Professional or AutoCAD software and include pdf copies.
 - b. Include riser diagram depicting location of each controller, workstations, and associated network wiring.
 - c. Include individual schematics of each mechanical system showing each connected point with reference to their associated controller. Typical will be allowed where appropriate.
 - d. Include narrative descriptions of sequences of operation, program listings, point lists, and complete list with descriptions of graphic-panels, reports, alarms, and configuration work to be furnished as part of _WS software work.
3. Provide five hardbound copies using three ring binder with index and tabs. Include diagrams using folded 11 by 17 inch paper size. Make printed copies in color when color is used to differentiate information.
4. Provide soft-copy loaded on CD, DVD, thumb drive, or downloadable content-holding web page.

5. Once reviewed, returned hardbound or pdf submittal; copy may include review comments for corrections or requesting additional data required for approval. Address written comments and update content until document is fully approved. Once approved, work can begin.
6. Certificates:
 - a. Certify that products of this section meet or exceed specified requirements.
 - b. Reputable third party certification stating that supplier and vendor conformance with IEC 62443-4-1 Security Development Lifecycle process.
 - c. Certify that system supplier and installer were subject to regular and verifiable best practice Cybersecurity testing by manufacturer. Results of this testing will be made available upon request prior to system deployment.
7. Evaluation Service Reports: Show compliance with specified requirements.
8. Manufacturer's qualification statement.
9. Installer's qualification statement. Include specifics for fiber optic work.
- D. Maintenance contract.
- E. Executed warranty.
- F. Specimen warranty.
- G. Project Record Documents:
 1. Closeout Submittal:
 - a. System architecture drawing.
 - b. Layout drawing for each control panel.
 - c. Wiring diagram for individual components.
 - d. System flow diagram for each controlled system.
 - e. Instrumentation list for each controlled system.
 - f. Sequence of control.
 - g. Binding map.
 - h. BMS Schedule: IP and field level addresses with communication settings.
 - i. Operation and Maintenance Manuals.
 2. BMS-Specific References:
 - a. Product manuals for key software tasks.
 - b. Operating the system.
 - c. Adminstrating the system.
 - d. Engineering the OWS and EWS.
 - e. Application programming.
 - f. Engineering the network.
 - g. Setting up the web server.
 - h. Report creation.
 - i. Graphics creation.
 - j. All other engineering tasks.
 - k. System architecture diagram.
 - l. List of recommended maintenance tasks with description and frequency for associated system, data, and web servers, operator workstations, and web clients.
 - m. Product manual reference that includes task executing instructions.
 - n. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
 - o. Licenses, guarantees, and warranty documents for equipment and systems.
 3. Site-Specific Information:
 - a. System architecture diagram for components annotated with specific location information.
 - b. As-built drawing for each control panel.

- c. As-built wiring design diagram for each component.
 - d. Installation design details for each I/O device.
 - e. As-built system flow diagram for each system.
 - f. Sequence of control for each system.
 - g. Building binding map.
 - h. Product data sheet for each component.
 - i. Installation data sheet for each component.
- H. Software:
- 1. Provide copies of each loaded software with associated licensing documentation and support contact information. Indicate that licensing is in Owner's name for sign-off.
 - 2. Once signed, manufacturer's standard software and firmware licensing agreement grants unrestricted usage of the same including custom-developed programs and applications denoting manufacturer's right to disclose of trade secrets contained within source or applied software code.
 - 3. Licensing agreement will not preclude software use by third-party individuals for tasks related to commissioning, servicing, or future altering of installed-system configuration as long as licensed software products reside within Owner-controlled devices.
 - 4. Firmware Files: Submit copy of pre-installed or downloaded firmware files loaded on electronic-erasable memory of installed devices unless firmware is loaded on non-erasable chip requiring factory or field replacement(s).
 - 5. Project-developed software, files, and documentation is to become Owner's property. These include but are not limited to:
 - a. Server and workstation software.
 - b. Application programming tools and listing.
 - c. Configuration tools.
 - d. Network diagnostic tools.
 - e. Addressing tools.
 - f. Application files.
 - g. Configuration files.
 - h. Graphic files.
 - i. Report files.
 - j. Graphic symbol libraries.
 - k. Descriptive point lists.
 - l. Application program listing.
 - m. Application programs with comments.
 - n. Printouts of each report.
 - o. Alarm list.
 - p. Printouts of each graphic panel.
 - q. Commissioning and system startup reports.
 - r. Copy of each database, configuration file, or specific system file developed.
- I. Maintenance Materials:
- 1. See Section 016000 - Product Requirements for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- 1. Unlisted Manufacturers: Other manufacturers interested in participating as acceptable bidders for this project not listed as prequalified will furnish detailed technical prebid submittal with associated information to Architect at least two weeks prior to published bid date to allow adequate time to review bidder's credentials and capabilities.
- B. Installer Qualifications:

1. Provide proof of being listed as authorized distributor or branch office of specified manufacturer specializing in performing work of specified type and with at least three years of documented experience.
 2. Provide address of existing full service facility within 100 miles of the work site:
 - a. Staffed with engineers trained and certified by manufacturer for BMS configuration, programming, and service.
 - b. Staffed with technicians fully capable of providing instructions, maintenance, and emergency service on installed system components.
 3. Installers not listed as prequalified will submit credentials as detailed in prebid submittal for Architect review at least two weeks prior to bid date. Failure to follow attached formats will disqualify potential alternate bidders. Credentials must attest that installer meets specified requirements. Architect judgment regarding approval to bid as an acceptable installer after reviewing submitted data will be final.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.
- D. Documents at Project Site: Maintain one copy of manufacturer's instructions and shop drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Prior to delivery, ensure that suitable storage space is available to store products and materials in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, extreme humidity, and corrosive atmospheres within manufacturer-stated storage requirements.
- C. Deliver materials to project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified within Contract Documents.
- D. Store materials indoor in clean, dry space with uniform temperature to prevent condensation. In addition, protect electronics from electrical and magnetic energy emanations that could reasonably cause damage.
- E. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to the Architect.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 1-year manufacturer warranty for components, software, parts, and other furnished products. Complete forms in Owner's name and register with manufacturer.
- C. Installer Warranty:
 1. Provide 1-year warranty for furnished and installed products commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with installer.
 2. Act as manufacturer-agent to apply manufacturer warranty against defects in materials and workmanship for furnished products.
 3. Verify that corrective software modifications made during warranty period are updated on user documentation and both user and manufacturer archived software disks.
 4. Furnish labor to repair, reprogram, or replace these products and components at no extra charge during normal working hours within warranty period.
 5. Ensure that warranty service request response is issued within 24 business hours from initial request.

- D. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Automated Logic

2.02 HVAC CONTROL PROGRAMS

- A. General:
1. Support Inch-pounds units of measurement.
 2. Identify each HVAC Control system.
- B. Optimal Run Time:
1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
 2. Based on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
 3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
 4. Use outside air temperature to determine early shut down with ventilation override.
 5. Operator commands:
 - a. Define term schedule.
 - b. Define heating/cooling parameters.
 - c. Lock/unlock program.
 6. Control Summary:
 - a. HVAC Control system begin/end status.
 - b. Heating/cooling mode status.
 - c. Start/Stop times.
 7. Mass temperature summary:
 - a. Heating/cooling season limits.
 8. HVAC point summary:
 - a. Control system identifier and status.
 - b. Point ID and status.
 - c. Outside air temperature point ID and status.
 - d. Mass temperature point ID and point.
 - e. Period start.
- C. Supply Air Reset:
1. Monitor heating and cooling loads in building spaces, terminal VVT systems, and single zone unit discharge temperatures.
 2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
 - a. Raising cooling temperatures to highest possible value.
 - b. Reducing heating temperatures to lowest possible level.
 3. Operator commands:
 - a. Lock/unlock program.
 - b. Define space load and load parameters.
 - c. Request space load summary.
 4. Control summary:
 - a. HVAC control system status (begin/end).
 - b. Supply air reset system status.
 - c. Heating and cooling loop.
 - d. High/low limits.
 5. Space load summary:

- a. HVAC system status.
- b. Heating/cooling loop status.
- c. Current space load point value.
- d. Fan status point ID and status.
- e. Control discharge temperature point ID and status.

2.03 BMS: BUILDING MANAGEMENT SYSTEM

- A. All control products provided for this project shall comprise a BACnet internetwork. Communication involving control components (i.e., all types of controllers and Operator Workstations) shall conform to ANSI/ASHRAE Standard 135-2001, BACnet
- B. Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this section.
- C. The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, switches, and routers necessary for the internetwork. All communication components shall be UL 864 compliant.
- D. All controllers shall have a communication port for connections with the Operator Workstations using the BACnet Data Link/ Physical layer protocol.
- E. Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:
 - 1. Connection of an Operator Workstation device to any one controller on the internetwork will allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internetwork.
 - 2. All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internetwork. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internetwork value passing.
- F. The time clocks in all controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.
- G. The network shall have the following minimum capacity for future expansion:
 - 1. Each Building Controller shall have routing capacity for 99 controllers.
 - 2. The Building Controller network shall have capacity for 1,000 Building Controllers.
 - 3. The system shall have an overall capacity for 12,500 Building Controllers, Advanced Application Controller, and Application Specific Controller input/output objects.

2.04 NSC: NETWORK SERVER CONTROLLERS

- A. The BACnet NSCs will support BACnet SC node, hub and router functions as defined in the Annex AB of ASHRAE Std 135-2020.
- B. Provide sufficient number of NSCs to fully meet specified requirements with associated point list either attached or indicated on drawings.
- C. The NSC is defined as single device that combines network routing, control, and server functions.
- D. Provide each network server-controller factory tested with label showing it as certified by BACnet Testing Laboratory (BTL) as BACnet Building Controller (B-BC). Controllers that support lesser profiles such as B-SA are not acceptable.

- E. Network server-router-controller that will connect directly to workstation(s) over Ethernet at minimum speed of 100 Mbps and provide communication to SDCUs, and other I/O modules.
- F. Controllers that utilize RS-232 serial communications or ARCNET to communicate with OWS will not be accepted.
- G. Provide global supervisory control functions and common interface to linked fieldbus control devices and common LAN/WAN link.
- H. Capable of whitelisting IP addresses to restrict access to predefined list of hosts or devices.
- I. Capable of whitelisting file extensions for documents.
- J. Encrypted and authenticated communication configurable for non-open protocol communications using TLS 1.3.
- K. Support Simple Network Management Protocol version 3 (SNMPv3) for monitoring NSCs using Network Management Tool.
- L. Support remote system logging used by System Information and Event Monitoring (SIEM) software.
- M. Configured to monitor and control assigned HVAC equipment such as AHU(s) or boiler(s).
- N. Contain graphics, trends, trend charts, alarm views, and other similar presentation objects that can be served to OWS or WebStation (webOWs) interfaces.
- O. Capable of executing application control programs to provide:
 - 1. Calendar functions.
 - 2. Scheduling.
 - 3. Trending.
 - 4. Alarm monitoring and routing.
 - 5. Time synchronization by means of an Internet site including automatic synchronization.
 - 6. Native integration of LonWorks controller data and Modbus controller data or BACnet controller data and Modbus controller data.
 - 7. Network Management functions for LonWorks based devices.
- P. Hardware:
 - 1. Memory:
 - a. Store operating system, application programs, and other portions of configured database in non-volatile flash memory.
 - b. Contain enough memory for loaded applications, history logging, and minimum of 20 percent of selected size for additional free memory.
 - 2. Communication Ports:
 - a. Ethernet:
 - 1) Two 10/100 Mbps ports for communication with other devices and internet.
 - 2) Support active switch, IPv4 addressing, and BACnet/IP or Modbus TCP communication protocols.
 - 3) Port 1: Support static or DHCP client configuration to link other OWS or NSCs.
 - 4) Port 2:
 - (a) Support switch mode or DHCP server to set addressing of DHCP client devices. Port can be disabled.
 - (b) DHCP Server Mode:
 - (1) Support up to 50 BACnet/IP daisy chained SDCUs.
 - (2) Support up to 250 SDCUs when interconnected into five daisy chained sub networks using external switch.
 - (c) RSTP (Rapid Spanning Tree Protocol):
 - (1) Support up to 39 IP devices.

- (2) Support up to 234 SDCUs when interconnected into six sub networks using external managed switch.
 - (3) External switch to support IEEE 802.1W or IEEE 802.1Q-2014.
 - b. RS-485: Two port software configurable for BACnet/MSTP, Modbus RTU, or Modbus ASCII communication protocols.
 - c. TP/FT: One FFT-10 port for communication to LonWorks devices.
 - d. USB: Two ports, one for device and one for host.
 - 3. External Device or System Integration:
 - a. Integrate using device driver over controller port(s), DDC, or dedicated gateway.
 - b. Convert data from each respective source-generated communications protocol.
 - c. Field coordinate driver(s), data table(s), references, graphic panel(s), and related reference data required to complete intended integration.
 - 4. Footprint: Maximum of 3.94-W by 4.92-H by 2.95-D inch.
- Q. Controller Interconnectivity Requirements:
- 1. Support wired and wireless communication protocols as well as web protocols and services without needing to provide multiple NSCs nor additional software for support.
 - 2. BACnet SC: Comply with ASHRAE Std 135, support BACnet IP controller segments.
 - 3. BACnet IP: Interconnect over IP in compliance with ASHRAE Std 135.
 - 4. BACnet MS/TP:
 - a. Interconnect field devices using MS/TP in compliance with ASHRAE Std 135.
 - b. Support up to 50 devices in daisy-chain topology or 39 when using RSTP topology.
 - c. Segmentation: Maximum capacity expansion of 250 devices spread over 5 segments when using daisy-chain topology or up to 234 devices spread over 6 segments when using RSTP topology.
 - 5. Modbus IP: Support TCP over Ethernet, comply with Modbus (PS) and ANSI/CEA-709.1.
 - 6. Modbus RTU (ASCII and J-bus):
 - a. Interconnect fieldbus devices in compliance with Modbus (PS) and ANSI/CEA-709.1.
 - b. Support up to 100 devices for HVAC and lighting control equipment operation with respective power metering.
 - c. Use RS-485 or RS-232 port with capacity to communicate with up to 31 devices per port for HVAC and lighting control equipment operation with respective power metering. When both ports are used combined capacity will allow up to 62 devices in total.
 - 7. Wi-Fi: Interconnect wireless field devices in compliance with IEEE 802.11.
 - 8. Bluetooth: Interconnect wireless field devices in compliance with Bluetooth CS.
 - 9. EnOcean:
 - a. Interconnect wireless field devices in compliance with ESP3 specification.
 - b. Support SDCU-level EnOcean wireless devices within 315Mhz, 868Mhz, or 902Mhz frequency band using internal antenna or external mount antenna with RP-SMA connector.
 - 10. ZigBee:
 - a. Interconnect wireless field devices in compliance with IEEE 802.15.4.
 - b. Support SDCU-level ZigBee Pro wireless devices using internal antenna or external mount antenna with RP-SMA connector.
 - 11. Compliance: UL 864, UL 916, 47 CFR 15 for Class A radiation, and 47 CFR 68.
- R. Modular I/O Expansion:
- 1. Provide I/O capacity through plug-in modules of various types as required to meet individual control applications.
 - 2. Capable of allowing module "hot-change" (hot-swap) while keeping the system on-line without user interventions thus automatically addressing and configuring details.
 - 3. Protect module addresses If module backplane or connected module(s) were to fail.

4. Universal Inputs: Support the following thermistors without external converters:
 - a. 10 kohm: Type I (Continuum), II (I/NET), III (Satchwell), or IV (FD).
 - b. Linearized 10 kohm: Type V (FD w/11k shunt) or type III (Satchwell).
 - c. 1.8 kohm (Xenta).
 - d. 1 kohm (Balco).
 - e. 20 kohm (Honeywell).
 - f. 2.2 kohm (Johnson).
 - g. PT100 (Siemens).
 - h. PT1000 (Sauter).
 - i. Ni1000 (Danfoss).
5. Analog Inputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
6. Digital Inputs: Dry contacts, pulse accumulators, and voltage sensing.
7. Digital Outputs: 24 VAC triacs and relays.
8. Analog Outputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
9. Hardware Output Override Switches:
 - a. Provide integral 3-position manual override switch for each analog and digital output for manual override into On, Off, or Auto output state. Provide controller feedback for override switch position monitoring.
 - b. Provide integral override potentiometer for each analog output for manual adjustment of configured output signal over full range when manual override switch is indexed to On.
- S. Local Status Indicator Lamps:
 1. Provide LED indication of CPU status, Ethernet LAN status, and field bus status.
 2. Provide indication of point value such as On or Off for each input and output.
 3. Support software configuration of LED indication lamps to customize specific objects to indicate when On or Off or whether indicating color turns red or green.
- T. Real Time Clock (RTC):
 1. Include RTC accurate plus/minus 10 seconds per day and formatted to include time of day, day, month, year, and day of week.
 2. Allows assigned time zone UTC offset to store and apply daylight savings time.
 3. Capable of keeping date and time accurate up to 10 consecutive days without power without the need of batteries for RTC backup.
- U. Power Supply:
 1. Provide 24 VDC power supply with 30 watts for interconnected NSC and associated I/O modules. Expand power supply capacity when additional power consuming modules are required.
 2. Include separate terminal base to allow power and communications interconnections between power supply, NSC and I/O modules allowing for ease of replacement without separate or loose wiring.
- V. Software Requirements:
 1. Store in non-volatile flash memory executable software applications such as operating system, application programs, and other configured database objects such as graphics, trends, alarms, views, and other definable objects as memory storage capacity allows and without restrictions placed on system application programs types.
 2. Capable of parallel processing, executing each control program simultaneously without affecting the operation of other program unless linked to do so.
 3. Each program will have full access to processor I/O facilities without being interrupted due to normal user communications including interrogation, program entry, program printout for storage, and others.
 4. Provide memory capacity of 4 GB segregated into 2 GB for applications and historical data and 2 GB dedicated for backup storage.

5. Alarm Management:
 - a. Allow system point alarms configuration based on high or low limits or in comparison to other point values. NSC to test each alarm per scan and display one or more alarm messages or reports for those active.
 - b. Allow unlimited number of alarms for each user configured point and object.
 - c. Alarms can be configured to be generated based upon a single system condition or multiple system conditions.
 - d. Generate alarms based on alarm-condition evaluation and present using fully configurable order such as by priority, by time, by category, and others upon system logging regardless of whether the log-in takes place at OWS or WebStation end.
 - e. The alarm management will support configuration of user cause and action notes to be selected and associated with an alarm event. Checklists will also be possible in order to present operator with a suggested mode of troubleshooting. When acknowledging an alarm, allow system-user assignment for direct alarm notification and resolution.
 - f. Alarms must be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet IP protocol.
6. Power Failure Mode:
 - a. Restart: Upon restoration of power after an outage, restart automatically and without human intervention, then update monitoring functions, resume halted operations, synchronize time and status, and implement preconfigured start-up strategies as required.
 - b. Data Retention: During a power failure keep objects and data configured to be retained such as installed programs, trends, and historical data without time restrictions or need for batteries to achieve it.
7. Floor Zoning, Software-Defined:
 - a. Support synchronized control of lights, blinds, and HVAC across multiple floorplan scenarios.
 - b. Handle multiple synchronized control sequences or scenarios of lights, blinds, and HVAC to accommodate different floor plan scenarios.
 - c. Allow manual or automatic changeover of synchronized lights, blinds, and HVAC control from one floorplan scenario to another.
 - d. Adapt synchronized controls of lights, blinds, and HVAC to different floorplan scenario using other device running standard web browser.
 - e. Allow administrator to manage user and group permissions to view or reconfigure floor plan scenarios.
8. Energy Management, Executable Routine Requirements:
 - a. Time of day scheduling.
 - b. Calendar based scheduling.
 - c. Holiday scheduling.
 - d. Temporary schedule overrides.
 - e. Optimal start.
 - f. Optimal stop.
 - g. Night setback control.
 - h. Enthalpy switchover (Economizer).
 - i. Peak demand limiting.
 - j. Temperature compensated duty cycling.
 - k. CFM Tracking.
 - l. Heating/Cooling interlock.
 - m. Hot/Cold deck reset.
 - n. Hot water reset.
 - o. Chilled water reset.

- p. Condenser water reset.
- q. Chiller sequencing.
- 9. Embedded Web Server:
 - a. Configured to serve out web pages containing the same information available at system OWS.
 - b. Web page development will not require additional engineering labor over that required to show them at system OWS.
 - c. Configurable to log each Embedded Web Server access attempt.
 - d. Configurable to redirect IP-based HTTP based connections to secure HTTPS connections.
 - e. Authenticate and authorize users and automatically logout after adjustable time period.
- 10. Data Storage for Trend-logs and History:
 - a. Capable of logging any input, output, calculated value, or other system variable over user defined time intervals ranging from one second to 1440 minutes or based upon user configurable change-of-value(s).
 - b. At a minimum, store 1,000 trend-logs with 100,000 records. Each log can record either instantaneous average, minimum, or maximum point value. Logged data will be downloadable to higher level NSC or server for long term archiving based upon user-defined time intervals or manual command.
 - c. For extended trend logs provide a minimum of 1,500 trend-logs with 600,000 records.
 - d. Allow user curating of meter log data to ensure accuracy upon meter replacements.
 - e. Automatically trend every hardware input and output point hosted within whether directly or using external I/O modules without requiring manual creation. NSC to set automatic trend-logs based upon change-of-value(s) and store at least 500 trend samples before replacing the oldest sample with new data.
 - f. Logged data presentation will be built into NSC server capability. Display data using time stamped text-based list format or chart format using fully configurable pen colors, weights, scales, and time spans.
 - g. Include tooltips visible based on user preference.
 - h. Comments will be visible whenever viewing the trend log list.
 - i. Give indication of memory usage and alert user if too many logs are allocated.
 - j. BMS software and Network Servers will support historical data recording independent of NSC-memory limitations and available for reporting and analysis without additional configurations or actions.
 - k. Allow data access and use from BMS or third-party reporting systems.
- W. User Programming Language:
 - 1. Provide workstation-loaded software application that includes strategies, sequences of operation, control algorithms, parameters, and setpoints.
 - 2. Programming language will be either script-based structured text or graphical function-block based.
 - 3. Allows configuration of control programs, schedules, alarms, reports, communication links, local displays, mathematical calculations, historical data storage, and user comments anywhere within configured program.
 - 4. The use of "canned" program method(s) will not be accepted.
 - 5. Pretested Control Algorithms Required:
 - a. Proportional, integral plus derivative control (PID).
 - b. Two-position control.
 - c. Digital filter.
 - d. Ratio calculator.
 - e. Equipment cycling protection.
 - 6. Mathematical Functions:

- a. Include basic mathematical functions addition, subtraction, multiplication, division, square, square root, exponential, logarithm, boolean logic statements, or combinations of both.
 - b. Include complex logical statements including operators such as greater-than (>), less-than (<), equal (=), and, or, exclusive, and others. Allow statement usage within the same equations with mathematical operators and nested up to five parentheses deep.
- X. Regulatory Certification Compliance:
 - 1. CE – EN 61000-6-3.
 - 2. CE – EN 61000-6-2.
 - 3. CE – EN 61010-1.
 - 4. CE – EN 61326-1.
 - 5. FCC CFR 47 Part 15 Class A.
 - 6. RCM.
 - 7. RoHS 2011/65/EU.
 - 8. China RoHS SJ/T 11364-2014.
 - 9. UL 916 listed for energy management equipment.
- Y. HMI, Tablet Display:
 - 1. Provide tablet display for industrial-grade Human-Machine Interface (HMI) that can be locked within BMS to create a dedicated tool for local operation and maintenance.
 - 2. Table display to provide an easy-to-use interface through which users and engineers can locally access both attached and linked NSCs.
 - 3. Set display to always start in kiosk mode ensuring that end user can only use device with attached NSC.
 - 4. Require password on start up and after defined period of inactivity.
 - 5. Support being handheld or control cabinet fitted.
 - 6. Provide touchscreen system navigation making it easy to operate and maintain.
 - 7. Include hardware components for wall or panel surface mounting.
 - 8. Display: 10.1 by 10.1 inch screen with resolution of 1,280 by 800 pixels, 16:10 aspect ratio, and based on the Android platform.
 - 9. Enclosure: IP54 rated frame that helps protect against dust and moisture.
 - 10. Power: 24 VDC through Y-shaped cable.
 - 11. Communications: BACnet IP over wired built-in USB connection.
 - 12. Wireless Wi-Fi Communications Module:
 - a. Link tablet display and NCS using wireless access point.
 - b. Provide adhesive-mount Wi-Fi antenna.
 - c. IEEE 802.11b/g/n compliant.
 - d. Support enhanced wireless security using 64-bit and 128-bit WEP encryption.
 - 13. Connect using only secure HTTPS connections via NSC WebStation functionality.
 - 14. Connect using specific password-protected user account defined within NSC configuration.

2.05 SDCU: CONNECTED ROOM SOLUTIONS

- A. Panel-mount BACnet IP controller with up to four sensors per room.
- B. Provides communication and power to sensors using Category 5 or 6 cable.
- C. Fully programmable capable of supporting different local control strategies.
- D. Central repository of common standard applications including:
 - 1. Occupied state.
 - 2. Unoccupied state.
 - 3. Load shed mode.

4. Daylight harvesting.
 5. Time clock scheduling.
- E. The controller will utilize ASHRAE standards adjust "Minimum Ventilation per Person (CFM)" using people counting sensors.
 - F. The controller will take the advantage of saving energy by applying room temperature setback(s) within 3 minutes becoming unoccupied using people counting sensors.
 - G. Graphical Interface: Uses floor plan maps allowing user(s) to assign HVAC equipment, lights, blinds, and sensors directly into room spaces or custom defined zones and partition spaces.
 - H. Building Automation Devices: Interface up to 256 devices including sensors, pushbuttons, actuators, controllers, components, and other system devices using the KNX open protocol.
 - I. Wireless Devices: Communicates with wireless devices such as sensors, power meters, and lighting control gateways using IEEE 802.15.4 ZigBee 3.0. The use of previous ZigBee standards is not acceptable.
 - J. Occupancy and Light Levels: Connects and powers up to four advanced occupancy and light level sensors that do not require batteries for operation.
 - K. The BACnet IP RP Fieldbus controller supports two RS485 communication ports that connects and supplies power to externally-linked devices over category 5 or category 6 cable(s) using a daisy chain style. Externally-linked devices provides I/O expansion beyond controller capacity and supports:
 1. Temperature, humidity, CO2, or presence detector wall-mount sensors.
 2. Combined temperature, humidity, CO2, or presence detector wall-mount sensors.
 3. Control modules for lights and blinds.
 4. Interfacing open market Modbus RTU devices.
 5. Up to four ceiling-mount intelligent multi-sensors that supports thermal imaging detection.
 - L. BACnet IP Room Control; Ceiling-mount, intelligent Space Sensors:
 1. Sensor includes two RJ45 communication ports that allows daisy chain style communications between linked sensor(s) and parent BACnet IP RP Fieldbus controller over category 5 or category 6 cable.
 2. Parent BACnet IP RP Fieldbus controller can power up to four intelligent sensors.
 3. Sensor includes built-in thermal Imaging sensing with detection coverage area of up to 516.7 sq ft (22.7 ft x 22.7 ft). Also, sensor technology allows people counting to enable proactive building control based on actual number of occupants instead of by presence, preset value, or hours of operation.
 4. Sensor includes built-in ambient light sensor that supports field-of-view coverage of 35 degrees from vertical plane and 0 to 10,000 luminosity range.
 5. Sensor supports Bluetooth Low Energy (BLE) radio that enables connectivity of mobile applications for controlling room lights, blinds, and temperature by allowed user(s).
 6. Sensor's BLE radio supports iBeacon protocol capable of working in conjunction with location-awareness applications.
 7. The ceiling-mounted intelligent Space Sensor(s) will be Schneider Electric's Insight or an approved equivalent to be used in the project.
 - M. Room Integrations:
 1. Room Lights Using Built-in DALI Port or Expansion Module:
 - a. Capable of full control of up to 32 individual lighting fixtures interfaced by ballasts or LED drivers which can be combined up to maximum of 16 groups.
 - b. Rated for 10A in total draw or 5A per channel, maximum.
 - c. Certified of full IEC 60929 DALI version-2 (DALI2 or DALI-2) control.
 - d. Support DALI version-1 (DALI1 or DALI-1) control.
 - e. Support discharge lamps, LEDs, and color control (device type 8).

- f. Support feedback from control gear including lamp failure feedback.
 - g. Support addressing and grouping of control gear.
 - h. Capable of turning on-off, or dim light(s) using 0 to 10 VDC signal.
 - i. During zero light output, shut down ballasts to minimize leakage current.
 - j. Certified for multi-master functionality to interface DALI-devices including pushbuttons, sensors, and dimmers over DALI communication bus.
 - k. Interface and control dimmed lights using phase-cut dimming. Automatically detect appropriate leading or trailing edge control mechanism needed based on load type.
- 2. Blinds and Shades:
 - a. Interface and control blind motors using voltage standard motor interface (SMI) open communications protocol.
 - b. Interface and control blind motors using high voltage SMI communications protocol.
 - c. Interface and control blind motors using low voltage (24V) relays.
 - d. Interface and control blind motors using line voltage relays.
 - 3. Glass Dimmers: Interface with third-party Modbus (PS) devices sensors, pushbuttons, and glass touch panels.
- N. Space Sensors:
- 1. Temperature:
 - a. Sensing Element: 10k ohm, type 3 thermistor.
 - b. Accuracy: Plus/minus 0.4 degrees F.
 - c. Display Resolution: 0.1 or 1 degrees F.
 - d. Measuring Range: 32 to 122 degrees F.
 - e. Built-in LCD Display.
 - f. Color Display: 2.4 by 2.4 inch, backlit, color, touchscreen to show:
 - 1) Space temperature.
 - 2) Cooling space temperature set point.
 - 3) Heating space temperature set point.
 - 4) Current heating or cooling mode.
 - 5) Current occupancy mode.
 - 6) Fan speed.
 - 7) Current time.
 - 8) Light control.
 - 9) Blind adjustment.
 - 10) Scene selection.
 - 11) Three-button interface for adjust and override control.
 - 2. Humidity:
 - a. Accuracy: Plus/minus 2 percent RH.
 - b. Measuring Range: 0 to 100 percent RH.
 - c. Display Resolution: 0.1 or 1 percent RH.
 - d. Built-in LCD Display.
 - 3. CO2:
 - a. Accuracy: Plus/minus 30 ppm and plus/minus 2 percent of measured value.
 - b. Measuring Range: 0 to 2,000 ppm.
 - c. Operating Elevation: 0 to 16,000 feet.
 - d. Temperature Dependence: 0.11 percent of full scale per degree.
 - e. Stability: Under 2 percent of full scale over sensor life of 15 years.
 - f. Sensing Method: Nondispersive infrared (NDIR), diffusion sampling.
 - g. Built-in LCD Display.
 - 4. Motion: Include sensor for occupancy detection.

2.06 SDCU: BACNET IP CONTROLLERS

- A. Provide enclosed controller with respective I/O expansion modules and accessories to meet mechanical equipment control requirements for equipment including central plant(s), air handlers, and terminal units.
- B. Configure each SDCU to operate completely stand alone, containing required I/O and programs to control associated equipment or system.
- C. Communications:
 - 1. Peer-to-peer communications between devices without requiring NSC.
 - 2. Act as master to allow for the exchange and sharing of data variables and messages with other controller(s) connected within same communication cabling. Slave controllers are not acceptable.
 - 3. Equipped with dual 10/100 Mbps, base-T, Ethernet communication ports and internal switch ready to support:
 - a. IPv4 addressing.
 - b. Disabling secondary Ethernet port.
 - c. Static IP setting, DHCP client and Auto-IP address acquisition.
 - d. Configurable to restrict communications to only whitelisted IP addresses.
 - 4. Topology Support:
 - a. Daisy chain topology of up to 50 controllers. Communication disruptions will initiate system alarm to notify assigned NSC and BMS front-end about identified disruption.
 - b. Rapid Spanning Tree Protocol (RSTP) that builds a loop-free logical topology of up to 39 controllers ensuring uninterrupted communication and related alarms broadcasting in case of disruption(s).
- D. Performance:
 - 1. Listed by BACnet Testing Laboratory (v12 or later) as BACnet Advanced Application Controllers (B-AAC).
 - 2. 22-bit microprocessor operating at 500 MHz that supports BACnet protocol stack in accordance with ASHRAE Std 135 and supported BACnet device profile.
 - 3. Multitasking, real-time digital control processors consisting of communication controllers, controls processing, power supplies with built-in inputs and outputs.
 - 4. Support upgrade of firmware with no impact to operation.
- E. Programmability:
 - 1. Support both script and graphical programming languages consistent with the NSC.
 - 2. Control programs to reside within same enclosure as I/O circuitry that reads inputs and controls outputs.
 - 3. Store programmed control sequences in non-volatile memory which is not dependent upon battery power for retaining.
 - 4. Communicate with NSC at minimum baud rate 100 Mbps.
 - 5. Support add-on display for access in real-time for monitoring inputs and overriding of outputs. Feature not available for VAVs.
 - 6. Use dedicated processor for override functionality to assure reliable operation when overriding an output.
 - 7. Include memory capacity to support operating system, databases, and other functions including:
 - a. Control processes.
 - b. Energy management applications.
 - c. Alarm management.
 - d. Historical data and trend data.
 - e. Maintenance support applications.
 - f. Custom processes.
 - g. Manual override monitoring.

8. Support local storage of trend data up to twice built-in I/O capacity and be capable of recording and holding five days worth of data captured at 15 minute intervals minimum.
9. Use 16-bit A/D converter for analog or universal inputs.
10. Use 10-bit D/A converter for analog or universal outputs.
11. Built-in I/O Support:
 - a. Hardwired Sensor and Device Interface: Minimum of 8 and up to 20 configurable I/O channels to monitor and control listed types of inputs and outputs without adding equipment inside or outside DDC cabinet.
 - 1) Universal Inputs: Support the following thermistors without external converters.
 - (a) 10 kohm: Type; I (Continuum), II (I/NET), III (Satchwell), or IV (FD).
 - (b) Linearized 10 kohm: Type V (FD w/11k shunt) or type III (Satchwell).
 - (c) 1.8 kohm (Xenta).
 - (d) 1 kohm (Balco).
 - (e) 20 kohm (Honeywell).
 - (f) 2.2 kohm (Johnson).
 - (g) PT100 (Siemens).
 - (h) PT1000 (Sauter).
 - (i) Ni1000 (Danfoss).
 - 2) Analog Inputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
 - 3) Digital Inputs: Dry contacts, pulse accumulators, and voltage sensing.
 - 4) Digital outputs: Triac or relay contacts.
 - 5) Analog Outputs: Current at 0 to 20 mA VDC or voltage at 0 to 10 VDC.
 - b. Intelligent Sensor Interface:
 - 1) Support dedicated RJ45 port to communicate and power up to four wall mount sensors without requiring dedicated on-board inputs or outputs.
 - 2) Support configurable selection of supported protocols.
 - 3) Support matching bus-connected room or space sensor(s) that does not utilize controller hardware points. Room sensors can be dedicated or combined type for temperature, humidity, CO2, or presence detector.
 - 4) Support modules for controlling lights and blinds that do not utilize controller hardware points.
 - 5) Support connecting to open market Modbus devices.
 - 6) Allow disabling RJ45 communications port via software configuration.
 - c. HMI: BACnet Operator Display:
 - 1) As minimum, includes capabilities defined in the BACnet B-OD profile.
 - 2) Relies on open industry-standard BACnet IP and supports:
 - (a) IPv4 addressing.
 - (b) Static IP setting and DHCP.
 - 3) Includes single Ethernet port for direct communication with another device or multiple devices through LAN/WAN switch.
 - 4) Uses 24 VDC, plus/minus 20 percent tolerance and 9W maximum.
 - 5) Includes on-board 32-bit microprocessor operating at 800 MHz.
 - 6) Complies with the following regulatory certifications:
 - (a) FCC Rules and Regulations CFR 47, Part 15, Class A
 - (b) Industry Canada
 - (c) ICES-003
 - (d) UL 61010-1 and 61010-2-201
 - (e) CE - Compliance to European Union (EU)
 - (f) 2014/30/EU Electromagnetic Compatibility Directive
 - (g) 2014/35/EU Low Voltage Directive
 - (h) 2011/65/EU Restriction of Hazardous Substances (RoHS) Directive

- (i) 2015/863/EU amending Annex II to Directive 2011/65/EU
- (j) EN 61326-1 Product Standard
- (k) EN 61131-2 Safety Standard.
- (l) WEEE - Directive of the European Union (EU)
- (m) European Union (EU) Directive 2012/19/EU
- 7) Receives and initiates system clock synchronization messages over BACnet.
- 8) Automatically synchronize system clocks daily when set as time master.
- 9) Adjusts internal clock time automatically according select or different time zones.
- 10) Panel-mount product with ingress protection rating equal to IP65 (dust-tight and safe from low pressure water jets).
- 11) Maximum support of up to seven controller devices over network.
- 12) Allows firmware upgrade using USB-stored image file.
- 13) Uses LED indicators as alarm-status indicators of connected BACnet devices that indicates active, acknowledged, or non-active alarm event without requiring user logging in.
- 14) Built-in 7 inch, TFT, LCD color touch-screen display with 800 x 480 pixel resolution, 16:10 aspect ratio, and 50,000 hours LED lifetime, approximate.
- 15) Supports multiple user management consisting of tier-assigned log-in access:
 - (a) Tier 1: Users can view content, do supported actions, access user management, upload firmware, and apply factory reset.
 - (b) Tier 2: Users can view content and supported actions except user management, upload firmware or apply factory reset.
 - (c) Tier 3: Users can only view content.
- 16) User tracker that monitors each user log-in access and manual changes.
- 17) Schedule management utility to create, edit, export, and apply exception events.
- 18) Includes Configurable Application Menu (CAM) that allows reading CAM objects when defined in supported controller devices.
- 19) Capable of being reset to factory default state either by Admin user or manually by physically accessing the rear of the product.
- d. Wireless Communications:
 - 1) Bluetooth:
 - (a) Include on-board Bluetooth low energy radio signal.
 - (b) Support mobile application for controller commissioning.
 - (c) Support mobile applications for building occupants.
 - (d) Support direct connection to external antenna or disabling wireless signal.
 - 2) ZigBee:
 - (a) Include plug-in slot or connector for ZigBee 3.0 radio module.
 - (b) Support up to 16 different sensors and devices for easy commissioning.
 - (c) Support interfacing temperature, humidity, and CO2 sensors holding batteries with 10 years of battery-life.
 - (d) Support interfacing green-powered temperature-humidity sensors holding batteries with 10 years of battery-life.
 - (e) Support of older versions of ZigBee 3.0 are not approved due to lack of security layer.
 - (f) Support external ceiling antenna installation using purpose-designed extension cable, module(s), and housing when radio reception at controller side is compromised.
- 12. Real Time Clock (RTC):
 - a. Automatically synchronize RTCs daily from an operator-designated controller.
 - b. Automatically adjust for daylight saving time.
 - c. Accuracy: Plus/minus one minute per month.

- d. RTC Objects: Time of day, day, month, year, and day of week.
 - e. Power Loss: Maintain accuracy up to 7 days from power lost event.
- F. Spare I/O Capacity: Provide minimum of 10 percent spare capacity for each point type available within controller for future point connection.
- G. Power Requirements:
 - 1. 24 VDC (21 to 33 VDC) or 24 Vac plus/minus 20 percent from locally placed external transformer feed.
 - 2. Provide 220 VAC line voltage version where required.
 - 3. Meet UL 916 open class standard permitting SDCU installation without secondary enclosure where appropriate.
 - 4. Support power failure recovery within 10 seconds of detected power disruption and resume operation from where the disruption had occurred.
- H. Smoke Control and Smoke Management Application:
 - 1. CE - EMCD 2014/30/EU.
 - 2. CE LVD 2014/35/EU.
 - 3. FCC CFR 47 Part 15 Class B.
 - 4. RCM.
 - 5. RoHS 2011/65/EU.
 - 6. China RoHS SJ/T 11364-2014.
 - 7. Passive Control: Apply NFPA 90A guidelines to shutdown active fans with simultaneous closing of smoke and fire-smoke dampers.
 - 8. Active Control: Apply NFPA 92 guidelines for HVAC system use to prevent smoke migration from fire area(s) prior to exhaust combustion products including smoke exhaust.
 - 9. UL 2043 listed for plenum space mounting.
 - 10. UL 916 listed for open-energy management equipment.
 - 11. UL 916 listed for energy management equipment.
- I. Variable Air Volume (VAV) Application:
 - 1. Include built-in flow-through differential pressure transducer with 0 to 1 in-wc measurement range, accuracy of plus/minus five percent at 0.001 to 1 in-wc, and minimum resolution of 0.001 in-wc to ensure that primary air flow conditions are controlled and maintained within plus/minus five percent of applied setpoint between specified minimum and maximum air flow parameters.
 - 2. Support dedicated commissioning tool for air flow balancing.
 - 3. Require no programming for air balancing algorithm and allow balancing parameters synchronization from NSC.
- J. Remote I/O Controller Expansion:
 - 1. Extend inputs and outputs required for SDCU or NSC.
 - 2. Support daisy and RSTP topologies.
 - 3. Capable of sharing local I/O resources with one or multiple applications distributed across one or multiple SDCUs or NSCs.
 - 4. Support alarm and local trend.
 - 5. Support configurable fallback output value triggered in case of communication disruption.

2.07 SDCU: BACNET MS/TP CONTROLLERS

- A. Provide BTL (BACnet Testing Laboratory) certified device for intended application.
- B. Include Modbus RTU communication in addition to BACnet MS/TP and support of wireless communications.
- C. Interconnect wireless field devices in compliance with IEEE 802.15.4 using predefined profiles for door switches, window switches, occupancy sensors, water leakage detectors, CO2

sensors, temperature sensors, and humidity sensors. Capable of hosting minimum of 10 devices.

- D. Include power indicating light. Use local power, link powered devices are not acceptable.
- E. Store application programs using battery backup, flash memory, or other means such that power loss does not result in loss of application program(s) or configuration parameter settings.
- F. Capable of being programmed with customizable scripts using 'LUA' open programming language. Equipped with minimum allocated memory of 256KB of SRAM and 80KB for configurable and reserved for 'LUA' scripting purposes.
- G. Include onboard temperature sensor with option to add humidity and occupancy sensors.
- H. Field Bus Wiring and Termination:
 - 1. Use bus or daisy chain concept with no tees, stubs, or free topology for component wiring.
 - 2. Provide termination resistor at both ends of each fieldbus segment.
 - 3. Repeaters: Provide enclosed repeaters to interconnect two segments and locate within interstitial space.
- I. Local Interface:
 - 1. Support connection to portable interface device such as laptop computer or vendor unique hand-held device.
 - 2. Password protected access to execute other tasks than viewing data. Other tasks include:
 - a. Access to configuration menu parameters.
 - b. Adjust application parameters.
 - c. Execute manual control of input and output points.
 - d. View dynamic data.
- J. Application Specific Controllers (B-ASC):
 - 1. Application specific devices will have fixed function configurable applications.
 - 2. ASC that can be altered by the vendor's application programmable tool are considered an advanced application controller (AAC) and not an application specific device.
 - 3. Applications: Use for control of fan coil units, cooling VVT zones with reheat, fin-tube radiators, cabinet heaters, radiant panel heaters, electric reheat zones, terminal reheats, rooftop units (1H1C, 2H2C, 3H2C, MH2C), or heat pumps.
 - 4. Use for connected room solutions that do not require integrated lighting and blind busses built into singular unit.
- K. Advanced Application (Programmable) Controllers (B-AAC):
 - 1. General:
 - a. Built-in physical input and output circuits for analog input devices, binary input devices, pulse input devices, analog output devices, and binary output devices. The number and type of input and output devices supported will vary by model.
 - b. Support I/O expansion by adding circuit boards that physically connect to basic controller.
 - c. Support editing of embedded time schedules from OWS with BACnet object support service.
 - d. Support embedded trend log data export to OWS with BACnet object support service.
 - e. Support Embedded Alarm Messaging to:
 - 1) Deliver alarm messages to OWS with BACnet object support service for receiving alarm messages and configured as recipient.
 - 2) Support alarm acknowledgement from OWS with BACnet object support service for executing alarm and event acknowledgement.
 - f. Support analog and binary data reading from OWS with BACnet object support service for reading of data.

- g. Support control of 'out of service' property and assignment of value or state to analog and binary objects from OWS with BACnet object support service.
- h. Support receipt and response to Time Synchronization commands from BACnet NSC.
- i. Support the "Who is" and "I am." BACnet services.
- j. Support the "Who has" and "I have." BACnet services.
- 2. Analog Input Circuits:
 - a. Keep A/D chip resolution below 0.01 Volts per increment for measurement range of 0 to 10 VDC at 10 bit with resolution of 10/1024 or 0.00976 Volts per increment.
 - b. For nonflow sensors, control logic to support calibration offset usage such that raw measured value is added to plus/minus offset to create calibration value for use by control logic and OWS reporting.
 - c. For flow sensors, control logic to support adjustable gain and adjustable offset object usage for execution of two point calibration concept for adjustable low and high range value to match values determined with calibration instrument.
 - d. Provide software support for input signal linearization of nonlinear sensors such as thermistors and flow sensors.
- 3. Binary Input Circuits:
 - a. Wire dry contact device or sensor into controller using two-wire circuit without requiring external power supply.
- 4. Pulse Input Circuits:
 - a. Wire pulse input device or sensor into controller using two-wire circuit without requiring external power supply.
 - b. The pulse input circuit can process up to 20 pulses per second.
- 5. True Analog Output Circuits:
 - a. Logical commands will be processed by digital-to-analog (D/A) converter chip to allow having 0 to 100 percent control signal scalable to full output range of 0 to 10 VDC, 4 to 20 milliamps, 0 to 20 milliamps, or assignable range within full output range (Example: 0 to 100 percent creates 3 to 6 VDC where full output range is 0 to 10 VDC).
 - b. Keep D/A chip resolution below 0.04 Volts per increment or 0.08 milliamps per increment.
- 6. Binary Output Circuits:
 - a. Single pole, single throw or single pole, double throw relays with support for up to 230 VAC and maximum current of 2 A.
 - b. Voltage sourcing or externally powered triacs with support for up to 30 VAC and 0.5 A at 24 VAC.
- 7. Program Execution:
 - a. Process control loops to operate in parallel and not in sequence unless specifically required to operate in sequence by control sequence.
 - b. Adjustable process control loop sample rate down to minimum of one second.
 - c. Adjustable process variable sample rate down to minimum of one second.
 - d. Adjustable algorithm update sample rate down to minimum of one second.
 - e. Capable to detect controller power cycle that can be used via user programming to modify controller sequence upon power cycle detection.

2.08 ROOM CONTROLLERS/THERMOSTATS

- A. Controller communicates via user-selectable protocol choices that includes BACnet MS/TP, Modbus RTU, or BACnet IP over WiFi using optional WIFI module.
- B. Controller includes TFT transmissive LED backlit LCD touchscreen (HMI) with at least 12 user-selectable color options, 12 user-selectable HMI button displays, and multiple options for casings and fascia's.

- C. Controller is capable of displaying custom messages using minimum of 2 formats that can be statically defined within the controller or dynamically defined via BACnet commands.
 - 1. Format 1: Displays minimum of 24 character message on default HMI screen which can be scrolled.
 - 2. Format 2: Displays up to 480 characters with ability to scroll multiple messages. This format allows HMI screen to use up to 12 different colors at any given time per message.
- D. Controller is capable of automating the following equipment applications using simple user selectable configuration menus displayed on built-in HMI::
 - 1. 2/4-Pipe Fan Coil applications:
 - a. Analog or 1-speed, 2-speed or 3-speed fan control.
 - b. Control valves via analog, 2-position, or floating signal.
 - 2. RTU, Split System or Heat-Pump:
 - a. 2-stage heating or cooling.
 - b. Analog heating.
 - c. Dehumidification output.
 - d. Analog economizer output.
 - e. Demand based ventilation.
 - 3. Pressure Dependent and Pressure Independent VAVs or VVTs:
 - a. Single zone; parallel or series fan powered with analog or binary fan speed control.
 - b. Damper and reheat control via analog, 2-position, or floating control.
 - 4. Other mechanical system applications utilizing similar I/O and strategies mentioned above.
- E. The controller provides the following I/O capabilities:
 - 1. Seven universal inputs:
 - a. 10K Type II Thermistor.
 - b. 0 to 10 VDC analog.
 - c. Binary.
 - 2. Five binary outputs configurable as floating or On/Off.
 - 3. Four universal binary or analog 0 to 10 VDC outputs.
 - 4. Integrated or Dedicated:
 - a. Space Temperature.
 - b. Space Humidity.
 - c. Passive Infrared Motion Detection (PIR).
 - d. Light Level Sensor.
 - 5. Up to 20 Zigbee 3.0 Ecco-System and Zigbee Green devices with optional Zigbee Wireless radio, device choices includes:
 - a. Temperature and humidity.
 - b. Temperature, humidity, and co2.
 - c. Door or window contact.
 - d. Wall or ceiling PIR with temperature and humidity.
 - e. Water leak detection.
- F. The controller can be programmed with user customizable script using "Lua" open programming language within reserved memory space of 8 kb. The "Lua" programming provides the ability to enhance the controllers inherent control capabilities or create custom control strategies.
- G. The controller includes minimum of two level password protection to prevent unauthorized access where level 1 password is for basic daily user functionality and level 2 for installer or management and configuration.

2.09 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.

- B. System Tests:
 - 1. Test each system point for both hardware and software functionality.
 - 2. Test each system-linked mechanical and electrical system under control against specified sequence of operation.
 - 3. Successful completion of system test(s) constitutes warranty period commencement.
 - 4. Provide Owner with written report as confirmation that installed system functions in accordance with plans and specifications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions subject to install work and notify Contractor in writing about observed conditions that could be detrimental to proper and timely work completion.
- B. Examine equipment exterior and interior prior to installation. Report damage and do not install equipment that is structurally, moisture, or mildew damaged.

3.02 PREPARATION

- A. Demolition:
 - 1. See Section 024100 - Demolition for additional requirements.
 - 2. Remove controls which do not remain as part of the BMS along with associated wiring, conduit, and pneumatic tubing including those previously abandoned.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and Section 250500 where required.
- B. Install equipment in accordance with reviewed product data, final shop drawings, and as indicated on drawings.
- C. Code Compliance: Install wiring in accordance with applicable codes and ordinances.
- D. Interface With Other Work; Provide field supervision to trades installing:
 - 1. Dampers: Automatic control dampers.
 - 2. Blank-off Plates: Required for dampers smaller than duct or opening size.
 - 3. Sheet Metal Baffles Plates: Equipment or duct mounted to eliminate stratification.
 - 4. Electrical Power: 120 VAC power feed to actuators, heat trace, control panels, and related control equipment needs.
 - 5. HVAC-equipment installed smoke detectors with respective shutdown relay(s) into building fire alarm system. Then complete this work by providing, installing, terminating, and testing respective fan or equipment shut down interlocking wiring.
 - 6. Electrical Meter or Submeter: Auxiliary contact (pulse initiator) or commutations link for central monitoring of power or load in kW and energy or demand in kWh.
- E. Hardware Installation Practices for Wiring:
 - 1. Controllers: Mounted vertically according to manufacturer's installation documentation.
 - 2. Ethernet or Remote Site Controller Power: Provide dedicated 120 VAC power wiring for each device from separate breaker using respective hot, neutral, and ground wires. Terminate ground wire at breaker panel ground-bar.
 - 3. True-Earth Ground: Coordinate required ground connections into building's true earth ground. Do not use a corroded or galvanized pipe, or structural steel.
 - 4. Building Attached Wires: Tie to surface-mounted fasteners at regular intervals such that wiring does not droop. Do not attach or support wires using ducts, pipes, conduit, or other hanged items.
 - 5. Conduit in Finished Areas: Conceal in ceiling cavity spaces, plenums, furred spaces, and wall construction. Except metallic surface raceway may be used in finished areas on

masonry walls. Surface raceways in finished areas must be color-matched to existing finish within standard manufactured color limitations.

6. Conduit in Unfinished Areas: Conceal in ceiling cavity spaces, plenums, furred spaces, and wall construction. Have exposed conduit run parallel to or at right angles of building structure.
 7. Wire to Utility Spacing: Keep wires a minimum of 3 inches from hot water, steam, or condensate piping.
 8. Sensor Wires: Protect with plastic inserts where sensor wires leave conduit system.
 9. Telephone Equipment Areas: Do not run wires across these areas.
 10. Fire-Rated Penetrations: Provide fire caulking to seal used openings.
- F. Installation Practices for Field Devices:
1. Well-Mounted Sensors: Include thermal conducting compound within well to ensure good heat transfer to sensor.
 2. Actuators: Mount firmly to give positive movement, then adjust linkage to give smooth, continuous movement throughout 100 percent of selected stroke.
 3. Relay Outputs: Include coil transient suppression across selected to limit transients up to 150 percent of rated coil voltage.
 4. Water-Mounted Sensors: Ensure that mounting hardware allows devices to be removed without shutting down the system in which they are installed.
 5. Duct-Mounted Static-Pressure Sensors: Connect high pressure port into metal static-pressure probe inserted at upstream side and leave low pressure port open to plenum area at the point where high pressure port is tapped into ductwork.
 6. Building Static-Pressure Sensors: Insert high pressure port into corresponding space using metal tube then pipe low pressure port to building exterior.
- G. Wiring, Conduit, and Cable:
1. Compliance: NFPA 70, National Electrical Code.
 2. Wire and Cable: Use copper wires with listed minimum wire size and insulation class.
 - a. Class One: 14 Gauge, 0.0641 inch, 600 Volt maximum.
 - b. Class Two: 16 Gauge, 0.0508 inch, 300 Volt maximum.
 - c. Class Three: 18 Gauge, 0.0403 inch, 300 Volt maximum.
 - d. Communications: Manufacturer recommended.
 3. Power and Class One wiring may be run within same conduit. Class two, class three, and communications wiring may be run within same conduit.
 4. Where different wiring classes terminate within same enclosure, maintain clearances and install barriers in accordance with National Electrical Code.
 5. Use galvanized EMT when wiring is required to be installed in conduit with minimum size of 1/2 inch. Set-screw fittings are acceptable for dry interior locations. Use watertight compression fittings for exteriors and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature and moisture differential.
 6. Use flexible metallic conduit for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment, 3 feet maximum. Use liquid-tight flexible conduit in exteriors and interior locations subject to moisture.
 7. Provide junction boxes for cable splices, equipment termination, and EMT to flexible conduit transitions. Use junction boxes with blank cover of galvanized pressed steel, 4 sq in for dry interior locations. Use cast alloy junction boxes with threaded hubs and gasketed covers for damp locations.
 8. Use plenum-rated wiring for spaces above used as supply or return air plenums. Teflon wiring can be run without conduit above suspended ceilings. Exception: Use conduit for wires run within suspended ceilings to control outside air dampers or fire management system interfacing.

9. Use multimode glass fiber optic cable with 50/125, 62.5/125, or 100/140 microns in diameter. Plastic fiber cables are not acceptable.
- H. Enclosures:
1. Provide an enclosure to protect each field device from dust, moisture, moving parts, and to conceal integral wiring. Where practical, mount within FIP.
 2. Installed FIPs to contain power supplies for sensors, interface relays, contactors, and safety circuits.
 3. Provide NEMA EN 10250 Type 1 rated FIP enclosures of steel construction with baked enamel finish, hinged door, and keyed lock. Ensure that enclosure size includes 20 percent spare mounting space internally with identically keyed locks.
 4. Provide FIP-mounted screw type terminals to terminate field wires. The use of wire nuts within FIP is prohibited. Analog or communications wiring may use FIP as raceway without terminating.
 5. Provide NEMA EN 10250 Type 4 rated enclosures for outdoors.
 6. Use plastic track for wiring runs within enclosures then wrapped and secured within controllers.
- I. Identification:
1. Identify each control wire with labeling tape or sleeves using words, letters, or numbers that can be exactly cross-referenced with as-built drawings.
 2. Identify each field-enclosure other than controllers with Bakelite nameplate using white lettering against black or blue background.
 3. Mark junction-box covers to indicate that they are part of BMS system.
 4. Identify with nameplates each I/O field-device except space sensors or FIP-mounted devices except as indicated on drawings.
 5. Label I/O field devices inside FIPs.
- J. Existing Controls:
1. Existing controls which are to be reused must be tested and calibrated for proper operation. Each existing control found to be defective requiring replacement, will be noted to Owner who will be responsible for material and labor costs associated with specific repair(s) or replacement(s).
- K. Location of Field-Mounted Products:
1. Install sensors as indicated on drawings unless directed otherwise.
 2. Mount space-installed sensors away from heat-generating machinery, direct sunlight, and supply-diffuser air streams.
 3. Mount outdoor air temperature sensor(s) on the north building face. Install sensors such that the effects of heat radiated from the building or sunlight is minimized.
 4. Locate field-enclosures immediately adjacent to control panel(s) where connected.
- L. Software Installation:
1. Provide technician(s) to install, initialize, start-up, and debug installed software including hosting operating-system or other third-party software necessary for successful system operation.
 2. Sequences of Operation: Apply specifics as indicated on drawings.
- M. Database Configuration:
1. Provide labor to configure database portions required by points list and sequence of operation.
- N. Color Graphic Panels:
1. Unless otherwise directed, provide color graphic-panel displays as depicted in mechanical drawings for each system and floor plan containing associated points identified on point list with controls to allow setpoint changes and commands to be issued.
- O. Reports: At a minimum, provide four reports configured to include:

1. System user data.
2. Trend comparison data.
3. Energy consumption data.
4. Alarm status and prevalence information.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Manufacturer Services: Provide services of manufacturer's field representative to inspect installed system and components.
- C. Coordination of Other Tests and Inspections:
 1. Provide technician for five days for manpower and engineering services required to assist both HVAC and TAB contractors to test, adjust, and balance related building systems.
 2. Coordinate with TAB contractor to provide complete air and water balance report; see Section 230593.
 3. Provide access to accommodate tests and inspections by independent testing agency employed by Owner.
- D. Point to Point Checkout:
 1. Inspect and verify each I/O device for proper installation and functionality. Fill-out dated DDC-associated checkout sheet itemizing each device then submit for Project Manager review and approval prior to inclusion into final report.
 2. In case of wireless devices, record device signal strength noted during device checkout.
- E. Controller and Workstation Checkout:
 1. Conduct field checkout of controllers and front end equipment including computers, printers, and related devices to verify proper operation of both hardware and software.
 2. Fill-out dated checkout sheet itemizing each device with description of associated tests applied for inclusion into the final report.
- F. System Acceptance Testing:
 1. Verify and compare loaded application software against approved sequences of operation.
 2. Control loops will be exercised by inducing a setpoint shift of at least 10 percent and observing whether the system successfully returns the process variable to setpoint. Record results for final report inclusion.
 3. Test each alarm within system and validate that system generates appropriate alarm message, appears at prescribed destinations mainly workstations or printers, and that other related actions occur as defined such as graphic-panels invoked, reports generated, and field actions. Record results for final report inclusion.
 4. Test each graphic-panel display, operation, and navigation; verify that appearance, content, and controls are correct and work as intended. Record results for final report inclusion.
 5. Execute Operational Testing:
 - a. Verify and test that each point is properly polled, associated alarm is configured and operates accordingly, linked to associated graphic-panel(s), and trend-data captures are included within configured reports.
 - b. Test each third party communications-link interface prior to testing each individual polled point. When the interface involves Ethernet file transfer then test associated logic that controls intended file transmission and verify specified information content.

3.05 SYSTEM STARTUP

- A. Manufacturer Services: Provide services of manufacturer's field representative to perform systems startup.
- B. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

- C. Installed Product Testing:
 - 1. Execute both startup and performance verification tests, upon completion have assigned technician to initiate and date accordingly.
 - 2. Provide respective startup performance verification test reports upon their completion.
- D. Startup Test Checklist Requirements:
 - 1. Measurement of primary and secondary voltage sources.
 - 2. Verification of proper controller power wiring.
 - 3. Verification of component inventory against submittal(s).
 - 4. Verification of labeling on components and wiring.
 - 5. Verification of connection integrity and quality (loose strands and tight connections).
 - 6. Verification of bus topology, grounding of shields and installation of termination devices.
 - 7. Verification of point checkout.
 - 8. Verify that each I/O device is landed according to approved submittal and functions per sequence of control.
 - 9. Verify that analog sensors are properly scaled with values correctly reported.
 - 10. Verify that binary sensors are properly configured with states correctly reported.
 - 11. Verify that analog outputs are properly configured and move full stroke when commanded.
 - 12. Verify that binary outputs are properly configured and respond appropriately to respective energize and de-energize commands.
 - 13. Document noted analog sensor calibration in terms of measured value, reported value, and calculated offset.
 - 14. Document control loop tuning in terms of sample rate, gain, and integral time constant.
- E. Performance Verification Test Checklist Requirements:
 - 1. Execute and complete written tests allowing operator system interaction.
 - 2. Develop detailed checklist to test and verify operator system interaction tasks including, but not limited to the following:
 - a. Graphics navigation.
 - b. Trend data collection and presentation.
 - c. Alarm handling, acknowledgement, and routing.
 - d. Time schedule editing.
 - e. Application parameter adjustment.
 - f. Manual control.
 - g. Report execution.
 - h. Automatic backups.
 - i. Web Client access.
- F. Control System Switchover:
 - 1. Demolition of existing control system will occur after system is in place with respective sensors and field interface devices.
 - 2. Switchover from existing control system to new system will be fully coordinated. Coordinate with Owner or representative on site during switchover.
 - 3. Minimize system downtime during switchover. Have sufficient installation mechanics on site so that entire switchover can be accomplished within reasonable time frame.

3.06 CLEANING

- A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.
- B. Upon work completion, check and thoroughly clean each equipment pertinent to this project, and other areas where products were installed.

3.07 COMMISSIONING

- A. See Section 019113 - General Commissioning Requirements for additional requirements.

- B. HVAC Cx Tests: See Section 230800 to coordinate with CxA requirements.
- C. iBMS Cx Tests: See Section 250800 to coordinate with CxA requirements.
- D. Functional Tests: Commission and set in operating condition interfaced equipment and systems such as chilled water plant, hot water plant, and air handling systems in the presence of respective equipment and system manufacturer's representatives, Owner, and Architect or their representatives as applicable.
- E. Analytics: When provided use AFDD or CCDT to generate analytics to help with system Cx otherwise use of system data logging feature to generate this data.

3.08 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals for additional submittals.
- B. See Section 017900 - Demonstration and Training for additional requirements.
- C. Demonstrate proper operation of equipment to Owner's designated representative.
- D. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Accommodate up to 10 attendees.
 - 2. Training Reference: Operation and maintenance manual and additional training materials as required.
 - 3. Provide minimum of 40 hours of training.
 - 4. Instructor: Manufacturer's training personnel.
 - 5. Location: Coordinate for on-site and classroom.
 - a. OWS and EWS Use and Programming: Include three days.
 - b. System Engineering and DDC Programming: Include two to three weeks.
 - c. Include listed training for 3 persons excluding travel, lodging, and daily expenses.
 - 6. Minimum Training Curriculum Topics:
 - a. System overview.
 - b. System software and operation.
 - c. System access.
 - d. Software features overview.
 - e. Changing setpoints and other attributes.
 - f. Scheduling.
 - g. Editing programmed variables.
 - h. Displaying color graphics.
 - i. Running reports.
 - j. OWS and EWS maintenance.
 - k. Viewing application programming.
 - l. Operational sequences including start-up, shutdown, adjusting, and balancing.

3.09 PROTECTION

- A. See Section 017610 - Temporary Protective Coverings for additional requirements.
- B. Protection of In-Place Conditions: Protect and maintain in-place conditions acceptable to ensure that equipment is undamaged at time of Substantial Completion.

3.10 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

END OF SECTION

SECTION 232113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.
 - 4. Pressure independent temperature control valves and balancing valves.
- F. Flow controls.

1.02 RELATED REQUIREMENTS

- A. Section 083100 - Access Doors and Panels.
- B. Section 099123 - Interior Painting.
- C. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- E. ASME B31.9 - Building Services Piping; 2020.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- H. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- I. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
- J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- L. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.
- M. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.
- N. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2023.

- O. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2020.
- P. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- Q. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.
- R. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2019).
- S. AWS D10.12M/D10.12 - Guide for Welding Mild Steel Pipe; 2000.
- T. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
- U. AWWA C606 - Grooved and Shouldered Joints; 2022.
- V. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 SUBMITTALS

- A. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Administrative Requirements for submittal procedures.
- B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- D. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping system shall be tested at a minimum of 125 PSI or 1.5 times the working pressure, whichever is greater per ASME B31.9 Standards.
- C. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.

- a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
 - b. Use rigid joints unless otherwise indicated.
- 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- 5. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- D. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
 - 1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.
- E. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
 - 2. On discharge of condenser water pumps, use spring-loaded check valves.
 - 3. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
 - 4. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
 - 5. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
 - 6. For shut-off and to isolate parts of systems or vertical risers, use gate, ball, or butterfly valves.

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D10.12M/D10.12 welded.
 - 2. Welded Joints: ASME IX Article V Appendix E
 - 3. Threaded Joints: ASME B16.3, malleable iron fittings.
 - 4. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:

2.03 EQUIPMENT DRAINS AND OVERFLOWS

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
 - 1. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
- C. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
 - 1. Fittings: ASTM D2466 or D2467, PVC.
 - 2. Joints: Solvent welded in accordance with ASTM D2855.

2.04 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Conform to ASME B31.9.

- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- F. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- J. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- K. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- L. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- M. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- N. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.
- O. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - 1. Bases: High-density polypropylene.
 - 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 3. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 - 5. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
 - 6. Manufacturers:
 - a. PHP Systems/Design: www.phpsd.com/#sle.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe of 2 Inches and Less:
 - 1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.
 - 2. Copper Piping: Bronze.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Grooved-End-Tube Couplings
 - a. Include ferrous housing sections cast with offsetting, angle pattern bolt pads, coated with copper-colored enamel, EDPM-synthetic rubber gaskets of a Flush Seal design suitable for hot and cold water, bolts and nuts. Victaulic Style 606
 - 2. Grooved-End-Tube Flange Adapters

- a. Ductile-iron casting, coated with copper-colored enamel, flat-faced, for engaging into roll grooved copper tube and fittings and bolting directly to flanges with ANSI Class 125 and 150 bolt hole patterns. Victaulic Style 641
3. Grooved-End-Tube Mechanical-T
 - a. Bronze upper housing and copper-colored enamel coated ductile iron lower housing, threaded outlet and locating collar, EPDM synthetic rubber gasket suitable for hot and cold water, and bolts and nuts. Victaulic Style 622
4. Dimensions and Testing: In accordance with AWWA C606.
5. Mechanical Couplings: Comply with ASTM F1476.
6. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
7. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
8. When pipe is field grooved, provide coupling manufacturer's grooving tools.
9. Flaring of tube and fitting ends to IPS dimensions is not permitted
10. Manufacturers:
 - a. Victaulic Company: www.victaulic.com/#sle.

2.06 BALL VALVES

- A. Manufacturers:
 1. Victaulic Company: www.victaulic.com.
 2. Apollo Vavles: www.apollovalves.com

2.07 BUTTERFLY VALVES

- A. Manufacturers:
 1. Apollo Vavles: www.apollovalves.com
 2. Victaulic Valve www.victaulic.com
- B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- C. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.
- D. Operator: 10 position lever handle.

2.08 SWING CHECK VALVES

- A. Manufacturers:
 1. Victaulic Company: www.victaulic.com.
 2. Apollo Vavles: www.apollovalves.com

2.09 SPRING LOADED CHECK VALVES

- A. Manufacturers:
 1. Apollo Valves: www.apollovalves.com
- B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer, or threaded lug ends.

2.10 PRESSURE INDEPENDENT TEMPERATURE CONTROL VALVES AND BALANCING VALVES

- A. Manufacturers:
 1. Danfoss; www.danfoss.com/#sle.

2.11 FLOW CONTROLS

- A. Manufacturers:
 1. ITT Bell & Gossett: www.bellgossett.com/#sle.
 2. Taco, Inc: www.taco-hvac.com/#sle.
 3. Apollo Vavles: www.apollovalves.com

- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. See Section 232500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interference with use of space.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipe passing through partitions, walls, and floors.
- G. Slope piping and arrange to drain at low points.
- H. All exposed, unfinished pipe, fittings, supports, and accessories shall be painted, all exterior piping shall have approved UV protection.
- I. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- J. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- K. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 .

- L. Provide stem extensions for all valves on systems with pipe insulation such that the valve can be cycled without damaging pipe insulation.
- M. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. See Section 099123.

END OF SECTION

SECTION 232114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compression tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Balancing valves.
- F. Automatic flow control valves.
- G. Flow meters.
- H. Relief valves.
- I. Pressure reducing valves.

1.02 RELATED REQUIREMENTS

- A. Section 221006 - Plumbing Piping Specialties: Backflow preventers.
- B. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.

1.04 SUBMITTALS

- A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
- B. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- D. Project Record Documents: Record actual locations of flow controls.
- E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 COMPRESSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc; www.amtrol.com/#sle.

2. Bell & Gossett, a brand of Xylem, Inc; www.bellgossett.com/#sle.
 3. Taco, Inc; www.taco-hvac.com/#sle.
- B. Construction: Closed, welded steel, tested, and stamped in accordance with ASME BPVC-VIII-1; cleaned, prime coated, and supplied with steel support saddles; with tapings for installation of accessories.
1. Pressure Rating: 100 psi.
- C. Gauge Glass Set: Brass compression stops, guard, and 3/4 inch red line glass, maximum 24 inches length, long enough to cover tank for 2 inches above bottom to 2 inches below top.
- D. Quick Connect Air Inlet:
1. Compressed Air: 72 inches of 1/4 inch diameter braided reinforced air hose, air chuck, check valve, and shut-off valve on supply from control air compressor.
 2. Expansion Tank: Inlet tire check valve, manual air vent, tank drain, and pressure relief valve.
- E. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure, double check backflow preventer, test cocks, strainer, vacuum breaker, and valved by-pass. Refer to Section 221006.

2.02 AIR VENTS

- A. Manufacturers:
1. Armstrong International, Inc; www.armstronginternational.com/#sle.
 2. Bell & Gossett, a brand of Xylem, Inc; www.bellgossett.com/#sle.
 3. Taco, Inc; www.taco-hvac.com/#sle.
- B. Manual Air Vent: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Air Vent:
1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
 2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.
- D. Maximum Fluid Pressure: 150 psi.
- E. Maximum Fluid Temperature: 250 degrees F.

2.03 AIR SEPARATORS

- A. In-line Air Separators:
1. Manufacturers:
 - a. Armstrong International, Inc; www.armstronginternational.com/#sle.
 - b. Bell & Gossett, a brand of Xylem, Inc; www.bellgossett.com/#sle.
 - c. Taco, Inc; www.taco-hvac.com/#sle.
 2. Cast iron for sizes 1-1/2 inch and smaller, or steel for sizes 2 inch and larger; tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure.
 3. Maximum Allowable Service Temperature: 450 degrees F.

2.04 STRAINERS

- A. Manufacturers:
1. Armstrong International, Inc; www.armstronginternational.com/#sle.
- B. Size 2 inch and Under:
1. Provide threaded, grooved, or sweat brass or iron body for up to 175 psi working pressure, Y-pattern strainer with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:

1. Provide flanged or grooved iron body for up to 175 psi working pressure, up to 250 degrees F working temperature, Y-pattern strainer with 1/16 inch or 3/64 inch stainless steel perforated screen.
 2. Body Material by Fluid Service:
- D. Size 5 inch and Larger:
1. Provide flanged or grooved iron body for up to 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.
 2. Liquid Fluid Service: Up to 285 psi at 100 degrees F.

2.05 BALANCING VALVES

- A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 2. Ferguson Enterprises Inc: www.fnw.com/#sle.
 3. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
 4. ITT Bell & Gossett: www.bellgossett.com/#sle.
 5. Taco, Inc: www.taco-hvac.com/#sle.
- B. Size 2 inch and Smaller:
1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded, soldered, or viega press fit connections.
 2. Metal construction materials consist of bronze or brass.
 3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C. Size 2-1/2 inch and Larger:
1. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
 2. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

2.06 AUTOMATIC FLOW CONTROL VALVES

- A. Manufacturers:
1. Hays Fluid Controls; Mesurflo Balancing Valve: www.haysfluidcontrols.com/#sle.
- B. Construction:
1. Brass, bronze, or iron body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
 2. Built-in lug-type outlet butterfly valve with 2-position handle.
- C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.
- D. Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.

2.07 FLOW METERS

- A. Manufacturers:
- B. Orifice principle by-pass circuit with direct reading gauge, soldered or flanged piping connections for working pressure, with shut off valves, and drain and vent connections.
- C. Direct reading with insert pitot tube, threaded coupling, for 150 psi working pressure, maximum 240 degrees F, 5 percent accuracy.
- D. Cast iron, wafer type, orifice insert flow meter for 250 psi working pressure, with read-out valves equipped with integral check valves with gasketed caps.
- E. Calibrated, plug type balance valve with precision machined orifice, readout valves equipped with integral check valves and gasketed caps, calibrated nameplate, and indicating pointer.

2.08 RELIEF VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc; www.armstronginternational.com/#sle.
 - 2. Bell & Gossett, a brand of Xylem, Inc; www.bellgossett.com/#sle.
 - 3. Conbraco Industries: www.apollovalves.com/#sle.
- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.09 PRESSURE REDUCING VALVES

- A. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 232113.
- B. Materials of Construction:
 - 1. Valve Body: Constructed of bronze, cast iron, brass, iron
 - 2. Internal Components: Construct of stainless steel, brass, and engineered plastics, composition material
- C. Connections:
 - 1. NPT threaded: 1/2 inch or 3/4inch.
 - 2. Soldered: 1/2 inch.
- D. Provide integral check valve and strainer.
- E. Maximum Inlet Pressure: 400 psi.
- F. Maximum Fluid Temperature: 180 degrees F.
- G. Adjustable Pressure Range: From 10 to 45 psi, set to 25 psi.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blowdown connection.
- G. Provide pump suction fitting on suction side of base-mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.
- H. Support pump fittings with floor-mounted pipe and flange supports.
- I. Pipe relief valve outlet to nearest floor drain.
- J. Where one line vents several relief valves, make cross-sectional area equal to sum of individual vent areas.

END OF SECTION

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ducts.

1.02 RELATED REQUIREMENTS

- A. Section 230130.51 - HVAC Air-Distribution System Cleaning: Post install duct cleaning.
- B. Section 230713 - Duct Insulation: External insulation and duct liner.
- C. Section 233300 - Air Duct Accessories.
- D. Section 233319 - Duct Silencers.
- E. Section 233700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- F. SMACNA (FGD) - Fibrous Glass Duct Construction Standards; 2021.
- G. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. Product Data: Provide data for duct materials, duct liner, and duct connections.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.

- C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 233319.
- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
- F. Duct Fabrication Requirements:
 - 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
 - 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
 - 3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
 - 4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
 - 5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
 - 6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
 - 7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- C. Flexible Ducts:
 - 1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -20 degrees F to 210 degrees F.
- D. Insulated Flexible Ducts:
 - 1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -20 degrees F to 210 degrees F.
- E. Low Pressure Supply (System with Cooling Coils): 1 inch w.g. pressure class, galvanized steel.
- F. Medium and High Pressure Supply: 6 inch w.g. pressure class, galvanized steel.
- G. Return and Relief: 1 inch w.g. pressure class, galvanized steel.
- H. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

- I. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.03 DUCTWORK FABRICATION

- A. Fabricate ductwork gauge in accordance with current (CMC) California Mechanical Code and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Tee's, bends, and elbows: Construct according to (CMC) California Mechanical Code and SMACNA (DCS).
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 DUCT MANUFACTURERS

- A. Metal-Fab, Inc: www.mtlfab.com.
- B. SEMCO Incorporated: www.semcoinc.com.
- C. United McGill Corporation: www.unitedmcgill.com.

2.05 METAL DUCTS

- A. Material Requirements:
 - 1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- E. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
- F. Locate ducts and dampers with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
- H. Use double nuts and lock washers on threaded rod supports.

- I. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- J. Connect diffusers or return air boots to low pressure ducts with 5 feet maximum length of flexible duct.
- K. Flexible air ducts shall not be used in lieu of ridged elbows or fittings. Flexible air ducts shall be permitted to be used as an elbow at a terminal device
 - 1. Elbow at a terminal device shall be provide with straps and support, "FlexRight" (Durable Elbow Support).
 - 2. Shall be a universal-mount, 1-piece, fully adjustable, radius forming brace
 - 3. Classified: UL 2043
 - 4. Material: 100 percent recycled copolymer polyporpylene
 - 5. Support Frame Radius: 8 Inches
 - 6. Compliance for Flexible Duct Radius with SMACNA HVAC Duct Construction Standards and ASHRAE Advanced Energy Design Guides
 - 7. Manufacturer: Build Right Products or equal
- L. Install flexible duct elbow supports in accordance with manufacturer's instructions.
- M. Install flexible duct elbow supports over outer jacket of flexible ducts to form smoot, 90-degree bends to eliminate flexible duct kinks and airflow restrictions
- N. Make bends in flexible ducts with minimum of 1-duct diamter centerline radius
- O. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- P. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.02 CLEANING

- A. Clean thoroughly each duct system. See Section 230130.51.
- B. Clean duct system by forcing air at high velocity through duct to remove accumulated dust. Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

END OF SECTION

SECTION 233300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers.
- C. Duct access doors.
- D. Duct test holes.
- E. Flexible duct connectors.
- F. Volume control dampers.

1.02 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
- D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- E. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.

1.04 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Manufacturers:
 - 1. Krueger-HVAC, Division of Air System Components: www.krueger-hvac.com/#sle.
 - 2. PCI Industries, Inc; Pottorff Brand; www.portorff.com.
 - 3. Ruskin Company: www.ruskin.com/#sle.
 - 4. Titus HVAC, a brand of Johnson Controls: www.titus-hvac.com/#sle.
- B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with worm drive mechanism with removable key operator.

2.02 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
 - 4. Ruskin Company: www.ruskin.com/#sle.

- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Nailor Industries, Inc: www.nailor.com/#sle.
 - 2. Ruskin Company: www.ruskin.com/#sle.
 - 3. SEMCO LLC: www.semcohvac.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.04 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.

2.05 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
 - 4. Ruskin Company: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. 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

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 233100 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 and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 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. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- G. 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.

END OF SECTION

SECTION 233600
AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-duct terminal units.
 - 1. Constant-volume units.
 - 2. Variable-volume units.
- B. Air volume control valves.

1.02 RELATED REQUIREMENTS

- A. Section 230548 - Vibration and Seismic Controls for HVAC.
- B. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).
- B. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units; 2016.
- C. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2019).
- D. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope; 2019.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- F. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.
- G. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 SINGLE-DUCT, VARIABLE-VOLUME AND CONSTANT-VOLUME UNITS

- A. Manufacturers:
 - 1. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp.: www.commercial.carrier.com/#sle.
 - 2. Price Industries; www.priceindustries.com/#sle.
- B. General:

1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
 2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.
- C. Unit Casing:
1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
 3. Unit Discharge: Rectangular, with slip-and-drive connections.
 4. Acceptable Liners:
 - a. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.
- D. Damper Assembly:
1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
 2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
 3. Incorporate low leak damper blades for tight airflow shutoff.
- E. Controls:
1. DDC (Direct-Digital Controls):
 - a. Bi-directional Damper Actuator: 24 volt, powered closed, spring return open.
 - b. Microprocessor-Based Controller: Air volume controller, pressure-independent with electronic airflow transducers, factory-calibrated maximum and minimum CFMs.
 - 1) Occupied and unoccupied operating mode.
 - 2) Remote reset of temperature or CFM set points.
 - 3) Proportional, plus integral control of room temperature.
 - 4) Monitoring and adjusting with portable terminal.
 - c. Room Sensor:
 - 1) Compatible with temperature controls specified.
 - 2) Wall-mounted, system powered, with temperature set-point adjustment including connection access for portable operator terminal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.
- C. Provide ceiling access doors or locate units above easily removable ceiling components.
- D. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.
- E. Do not support from ductwork.
- F. Connect to ductwork in accordance with Section 233100.

3.02 ADJUSTING

- A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow. Set units with heating coils for minimum 50 percent full flow.

3.03 SCHEDULES SHOWN ON SHEET M-0.2

END OF SECTION

SECTION 233700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
- B. Rectangular ceiling diffusers.
- C. Registers/grilles:
 - 1. Ceiling-mounted, exhaust and return register/grilles.
 - 2. Ceiling-mounted, supply register/grilles.
- D. Fabric air distribution devices.

1.02 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
- B. ARI 890 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2008.
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.03 SUBMITTALS

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit sheets indicating materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.

1.04 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Krueger: www.krueger-hvac.com.
- B. Price Industries: www.price-hvac.com.
- C. Titus: www.titus-hvac.com.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square, adjustable pattern, stamped, multi-core diffuser to discharge air in four way pattern with sectorizing baffles where indicated.
- B. Frame: T-Bar and Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame. In T-Bar ceiling provide filler panel.
- C. Fabrication: Steel with baked enamel off-white finish.

2.03 CEILING SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Aluminum extrusions with factory off-white enamel finish.
- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.05 FABRIC AIR DISTRIBUTION DEVICES

- A. General Requirements:
 - 1. Diffuser material to comply with ASTM E84, UL 723, UL 2518, NFPA 90A, and NFPA 90B.
 - 2. Air Dispersion Method:
 - 3. Hanger Supports:

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with airtight connection.
- D. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.

3.02 SCHEDULES SHOWN ON SHEET M0.1

END OF SECTION

SECTION 233813
COMMERCIAL-KITCHEN HOODS

PART 2 PRODUCTS

1.01 HOOD APPLICATIONS

1.02 HOOD CONSTRUCTION

- A. Provide products that comply with NFPA 96, the requirements and recommendations of SMACNA (KVS), and the requirements of the Authorities Having Jurisdiction.
- B. Construction: Materials, inside and out, are stainless steel complying with ASTM A666/A666M, Type 304, stretcher leveled; unless otherwise indicated.
 - 1. Sheet Thickness: 18 gauge, 0.048 inch, minimum.
 - 2. Fabrication: Fabricate each individual hood in one piece, with all welds ground and finished to match (inside and out); fabricate flat surfaces exposed to view as double-pan formed panels with internal stiffener members.
 - 3. Finish on Surfaces Exposed to View: No.4 (brushed directional); provide stainless steel faces on all sides exposed to view.
 - 4. Finish on Concealed Surfaces: No.4 or No.2B (dull, matte).
 - 5. Duct Collars: For exhaust and make-up air openings, provide duct collar welded to hood unit; minimum of 8 inches extension from top or back face of unit, with minimum one inch 90 degree flange, unless otherwise indicated.
 - 6. Access Panels: Provide removable or hinged access panels sufficient for maintenance and replacement of operating components inside unit; maximum width of 40 inches.
 - 7. Supports: Stainless steel mounting brackets, struts, and threaded hanger rods.
 - a. Hanger Rods: 3/8 inch diameter, minimum.
 - b. Hanger Spacing: 48 inches on center, maximum.
 - c. Attachment to Structure: Mechanical fittings or inserts, stainless steel.

1.03 HOOD ACCESSORIES

- A. Controls:
 - 1. Fans: Provide manual push button controls for starting and stopping fans and labeled indicator lights showing fan status.
 - 2. Fans: Provide controls for fan operation by time clock, programmable by the week, capable of maintaining time cycle after operation of manual push buttons.
- B. Control Panels: Factory assembled and pre-wired, ready for utility connections.
 - 1. UL listed for use with specific hood.
 - 2. Provide a single control panel combining all control functions for a particular hood, unless otherwise indicated.
 - 3. Provide a single control panel for each group of hoods served by a single exhaust fan.
 - 4. Enclosures: Flush-mounted; stainless steel, to match hood.
 - 5. Provide indicator lights on control panel door showing status of fans and power supply.

END OF SECTION

SECTION 234000
HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extended surface high efficiency media filters.

1.02 REFERENCE STANDARDS

- A. AHRI 850 (I-P) - Performance Rating of Commercial and Industrial Air Filter Equipment; 2013 (Reaffirmed 2023).
- B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).

1.03 SUBMITTALS

- A. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.01 FILTER MANUFACTURERS

- A. American Air Filter Company, Inc; www.aafintl.com/#sle.
- B. Camfil, a company of the The Camfil Group; www.camfil.us/#sle.
- C. CLARCOR Air Filtration Products: www.airguard.com

2.02 EXTENDED SURFACE HIGH EFFICIENCY MEDIA FILTERS

- A. Media: Pleated, water-resistant glass fiber with kraft separators; in fiber board frame with corrosion resistant coating.
- B. Minimum Efficiency Reporting Value (MERV): 15, when tested in accordance with ASHRAE Std 52.2.
- C. Performance Rating, per ASHRAE Std 52.2:
 - 1. Dust Spot Efficiency: 80-85 percent.
 - 2. Initial Resistance at 150 fpm Face Velocity: 0.35 in-wc.
 - 3. Recommended Final Resistance: 1.5 in-wc.

PART 3 EXECUTION

3.01 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. 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 260010
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

- A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The work required under this division is not limited to the electrical specifications and drawings. Refer to all bid documents including Civil, Architectural, Structural, and Mechanical documents which may designate Work to be accomplished. The intent of the Specifications is to provide a complete and operable electrical system, which shall include all documents that are a part of the entire Project Contract.
 - 1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this division complete as shown or noted on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Refer to all sections in the general contract conditions, Contract Requirements.
- C. Work Installed but Furnished by Others:
 - 1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.02 GENERAL REQUIREMENTS

- A. Guarantee See General Conditions:
 - 1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guarantee period, from date of final completion. Guarantee all work against defective workmanship, material, and improper installation. Upon notification of failure, correct deficiency immediately and without additional cost to the Owner.
 - 2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor.
- B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.
- C. Codes and Regulations:
 - 1. Design, manufacturer, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:
 - a. Institute of Electrical and Electronic Engineers - IEEE
 - b. National Electrical Manufacturers' Association - NEMA
 - c. Underwriters' Laboratories, Inc. - UL
 - d. National Fire Protection Association - NFPA
 - e. American Society for Testing and Materials - ASTM
 - f. American National Standards Institute - ANSI

- g. California Electrical Code - CEC, Title 24, Part 3
 - h. California Code of Regulations, Title 8, Subchapter 5
 - i. California Building Code-CBC, Title 24 Parts 1 &2
 - j. State & Municipal Codes in Force in the Specific Project Area
 - k. Occupational Safety & Health Administration - OSHA
 - l. California State Fire Marshal
 - m. California Fire Code- CFC, Title 24 Part 9
 - n. National Electrical Testing Association - NETA
2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.
- D. Requirements of Regulatory Agencies:
- 1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply. The most stringent condition shall be as interpreted by the Engineer.
 - a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Contractor at his expense shall obtain the Work, unless otherwise specified.
 - b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.
- E. Shop Drawings:
- 1. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor for additional requirements.
 - 2. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinate his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.
 - 3. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.
 - 4. Submit a complete list of materials and equipment proposed for the job, including manufacturers names and catalog numbers.
 - 5. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces". Failure to add the above written statement for compliance will result in return of submittals without review.
 - a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" (275 mm x 435 mm) or smaller, in sets with covers neatly showing titles.
 - b. The Contractor shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.
 - c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.
 - d. Include complete catalog information such as construction, ratings, insulation systems, as applicable.

- e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendor's certification that the material furnished for the work does in fact equal or exceed such specifications.
 - f. Reference listings to the specifications' Sections and Article to which each is applicable.
 - g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment space, room or yard, drawn to scale at 1/2 inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.
- 6. Contractor shall prepare coordinated drawings when required by Division 01 or where noted otherwise.
- F. Interpretations: The Contractor through the Architect must make Requests for interpretations of drawings and specifications. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.
- G. Standard of Quality
 - 1. The contract Drawings and Specifications establish the "MINIMUM STANDARD OF QUALITY" each product and/or system must meet to be considered acceptable. Products of other manufactures will be considered if the product and/or system meet or exceed the "MINIMUM STANDARD OF QUALITY" established by this Contract Document.
 - 2. Items for similar application shall be of the same manufacturer.
 - 3. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.
 - 4. Where codes as listed in Section General Requirement Section of the Specifications that establish label or approved requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.
 - 5. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.
 - 6. Provide and install all incidental items that belong to the Work described and which are required for complete systems.
 - 7. All switchboards, distribution boards, panel boards and circuit breakers shall be of the same manufacturer.
 - 8. All wiring devices such as switches and receptacles shall be of the same manufacturer.
- H. Substitutions: Refer to Division 01
- I. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:
 - 1. General Requirements:
 - a. Main service and distribution switchboards.
 - b. Panelboards.
 - c. Conduits
 - d. Conductors, include all selected insulation types.
 - e. Fuses
 - f. Disconnect switches and Starters.
 - g. Pullboxes, manholes and handholes.
 - h. Standard lighting fixtures, specially fabricated fixtures, ballasts and lamps, with samples and sample of standard finish available (where requested).
 - i. Control devices, standard and special receptacles, switches, outlets and finish device plates.
 - j. Cabinets for signal and telephone system, special terminals and cabinets. Include all cabinet dimensions.
 - k. Fire alarm system.
 - l. Transformers

- J. Utility Service:
1. Contractor shall verify the locations shown on the drawings and shall include extensions of lines to building service from locations which are acceptable to the Owner.
 2. Verify electrical, civil, architectural and structural, dimensional and other requirements with the Owner.
 3. Should any major modifications to the work indicated be necessary to comply with the Owner requirements, notify the Architect.
 4. Contractor shall contact the utility company representatives to establish pre-construction coordination, obtain all necessary meters and/or approvals, and schedule utility work to coordinate with the construction schedule.
 5. All utility services shall be installed per the utility company requirements. Verify final construction requirements with utility company service planners prior to construction.
- K. Record Drawings: Refer to Division 01, Contract Closeout.
- L. Work Responsibilities:
1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts occur in plans and/or specifications, the most stringent application shall apply and shall be part of the base bid.
 2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.
 3. In the event minor changes in the indicated locations or arrangement are necessary due to developed conditions in the building construction or rearrangement of furnishings or equipment or due to interference with other trades, such changes shall be made without extra cost.
 4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.
 5. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the furnished equipment will fit into the spaces provided without violation of applicable Codes.
 6. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Architect.
 7. Contractor shall be responsible for coordination of coordinated drawings when required by the Architect.
 8. Replace or repair, without additional compensation any work which does not comply with or which is installed in violation of any of these requirements.
- M. Installation General: For special requirements, refer to specific equipment under these requirements.
1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for the proper installation of the electrical work.
 2. Locations of Openings: Locate chases, shafts and openings required for the installation of the electrical work during framing of the structure. Do any additional cutting and patching required. Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish all access panels to make all boxes, connections and devices accessible as required by CEC.
 3. Location of Sleeves: Where conduits pass through concrete walls, suspended slabs or metal deck floors, install sleeves of adequate size to permit installation of conduit. Sleeves shall be installed prior to pouring of concrete and shall have ends flush with the wall or extend 2 inches above floor surfaces. Verify locations.

4. Wherever conduit extends through roof, install flashings in accordance with drawings and details.
 5. Contractor shall be responsible for cutting and patching which may be required for the proper installation of the electrical work.
 6. Protect work, materials and equipment and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damaged or defective work, materials and equipment before requesting final acceptance.
 7. Conduit and Equipment to be Installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior. All underground conduits shall be mandrelled prior to pulling wire.
 8. Conduit and Equipment to be Painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.
 9. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.
 10. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish on a weekly basis. Vacuum out all cabinets, switchgear and panels and junction boxes prior to pulling any conductors.
 11. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type fasteners, exterior, or interior in restrooms, shall be vandal-resistant spanner type; include tool.
- N. Excavation, Cutting and Patching:
1. Excavating, trenching and backfilling required for the work of this Division in accordance with the applicable requirements of Division 2. Excavating and backfilling connected with electrical work, repaving cuts and providing and maintaining protective measures for the electrical work excavation required by the governing authorities having jurisdiction shall be performed as a part of the work of this Division.
 2. Verify openings indicated on the drawings. Provide all cutting, patching and reinforcement of the construction of the building as required to install electrical work.
- O. Tests
1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.
 2. Resistance to ground tests shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make tests before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistances exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.
 3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.
 4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.
 5. Upon completion of the work and adjustment of all equipment, conduct an operating test. Conduct the test in the presence of an authorized representative of the Owner's Representative. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical

- defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.
6. Complete tests prior to final inspection of project, including corrective work based on the results of the tests.
 7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.
- P. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damaged or marred. Keep moving parts clean, dry and lubricated.
- Q. Cleaning Up:
1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.
 2. Thoroughly clean switchgear including busses, apparatus, exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.
 3. Thoroughly polish chromium or plated work. Remove dirt and stains from lighting fixtures.
 4. Leave the entire installation in a clean condition.
- R. Completion:
1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.
 2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.
- S. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists. As specified in Division 01
- T. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of Completion of the project will not be made until all items have been corrected.
- U. Final Completion of Electrical Systems:
1. Prior to Final Completion of operating electrical systems, the Contractor shall:
 - a. Provide materials of the type and quality specified and as necessary for proper operation, tested and ready for use.
 - b. Furnish the required Operating and Maintenance Data/Manuals.
 - c. Clean up of the project pertaining to this Division of the work.
 - d. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.
 - e. Conduct tests required and as specified in this Division and submit test reports and corrective actions taken.
 - f. Submission of warranties and guarantees.
 2. Final Completion of Work Shall be Contingent On:
 - a. Contractor replacing defective materials and workmanship.

- b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each system for approval at such time as Architect directs. Conduct test in presence of authorized representative of Architect and demonstrate that systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defects.
 - c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours shall be a minimum of four (4) hours for each system or days as required under separate Sections of these Specifications. Complete operation and maintenance manuals shall be provided at least two (2) weeks prior to training.
 - d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.
- V. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor. Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.
- W. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of all equipment and systems. The instructors shall have received factory training and shall be thoroughly familiar with the equipment installed. The operating personnel shall receive the number of days instruction as indicated in other sections.

1.03 PROJECT RECORD DOCUMENTS

- A. Record Drawings: CAD: Use a computer aided drafting (CAD) system in the preparation of record drawings for this Project. Acceptable CAD systems shall be capable of producing files in AutoCAD Version 2012 compatible DWG or DXF format. Owner's consultant will furnish CAD backgrounds for use by the Contractor after construction is 85% complete except where prohibited by Contract.
- B. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.
- C. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.
- D. Final Record Drawings: Conform to Division 01 requirements.
- E. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.
- F. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.
- G. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.
- H. At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies, a complete separate, clean, undamaged set of the latest stamped, actioned submittals. As work progresses, maintain records of "as installed" conditions on this set in suitable ink or chemical fluid. Update the set daily. After successful completion of Project Site

testing specified herein, and after completion of Punch List corrections, copy all records of "as installed" conditions on to originals.

- I. Quantity:
 - 1. Review sets: As for Shop and Field Drawings.
 - 2. Record set: Refer to Division 01.
- J. Content: All drawings required under "Field and Shop Drawings". Show "as installed" condition. Where room designations according to Project permanent signage differ from construction designations in the Contract Documents, show both designations.
- K. Warranty Certificates: Comply with Division 01.

PART 2 - COMMISSIONING

2.01 COMMISSIONING OF ELECTRICAL SYSTEMS

- A. Include cost for commissioning requirements in the contract price.
- B. Attend commissioning meetings scheduled by the CxA.
- C. Prepare preliminary schedule for indoor lighting system inspections, O&M manual submission, training sessions, lighting controls testing, system verification, performance testing, and system completion for use by the CxA. Update schedule as appropriate throughout the construction period and provide updated schedule to the commissioning team.
- D. Verify proper installation and performance of all electrical services provided.
- E. Complete Title 24 Certificate(s) of Installation and manufacturer's pre-start checklists prior to scheduling startup of HVAC and electrical equipment.
 - 1. Retain Certificate(s) of Installation in a 3-ring binder in an organized fashion. Binder is to remain on the job site
 - 2. Make Certificate(s) of Installation available for CxA review upon request.
 - 3. Retain calibration records for equipment provided with manufacturer calibrated sensors in the Certificate(s) of Installation binder.
- F. Where applicable, complete the Certificate(s) of Acceptance per the contract documents.
 - 1. Retain Certificate(s) of Acceptance in a 3-ring binder in an organized fashion. Binder is to remain on the job site
 - 2. Provide copies of all Certificate(s) of Acceptance to the CxA.
 - 3. Certificate(s) of Acceptance shall be conducted by companies who are certified as California Advanced Lighting Controls Training Program Acceptance Technician (CALCTP-AT) employer and only completed by those employees of said company who are certified to complete the respective acceptance test.
- G. Monitor and respond to Resolution Tracking Forms distributed by the CxA in order to expedite corrective actions necessary to achieve design intent.
- H. Participate in the Certificate(s) of Acceptance and Functional Performance Tests as required to achieve design intent.
- I. Participate in the opposite-season testing as required to achieve design intent.
- J. Participate in O&M Training as required by project specifications.
- K. Ensure participation of major equipment manufacturers and their representatives as applicable.
- L. Obtain O&M data on all equipment and assemble in binders using tabs as required.
- M. Conduct a maintenance orientation and inspection with hands on training per the contract documents.
- N. Provide written certification and completed Certificate(s) of Installation forms and checklists documenting that the following work has been completed in accordance with the plans and specifications and that they are functioning as designed.
 - 1. Correct labeling of all circuits with connected equipment.

2. Lighting system controls operations, including occupancy sensors, automatic time controls or Energy Management control, override timers, manual dimming controls, exterior lighting controls, multi-level switching, as applicable to the Work.

END OF SECTION

SECTION 260505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 3 EXECUTION

1.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Beginning of demolition means installer accepts existing conditions.

1.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

1.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

END OF SECTION

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Nonmetallic-sheathed cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
- I. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- R. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is permitted only as follows:
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 3. Tinned Copper Conductors: Comply with ASTM B33.
- I. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 - 4) 20A exterior circuits: 10 AWG..
 2. Control Circuits: 14 AWG.
- J. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Southwire Company: www.southwire.com/#sle.
 - d. Rome Wire and Cable.
 - e. Okonite Wire
 - f. Pirelli Wire and Cable
 - g. Carol Cable
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:

1. Copper Building Wire: Type THHN/THWN-2, except as indicated below.
 - a. Size 1 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2 or THHN/THWN-2.
2. Size 10 AWG and Smaller: Solid.
3. Size 8 AWG and Larger: Stranded.

2.04 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.05 ACCESSORIES

- A. Electrical Tape:
 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

- C. Wire Pulling Lubricant:
 - 1. Listed and labeled as complying with UL 267.
 - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 - 3. Suitable for use at installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 - 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
 - 9. Provide oversized neutral/grounded conductors where indicated and as specified below.
 - a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 - 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- G. Terminate cables using suitable fittings.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.
- I. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- P. Identify conductors and cables in accordance with Section 260553.

- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section Firestopping.
- R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 260519.13
UNDERCARPET ELECTRICAL POWER CABLES

PART 2 PRODUCTS

1.01 UNDERCARPET CABLE SYSTEM

- A. Provide new undercarpet cable system consisting of all required components, fittings, devices, accessories, etc. as necessary for a complete system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use undercarpet cables for applications other than as permitted by NFPA 70 and product listing/classification.
- D. Transition Fittings: Undercarpet cable system manufacturer's transition boxes and transition blocks for interface between conventional premises wiring systems and undercarpet cables.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- F. Ground access wells.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Field quality control test reports.
- C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 - 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 5. Ground Rod Electrode(s):
 - a. Provide two electrodes unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.

- c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - d. Provide ground access well for each electrode.
- 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- 7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- G. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 - 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
 - 1. Provide grounding electrode system for each separate building or structure.
 - 2. Provide equipment grounding conductor routed with supply conductors.
 - 3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
 - 4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.
- I. Separately Derived System Grounding:
 - 1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 - 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 - 4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
 - 5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
 - 6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.

7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- J. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
 - c. Metal process piping.
 8. Provide bonding for interior metal air ducts.
 9. Provide bonding for metal building frame.
 10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
- K. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
- F. Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
 2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
 4. Cover: Factory-identified by permanent means with word "GROUND".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
- D. Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

- E. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze conduit hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for conduit and electrical equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
- C. Design supports for multiple conduits capable of supporting combined weight of supported systems, system contents, and conductors.
- D. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- E. Design seismic-restraint hangers and support for conduit and equipment and obtain approval from authorities having jurisdiction.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - 6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
 - 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 - 2. Comply with MFMA-4.
 - 3. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 - 2. New Concrete: Use preset concrete inserts.
 - 3. Existing Concrete: Use expansion anchors.

4. Solid or Grout-Filled Masonry: Use expansion anchors.
5. Hollow Masonry: Use toggle bolts.
6. Hollow Stud Walls: Use toggle bolts.
7. Steel: Use welded threaded studs complying with AWS D1.1/D1.1M with lock washers and nuts or Beam clamps (MSS Type 19 21 23 25 or 27) complying with MSS SP-69.
8. Sheet Metal: Use sheet metal screws.
9. Wood: Fasten with lag screws or through bolts.
10. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
11. Plastic and lead anchors are not permitted.
12. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
 - b. Comply with MFMA-4.
 - c. Channel Material: Use galvanized steel.
13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

- J. Secure fasteners in accordance with manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete or Cast-in-Place Concrete (Limited Applications)" as applicable.
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturers written instructions.

3.04 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. PVC-coated galvanized steel rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Galvanized steel electrical metallic tubing (EMT).
- F. Reinforced thermosetting resin conduit (RTRC).

1.02 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.
- G. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series; 2015.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- K. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- M. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- N. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- B. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

1.05 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use rigid PVC conduit.
 - 3. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.
 - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
 - 5. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
 - 6. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches on either side of where conduit emerges.
- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.

- J. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.
- L. Corrosive Locations Above Ground: Use stainless steel rigid metal conduit (RMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), stainless steel electrical metallic tubing (EMT), or reinforced thermosetting resin conduit (RTRC).
- M. Hazardous/Classified Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).
- N. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
 - 1. Maximum Length: 6 feet.
- O. Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit (FMC).
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- P. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4-inch trade size.
 - 3. Control Circuits: 1/2-inch trade size.
 - 4. Flexible Connections to Luminaires: 3/8-inch trade size.
 - 5. Underground, Exterior: 1-inch trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

2.05 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
- C. PVC-Coated Boxes and Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
 - 3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
 - 4. Material: Use steel or malleable iron.
 - 5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.07 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression/gland type.
 - a. Do not use indenter type connectors and couplings.
 - b. Do not use set-screw type connectors and couplings.
 - 4. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.
 - 5. Embedded Within Concrete, Where Permitted: Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.10 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
- B. Supports: As recommended by manufacturer.
- C. Fittings: Same type and manufacturer as conduit to be connected.

2.11 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.
- D. Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.
- E. PVC-Coated Galvanized Steel Rigid Metal Conduit (RMC): Install using only tools approved by manufacturer.
- F. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal conduits unless specifically indicated to be exposed.
 - 4. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 5. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 6. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
 - 7. Arrange conduit to provide no more than 150 feet between pull points.
 - 8. Route conduits above water and drain piping where possible.
 - 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 - 11. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 12. Group parallel conduits in same area on common rack.
- G. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
 8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
 9. Use of spring steel conduit clips for support of conduits is not permitted.
 10. Use of wire for support of conduits is not permitted.
- H. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 7. Secure joints and connections to provide mechanical strength and electrical continuity.
- I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
 7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
- J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 18 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 2. Provide underground warning tape in accordance with Section 260553 along entire conduit length.
- K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section Concrete with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
 - 3. Where conduits are subject to earth movement by settlement or frost.
- M. Conduit Sealing:
 - 1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- O. Provide grounding and bonding; see Section 260526.
- P. Identify conduits; see Section 260553.

3.03 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor - Product Requirements, for additional provisions.
2. Keys for Lockable Enclosures: Two of each different key.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 13. Wall Plates: Comply with Section 262726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:

3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
 4. Locate boxes so that wall plates do not span different building finishes.
 5. Locate boxes so that wall plates do not cross masonry joints.
 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.

- H. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 260526.

3.02 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 260533.23

SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 RACEWAY REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

END OF SECTION

SECTION 260536
CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 CABLE TRAY SYSTEM - GENERAL REQUIREMENTS

- A. Provide new cable tray system consisting of all required components, fittings, supports, accessories, etc. as necessary for a complete system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use cable tray for applications other than as permitted by NFPA 70 and product listing/classification.
- D. Provide cable tray system and associated components suitable for use at indicated span/load ratings under the service conditions at the installed location.
- E. Unless otherwise indicated, specified span/load ratings are based on safety factor of 1.5 and working load only (no additional concentrated static load), with ratings for metal cable tray systems in accordance with NEMA BI 50015.
- F. Unless otherwise indicated, specified load/fill depths and inside widths are nominal values, with values for metal cable tray systems in accordance with NEMA BI 50015 including applicable allowable tolerances.

END OF SECTION

SECTION 260539

UNDERFLOOR RACEWAYS FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 DUCT SYSTEM REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete duct system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use duct systems for applications other than as permitted by NFPA 70 and product listing.

END OF SECTION

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2023.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
- E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Switchboards:
 - 1) Identify ampere rating and name.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify main overcurrent protective device.
 - 5) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - b. Panelboards:
 - 1) Identify ampere rating and name.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - c. Transformers:
 - 1) Identify kVA rating and name.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify load(s) served. Include location when not within sight of equipment.
 - d. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

- a. Minimum Size: 3.5 by 5 inches.
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
- 6. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.
 - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
 - 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- C. Identification for Raceways:
 - 1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
 - 2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
 - 3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
 - 4. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
 - a. For exposed boxes in public areas, use only identification labels.
- E. Identification for Devices:
 - 1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
 - 2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
 - 3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
- F. Identification for Luminaires:
 - 1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
 - b. Other Information: 1/4 inch.
 - 5. Color:
 - a. Normal Power System: White text on black background.
- D. Format for Caution and Warning Messages:
 - 1. Minimum Size: 2 inches by 4 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/2 inch.
 - 5. Color: Black text on yellow background unless otherwise indicated.
- E. Format for Receptacle Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Power source and circuit number or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.
- F. Format for Control Device Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Load controlled or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 - 1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
 - 2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 - 3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 - 4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
- E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.
 - 9. Conductors and Cables: Legible from the point of access.
 - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 260583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.

- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 260923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 260529 - Hangers and Supports for Electrical Systems
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section : Devices for manual control of lighting, including .
- F. Section 265100 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of lighting control devices with millwork, furniture, equipment and other potential conflicts.
 - 2. Coordinate placement of wall switch occupancy sensors with installed door swings.
 - 3. Coordinate placement of occupancy sensors with millwork, furniture, equipment and other potential obstructions to motion detection coverage.
 - 4. Coordinate placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement.
 - 5. Coordinate lighting control device product selections with luminaire characteristics; see Section 265100 and lighting fixture schedule.
 - 6. Notify Architect of conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. Product Data: Include ratings, operating modes or sequence of functions, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- B. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
 - 2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

- C. Field quality control reports.
- D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Include detailed information on device programming and setup.
- F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Maintain at project site one copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. Provide five year manufacturer warranty for occupancy sensors.
- B. Provide five year manufacturer warranty for all daylighting controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for purpose intended.
- B. Unless specifically indicated as excluded, provide components necessary for complete operating system including, but not limited to, conduit, wiring, connectors, hardware, and accessories.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that service voltage and ratings of lighting control devices are appropriate for service voltage and load requirements at location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes as required for installation of lighting control devices; see Section 260533.16.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
 - 3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Maintain separation of remote-control, signaling, and power-limited circuits.
 - 1. See manufacturer instructions and Section 260519 for control wiring conductors, wiring methods, and identification requirements.
- D. Install lighting control devices in accordance with manufacturer's instructions.
- E. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- F. Install lighting control devices plumb and level, and held securely in place.
- G. Where required and not furnished with lighting control device, provide wall plate; see Section 262726.
- H. Provide required supports; see Section 260529.
- I. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- J. Identify lighting control devices; see Section 260553.
- K. Daylighting Control Photo Sensor Locations:
 - 1. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure light level controlled at designated task location, while minimizing measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
 - 2. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into space, while minimizing measured amount of lighting from artificial sources.
- L. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near sensor location.
- N. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.
- O. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

3.04 FIELD QUALITY CONTROL

- A. Inspect each lighting control device for damage and defects.
- B. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.
- C. Correct wiring deficiencies and replace damaged or defective conductors, cables, and lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of installed lighting control devices.
 - 4. Location: At project site.

END OF SECTION

SECTION 260943
NETWORK LIGHTING CONTROLS - NLIGHT

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Network lighting control system and components:
 - 1. Touch panel controls
 - 2. Lighting management panels
 - 3. Lighting management modules
 - 4. Low voltage wall stations
 - 5. Power interfaces
 - 6. Wired sensors

1.02 RELATED DOCUMENTS

- A. Section 262726 Wiring Devices
- B. Section 260923 Lighting Control Devices
- C. Section 260943.13 Digital-Network Lighting Controls
- D. Section 260943.16 Addressable Fixture Lighting Control
- E. Section 260943.19 Wireless Network Lighting Controls
- F. Section 265113 Interior Lighting Fixtures

1.03 SUMMARY

- A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control
- B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed). Specific dimmers will be capable of "dimming lights to off"
- C. All system devices shall be networked together, enabling digital communication between devices, and shall be individually addressed.
- D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lost.
- E. The system architecture shall facilitate remote operation via a computer connection.
- F. The system shall not require any centrally hardwired switching equipment.
- G. The system shall be capable of wireless, wired, or hybrid wireless/wired architectures.

1.04 SUBMITTALS

- A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature)
- B. Riser Diagrams – typical per room type (detailed drawings showing device interconnectivity of devices)
- C. Other Diagrams – as needed for special operation or interaction with other system(s)
- D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up
- E. Hardware and Software Operation Manuals
- F. Other operational descriptions as needed

1.05 PROJECT CLOSEOUT DOCUMENTATION

- A. Provide a factory published manual
 - 1. Warranty

2. Technical support contact
3. Electronic manual on manufacturer's website for free download

1.06 QUALITY ASSURANCE

- A. All steps in sensor manufacturing process shall occur in North America; including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.
- B. All components and the manufacturing facility where product was manufactured must be RoHS compliant.
- C. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- D. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.07 PROJECT CONDITIONS

- A. Only install equipment after the following site conditions are maintained:
 1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C)
 2. Relative Humidity less than 90% non-condensing
 3. Standard electrical enclosures are permanently installed
 4. Equipment is protected from dust, debris and moisture

1.08 WARRANTY

- A. Five (5) year 100% parts replacement

1.09 MAINTENANCE & SUSTAINABILITY

- A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user
- B. Provide free telephone technical support

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable: Acuity Brands Lighting, Inc. – System: nLight by Acuity Controls
- B. Basis of controls design Manufacturer: Acuity Brands, One Lithonia Way, Conyers GA 30012, www.acuitycontrols.com
- C. Substitutions: Not Permitted :
 1. All substitutions must be submitted in writing for approval at least 14 days prior to bid date.
 2. Proposed substitute products must be documented with a line by line compliance review

2.02 SYSTEM REQUIREMENTS

- A. System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices 2) standalone lighting control zones 3) network backbone for remote or time based operation.
- B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.
- C. System must interface directly with intelligent LED luminaires such that only CAT-5 cabling is required to interconnect luminaires with control components such as sensors and switches (see Networked LED Luminaire section).
- D. Intelligent lighting control devices shall communicate digitally, require <7 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.

- E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- F. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.
- G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.
- H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
- I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, controls enabled luminaires, or from the network backbone. Standalone "bus power supplies" shall not be required in all cases.
- J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
- K. System shall have one or more primary wall mounted network control "gateway" devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
- L. System shall use "bridge" devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.
- M. System shall be capable of wirelessly connecting a lighting zone to a WiFi (802.11n) wireless data network for purposes of eliminating the "bridge" devices and all cabling that connects zones to bridge devices.
- N. WiFi enabled devices shall be able to detect when WiFi network is down and revert to a user directed default state.
- O. WiFi-enabled devices shall be capable of current monitoring
- P. WiFi-enabled devices shall utilize WPA2 AES encryption
- Q. WiFi-enabled devices shall be able to connect to 802.11b/g/n WiFi networks
- R. WiFi-enabled devices shall have two local RJ-45 port for communicating with non WiFi-enabled system devices
- S. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control schedules and profiles.
- T. Individual lighting zones shall be capable of being segmented into several "local" channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.
- U. Devices located in different lighting zones shall be able to communicate occupancy, photocell (non-dimming), and switch information via either the wired or WiFi backbone.
- V. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week, utilization of a space. Note: Operating modes should be utilized only in manners consistent with local energy codes.
 - 1. Auto-On / Auto-Off (via occupancy sensors)
 - 2. • Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - a. • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

- 1) • Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.
(a) Manual-On / Auto-Off (also called Semi-Automatic)
- 2) • Pushing a switch will turn lights on.
- 3) • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
(a) Manual-On to Auto-On/Auto-Off
- 4) • Pushing a switch will turn lights on.
- 5) • After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
- 6) • Sequence can be reset via scheduled (ex. daily each morning) events.
(a) Auto-to-Override On
- 7) • Zones with occupancy sensors automatically turn lights on when occupant is detected.
- 8) • Zone lighting then goes into an override on state for a set amount of time, or until the next time event returns the lighting to an auto-off style of control.
- 9) • Sequence can be reset via scheduled (ex. daily each morning) events.
(a) Manual-to-Override On
- 10) • Pushing a switch will turn lights on.
- 11) • Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
- 12) • Sequence can be reset via scheduled (ex. daily each morning) events.
(a) Auto On / Predictive Off
- 13) • Zones with occupancy sensors automatically turn lights on when occupant is detected.
- 14) • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
- 15) • Pressing the switch will turn the lights off and a short “exit timer” begins. After the timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
(a) Multi-Level Operation (multiple lighting levels per manual button press)
- 16) • Operating mode designed specifically for bi-level applications.
- 17) • Enables the user to cycle through up to four potential on/off/dim low/dim high lighting states using only a single button.
- 18) • Eliminates user confusion as to which of two buttons controls which load
- 19) • Three different transition sequences are available in order to comply with energy codes or user preference).
- 20) • Mode available as a setting on all devices that have single manual on/off switch (ex. nPODM, nPODM-DX, nWSX LV).
- 21) • Depending on the sequence selected, every button push steps through relay/dimming states according to below table
- 22) • In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to “step” in a sequence that achieves bi-level operation is present.
3. A taskbar style desktop application shall be available for personal lighting control.
4. An application that runs on “smart” handheld devices (such as an Apple® iPhone®) shall be available for personal lighting control.
5. Control software shall enable logging of system performance data and presenting this information in a web-based format and downloadable to .CSV files.

6. Control software shall enable integration with a BMS via BACnet IP, although a hardware BACnet IP integration solution is also available.
7. System shall provide the option of having pre-terminated plenum rated CAT-5e cabling supplied with hardware.

2.03 INDIVIDUAL DEVICE SPECIFICATIONS

- A. Control module (gateway)
 1. Control module shall be a device that facilitates communication and time-based control of downstream network devices and linking into an Ethernet network.
 2. Devices shall have a user interface that is capable of wall mounting, powered by low voltage, and have a touch screen.
 3. Control device shall have three RJ-45 ports for connection to the graphic touch screen, other backbone devices bridges) or directly to lighting control devices(up to 128 per port).
 4. Device shall automatically detect all devices downstream of it.
 5. Device shall have a standard and astronomical internal time clock.
 6. Device shall have one RJ-45 10/100 BaseT Ethernet connection.
 7. Device shall have a USB port
 8. Each control gateway device shall be capable of linking 1500 devices to the management software, with reduced memory version capable of support up to 400 devices.
 9. Device shall be capable of using a dedicated static or DHCP assigned IP address.
 10. Network Control Gateway device shall be the following nLight model Series:
 - a. nGWY2
 11. Networked system occupancy sensors
 - a. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
 - b. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
 - c. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.
 - d. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
 - e. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
 - f. Sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
 - g. Sensors shall be available with one or two occupancy "poles", each of which provides a programmable time delay.
 - h. Sensors shall be available in multiple lens options which are customized for specific applications.
 - i. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
 - j. All sensors shall have two RJ-45 ports or capable of utilizing a splitter.

- k. All sensors shall have the ability to detect when it is not receiving valid communication (via CAT-5 connections) and blink its LED in a pattern to visually indicate of a potential wiring issue
- l. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
- m. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring together the units with CAT-5 cabling.
- n. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.
- o. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
- p. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
- q. Wall switch sensors shall have optional features for photocell/daylight override, and low temperature/high humidity operation.
- r. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)
- s. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls.
- t. Wall switch sensors shall be the following nLight model numbers, with device color and optional features as specified:
 - 1) nWSX (PIR, 1 Relay)
 - 2) nWSX PDT (Dual Tech, 1 Relay)
 - 3) nWSX LV (PIR, No Relay)
 - 4) nWSX PDT LV (Dual Tech, No Relay)
 - 5) nWSX LV NL (PIR w/ Night Light, No Relay)
 - 6) nWSX PDT LV NL (Dual Tech w/ Night Light, No Relay)
 - 7) nWSX LV DX (PIR, No Relay, Raise/Lower Dim Ctrl)
 - 8) nWSX PDT LV DX (Dual Tech, No Relay, Raise/Lower Dim Ctrl)
 - (a) Network system shall have sensors that can be embedded into luminaire such that only the lens shows on luminaire face.
 - (1) Embedded sensors shall be capable of both PIR and Dual Technology occupancy detection
 - (2) Embedded sensors shall have an optional photocell
 - (3) Embedded sensors shall be the following nLight model number:
 - (4) nES 7 (PIR, No Relay)
 - (5) nES 7 ADCX (PIR w/ Photocell, No Relay)
 - (6) nES PDT 7 (Dual Technology, No Relay)
 - (7) nES PDT 7 ADCX (Dual Technology w/ Photocell, No Relay)
 - (8) Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.
 - (9) Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.
 - (10) Sensors shall be the following nLight model numbers, with device options as specified:

- B. Model # Series Occupancy Poles # of Relays Lens Type Detection Technology
- C. nCM(B) 9 1 - Standard PIR
- D. nCM(B) 9 2P 2 - Standard PIR

- E. nCM 9 RJB 1 - Standard PIR
- F. nCM 9 2P RJB 2 - Standard PIR
- G. nCM(B) PDT 9 1 - Standard Dual
- H. nCM(B) PDT 9 2P 2 - Standard Dual
- I. nCM PDT 9 RJB 1 - Standard Dual
- J. nCM PDT 9 2P RJB 2 - Standard Dual
- K. nCM(B) 10 1 - Extended PIR
- L. nCM(B) 10 2P 2 - Extended PIR
- M. nCM 10 RJB 1 - Extended PIR
- N. nCM 10 2P RJB 2 - Extended PIR
- O. nCM(B) PDT 10 1 - Extended Dual
- P. nCM(B) PDT 10 2P 2 - Extended Dual
- Q. nCM PDT 10 RJB 1 - Extended Dual
- R. nCM PDT 10 2P RJB 2 - Extended Dual
- S. 1 - Standard PIR
- T. nRM PDT 9 1 - Standard Dual
- U. nRM 10 1 - Extended PIR
- V. nRM PDT 10 1 - Extended Dual
- W. 1 - High Bay PIR
- X. nRM 50 1 - Aisle Way PIR
- Y. nWV 16 1 - Wide View PIR
- Z. nWV PDT 16 1 - Wide View Dual
- AA. 1 - Hallway PIR
- BB. nCM(B) 6 1 - High Bay PIR
- CC. nCM 6 RJB 1 - High Bay PIR
 - 1. Networked system daylight (photocell and/or dimming) sensors
 - a. Photocell shall provide for an on/off set-point, and a deadband to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
 - b. Photocell and dimming sensor's set-point and deadband shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.
 - c. Deadband setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
 - d. Photocell and dimming sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
 - e. Combination units that have all features of on/off photocell and dimming sensors shall also be available.
 - f. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.

- g. Sensor shall be the following nLight model numbers, with device options as specified:
 - 1) nCM(B) PC (RJB) (on/off)
 - 2) nCM(B) PC DZ (RJB) (on/off control, dual zone)
 - 3) nCM(B) ADCX (RJB) (remote automatic dimming control photocell)
 - 4) nCM(B) ADCX DZ (RJB) (remote automatic dimming control photocell, dual zone)
 - 5) nRM PC (on/off)
 - 6) nRM PC DZ (on/off, dual zone)
 - 7) nRM ADCX (remote automatic dimming control photocell)
 - 8) nRM ADCX DZ (remote automatic dimming control photocell, dual zone)
 - (a) Network system shall have dimming photocells that can be embedded into luminaire such that only the lens shows on luminaire face.
 - (1) Embedded sensors shall be the following nLight model number:
 - 9) nES ADCX (Dimming Photocell)
- 2. Networked System Power (Relay) Packs
 - a. Power Packs shall incorporate one Class 1 relay, a 0-10 VDC dimming output, and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.
 - b. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.
 - c. All devices shall have two RJ-45 ports.
 - d. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.
 - e. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
 - f. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
 - g. Power Packs and Power Supplies shall be available that are WiFi enabled.
 - h. Power Packs (Secondary) shall be available that provide up to 16 Amp switching of all lighting load types.
 - i. Power Packs shall be available that provide up to 5 Amps switching of all lighting load types as well as 0-10 VDC dimming or fluorescent ballasts/LED drivers.
 - j. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).
 - k. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.
 - l. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.
 - m. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
 - n. Specific Secondary Packs shall be available that control louver/damper motors for skylights.

- o. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
- p. Power (Secondary) Packs shall be available that provide up to 20 Amps switching of general purposed receptacle (plug-load) control.
- q. Power (Relay) Packs and Supplies shall be the following nLight model numbers:
 - 1) nPP16 (Power Pack w/ 16A relay)
 - 2) nPP16 D (Power Pack w/ 16A relay and 0-10VDC dimming output)
 - 3) nPP16 WIFI (Power Pack w/ 16A relay, WIFI enabled)
 - 4) nEPP5 D (Power Pack w/ 5A relay and 0-10VDC dimming output)
 - 5) nSP16 (Secondary Pack w/ 16A relay)
 - 6) nPP16 ER (UL924 Listed Secondary Pack w/ 16A relay for switching emergency power circuits)
 - 7) nPP16 D ER UL924 Listed Secondary Pack w/ 16A relay and 0-10VDC dimming output for switching/dimming emergency power circuits)
 - 8) nSP5 PCD 2W (Secondary Pack w/ 5A relay and incandescent dimming or 2-wire line voltage fluorescent dimming output)
 - 9) nSP5 PCD 3W (Secondary Pack w/ 5A relay and 3-wire line voltage fluorescent dimming output)
 - 10) nSP5 PCD MLV (Secondary Pack w/ 5A relay and magnetic low voltage dimming output)
 - 11) nSP5 PCD ELV 120 (Secondary Pack w/ 4A relay and electronic low voltage dimming output)
 - 12) nSP5 2P LVR (Louver/Damper Control Pack)
 - 13) nSHADE (Pulse On/Off Control Pack)
 - 14) nPP20 PL (Secondary Pack w/ 20A relay for general purpose receptacle load)
 - 15) nPS 80 (Auxiliary Bus Power Supply)
 - 16) nPS 80 WIFI (Auxiliary Bus Power Supply, WiFi enabled)
 - 17) nAR 40 (Low voltage auxiliary relay pack)
- 3. Networked System Relay & Dimming Panels
 - a. Panel shall incorporate up to 4 normally closed latching relays capable of switching 120/277 VAC or up to 2 Dual Phase relays capable of switching 208/240/480 VAC loads.
 - b. Relays shall be rated to switch up to a 30A ballast load at 277 VAC.
 - c. Panel shall provide one 0-10VDC dimming output paired with each relay.
 - d. Panel shall power itself from an integrated 120/277 VAC supply.
 - e. Panel shall be capable of operating as either two networked devices or as one.
 - f. Panel shall supply current limited low voltage power to other networked devices connected via CAT-5.
 - g. Panel shall provide auxiliary low voltage device power connected wired directly to a dedicated terminal connection.
 - h. Power (Relay) Packs and Supplies shall be the following nLight model numbers:
 - 1) nPANEL 4 (Panel w/ four 120/277 VAC relays and four 0-10 VDC dimming outputs)
 - 2) nPANEL 2 480 (Panel w/ two dual phase relays (208/240/480 VAC) and two 0-10 VDC dimming outputs)
- 4. Networked Auxiliary Input / Output (I/O) Devices
 - a. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a 1/2" knockout.
 - b. Devices shall have two RJ-45 ports
 - c. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.

- d. Specific I/O devices shall have a dimming control output that can control 0-10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current.
 - e. Specific I/O devices shall have an input that reads a 0-10 VDC signal from an external device.
 - f. Specific I/O devices shall have a switch input that can interface with either a maintained or momentary switch and run a switch event (toggle the lighting load) or run a local/remote control profile.
 - g. Specific I/O devices shall sense state of low voltage outdoor photocells.
 - h. Specific I/O devices shall enable RS-232 communication between lighting control system and Touch Screen based A/V control systems.
 - i. Specific I/O devices shall sense momentary and maintained contact closures, and either toggle a connected load after a momentary contact or ramp the load high/low during a maintained contact (stopping when the contact releases).
 - j. Auxiliary Input/Output Devices shall be the following nLight model numbers:
 - 1) nIO D (I/O device with 0-10 dimming output)
 - 2) nIO 1S or nIO RLX (I/O device with contact closure or 0-10VDC dimming input)
 - 3) nIO NLI (Input device for detecting state of low voltage outdoor photocell; sold in nIO PC KIT only)
 - 4) nIO X (Interface device for communicating with RS-232 enabled AV Touch Screens)
5. Networked LED Luminaires
- a. Networked LED luminaire shall have a mechanically integrated control device
 - b. Networked LED luminaire shall have two RJ-45 ports available (via control device directly or incorporated RJ-45 splitter)
 - c. Networked LED luminaire shall be able to digitally network directly to other network control devices (sensors, photocells, switches, dimmers)
 - d. Networked LED luminaire shall provide low voltage power to other networked control devices (excluding EMG versions)
 - e. System shall be able to turn on/off specific LED luminaires without using a relay, if LED driver supports "sleep mode"
 - f. System shall be able to maintain constant lumen output over the specified life of the LED luminaire (also called lumen compensation) by varying the input control power (and thus saving up to 20% power usage).
 - g. System shall indicate (via a blink warning) when the LED luminaire has reached its expected life (in hrs).
 - h. Integrated control devices shall be the following nLight model series:
 - 1) nIO LEDG (ER)
6. nIO EZ PH (ER)
7. nPS 80 EZ (ER)
8. nEPS 60 IO EZ
9. nEIO EZ LC (ER)
- a. LED Luminaires shall be the following Acuity Brands LED fixtures, which come factory enabled with nLight devices:
 - 1) Lithonia model families:
 - 2) RTL(X)
 - 3) TL(X)
 - 4) VTL(X)
 - 5) FSL(X)
 - 6) ACL(X)
 - 7) ALL(S)
 - 8) AVL
 - 9) BZL

- 10) GTL
- 11) SBS
- 12) IBL/IBH
- 13) PTN
- 14) LDN
- 15) DOM
- 16) WL
- 17) STL
 - (a) Gotham model families:
 - (1) EVO
 - (2) Incito
 - (b) Mark model families:
 - (1) Slot 2/4/6
 - (2) Fin
 - (3) Veil
 - (4) Whisper
 - (5) Nol
 - (6) SPR
 - (c) Peerless model families:
 - (1) Vellum
 - (2) Mino
 - (3) Round 2/4
 - (4) Square
 - (5) Origami
 - (6) Bruno
 - (7) Staple
 - (8) Lightline
 - (9) Lightedge
 - (10) Icetray
 - (11) Cerra
 - (12) Prima
 - (13) Naro
 - (14) Tulip
 - (15) Envision
 - (16) Aero
 - (17) Enzo

- 10. Networked System Wall Switches & Dimmers
 - a. Devices shall recess into single-gang switch box and fit a standard GFI opening.
 - b. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
 - c. All devices shall have two RJ-45 ports.
 - d. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
 - e. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
 - f. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
 - g. Devices with mechanical push-buttons shall be made available with custom button labeling
 - h. Devices with a single "on" button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.

- i. Wall switches & dimmers shall be the following nLight model numbers, with device options as specified:
 - 1) nPODM (single on/off, push-buttons, LED user feedback)
 - 2) nPODM DX (single on/off, single dimming raise/lower, push-buttons, LED user feedback)
 - 3) nPODM 2P (dual on/off, push-buttons, LED user feedback)
 - 4) nPODM 2P DX (dual on/off, dual dimming raise/lower, push-buttons, LED user feedback)
 - 5) nPODM 4P (quad on/off, push-buttons, LED user feedback)
 - 6) nPODM 4P DX (quad on/off, quad dimming raise-lower, push-buttons, LED user feedback)
11. Networked System Graphic Wall Station
 - a. Device shall have a 3.5" full color touch screen for selecting up to 16 programmable lighting control preset scenes or acting as up to 16 on/off/dim control switches.
 - b. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
 - c. Device shall enable configuration of all switches, dimmers, and lighting preset scenes via password protected setup screens.
 - d. Device shall enable user supplied .jpg screen saver image to be uploaded.
 - e. Device shall surface mount to single-gang switch box.
 - f. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply.
 - g. Device shall have a micro-USB style connector for local computer connectivity.
 - h. Device shall have two RJ-45 ports for communication
 - i. Device shall be the following nLight model number:
 - 1) nPOD GFX
12. Networked System Scene Controllers
 - a. Device shall have two, three, four, or eight buttons for selecting programmable lighting control profiles or acting as on/off switches.
 - b. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
 - c. Device shall recess into single-gang switch box and fit a standard GFI opening.
 - d. Devices shall provide LED user feedback.
 - e. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
 - f. All devices shall have two RJ-45 ports.
 - g. Device shall be capable of reprogramming other devices in its zone so as to implement user selected lighting scene.
 - h. Device shall be capable of selecting a lighting profile be run by the system's upstream Gateway so as to implement selected lighting profile across multiple zones (and not just its local zone).
 - i. Device shall have LEDs indicating current selection.
 - j. Scene Selector device shall be the following nLight model number:
 - 1) nPODM 2S (2 Scene, push-button)
 - 2) nPODM 4S (4 Scene, push-button)
 - 3) nPODM 4S DX (4 Scene, push-button, On/Off/Raise/Lower)
 - 4) nPODM 2L (2 Adjustable Preset Levels, push-button, On/Off)
 - 5) nPODM 2L AB (2 Scene, push-button, On/Off/High/Low)
 - 6) nPODM 4L DX (4 Adjustable Preset Levels, push-button, On/Off/Raise/Lower)
13. Communication Bridges
 - a. Device shall surface mount to a standard 4" x 4" square junction box.
 - b. Device shall have 8 RJ-45 ports.

- c. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.
- d. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5 cabled connection.
- e. Device shall be capable of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.
- f. Communication Bridge devices shall be the following nLight model numbers:
- g. nBRG 8 (8 Ports)

2.04 LIGHTING CONTROL PROFILES

- A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.
- B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.
- C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.
- D. Specific device parameters (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.
- E. All lighting control profiles shall be stored on the network control gateway device, with a system backup on the software's host server.
- F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.
- G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
- H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
- I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.
- J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.05 MANAGEMENT SOFTWARE

- A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software
- B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).
- C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.
- D. A printable network inventory report shall be available via the software.
- E. A printable report detailing all system profiles shall be available via the software.
- F. Software shall require all users to login with a User Name and Password.
- G. Software shall provide at least three permission levels for users.

- H. All sensitive stored information and privileged communication by the software shall be encrypted.
- I. All device firmware and system software updates must be available for automatic download and installation via the internet.
- J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

2.06 BMS COMPATIBILITY

- A. System shall provide a BACnet IP gateway as a downloadable software plug-in to its management software.
- B. BACnet IP connection shall also be available utilizing JACE-600 hardware unit.
- C. BACnet IP hardware shall be capable of supporting up to 1500 total devices across up to 5 total Gateways
- D. BACnet IP connection shall communicate information gathered by networked system to other building management systems.
- E. BACnet IP connection shall translate and forward lighting relay and other select control commands from BMS system to networked control devices via profiles stored in the system Gateway. All system devices shall be available for polling for devices status.
- F. BACnet IP hardware device shall be the following nLight model name:
 - 1. nBACnet

2.07 SYSTEM ENERGY ANALYSIS & REPORTING SOFTWARE

- A. System shall be capable of reporting lighting system events and performance data back to the management software for display and analysis.
- B. Intuitive graphical screens shall be displayed in order to facilitate simple viewing of system energy performance.
- C. An "Energy Scorecard" shall be display that shows calculated energy savings in dollars, KWHr, or CO2.
- D. Software shall calculate the allocation of energy savings to different control measures (occupancy sensors, photocells, manual switching, etc).
- E. Energy savings data shall be calculated for the system as a whole or for individual zones.
- F. A time scaled graph showing all relay transitions shall be presented.
- G. A time scaled graph showing a zones occupancy time delay shall be presented
- H. A time scaled graph showing the total light level shall be presented.
- I. User shall be able to customize the baseline run-time hours for a space.
- J. User shall be able to customize up to four time-of-day billing rates and schedules.
- K. Data shall be made available via a .CSV file

2.08 START-UP & SUPPORT FEATURES

- A. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone.
- B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.
- C. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.
- D. All system devices shall be capable of being given user defined names.
- E. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.

- F. All sensor devices shall have the ability to detect improper communication wiring and blink it's LED in a specific cadence as to alert installation/startup personnel.

END OF SECTION

SECTION 262416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less 2023.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- K. UL 67 - Panelboards Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- M. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. Source Limitations: Provide panelboards and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.

- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Load centers are not acceptable.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Copper.
 - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on type.
 - 2. Provide thermal magnetic circuit breakers for circuit breaker frame sizes less than 225 amperes.

3. Provide electronic trip circuit breakers for circuit breaker frame sizes 225 amperes and above.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Copper.
 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 14,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 7. Provide the following circuit breaker types where indicated:

- a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
8. Do not use tandem circuit breakers.
9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
10. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 260526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- M. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test shunt trips to verify proper operation.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates and covers.

1.02 RELATED REQUIREMENTS

- A. Section 260533.16 - Boxes for Electrical Systems.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Wall Dimmers: Include derating information for ganged multiple devices.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

- A. Provide wiring devices suitable for intended use with ratings adequate for load served.

2.02 MANUFACTURERS

- A. Hubbell Incorporated: www.hubbell-wiring.com.
- B. Leviton Manufacturing Company, Inc: www.leviton.com.
- C. Lutron Electronics Company, Inc: www.lutron.com.
- D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

2.03 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.04 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
- D.

2.05 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com.
 - 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.

2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- O. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 262813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com.
- B. Littelfuse, Inc: www.littelfuse.com.
- C. Mersen: ep-us.mersen.com.

2.02 APPLICATIONS

- A. Individual Motor Branch Circuits: Class RK1, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 265100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.

1.02 RELATED REQUIREMENTS

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- B. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- E. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- G. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- K. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- L. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
 - 3. Ballasts: Include wiring diagrams and list of compatible lamp configurations.
 - 4. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- C. Samples:
 - 1. Provide one sample(s) of each luminaire proposed for substitution upon request.
- D. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
 - 2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
 - 3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.
- G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. Provide five year manufacturer warranty for all LED luminaires, including drivers.
- B. Provide 5-year pro-rata warranty for batteries for emergency lighting units.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

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 listed, classified, and labeled as suitable for the purpose intended.
- D. 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.
- E. 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.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. 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.
- H. 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 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.

2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to one 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

- H. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet between supports.
 - 4. Install canopies tight to mounting surface.
- I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- M. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- N. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 265120
AUTOMATIC LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide and design an automatic lighting control system as described in this specification and as called for on the drawings.

1.02 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of 10 years experience in manufacturing and installing this type of system.
- B. The Contractor shall provide a list of recent jobs completed during the last 5 years with the name and phone number of a contact person.
- C. All components and assemblies are to be pre-tested and assembled at the factory prior to installation.
- D. Provide a factory-trained technician on site. The technician shall functionally test each component in the system after installation to verify proper operation and confirm that the panel wiring and addressing conform to the wiring documentation.

1.03 SUBMITTALS

- A. The following list includes the required shop drawings and product data information that shall be submitted.
 - 1. Underwriters Laboratories, Inc. (UL) listing and factory test reports.
 - 2. Internal and system wiring diagrams.
 - 3. Single line diagram of the system configuration. Typical riser diagrams are not acceptable.
 - 4. Dimensions of the equipment layout.
 - 5. Control wiring and conduits layout and connections.
 - 6. Floor plans to scale showing the location of each device and equipment.
 - 7. Product data of all the components including but not limited to programmable central controllers, transceivers panels, input relays, switches and other ancillary equipment.

1.04 REFERENCES

- A. UL 916 Energy Management Equipment.
- B. FCC Emissions Standards specified in Part 15, subpart J for Class A, Applications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide and microprocessor controlled relay panels for the Lighting Control System. The system shall include programmable standalone master panel, switch inputs, wiring, power supplies, relays and ancillary relays.
- B. Panels shall be capable of standing alone or operating as part of a network.
 - 1. The system shall provide intelligence to operate as follows:
 - a. Store all user operating data.
 - b. Initiate all relay output commands based on:
 - 1) Operator inputs
 - 2) Automatic operating schedule
 - 3) Binary type field sensors
 - 4) Universal override switch inputs
 - 5) Internal 56K Baud modem

- c. Provide automatic system diagnostics and alarming based on detected faults in the controller, transceiver panels, relays, and data line.
- 2. System shall include a memory back up to be able to survive an indefinite length of power failure.
- C. Lighting Control Panel (LCP): Microprocessor based, complete prewired assemblies consisting of the following:
 - 1. Stand alone panel controller capable of receiving and acting upon programs downloaded from the central computer. Programs downloaded from the network shall be capable of continuing to operate even if the network should fail. Battery Back up provides 8 days of memory retention. Panel shall be part of a system that can control up to 750 relays and receive up to 500 switch inputs. Panel shall have an USB input for local programming and trouble shooting from a laptop computer.
 - 2. Internal digital clock with self control power.
 - 3. Output modules: Plug in type to receive coded digital commands from the panel controller and pulse output relays to the appropriate state. Actual status feedback of the relays are to be fed back to the panel controller and from there to the central computer. Actual status of each relay is to be indicated by a pilot LED on the control board. Each Module controls 8 or 16 relays.
 - 4. Switch input modules: Plug-in type, actuated by remote external contact closures. These contact closures may be either momentary or maintained. The action of the contact is noted by the panel controller and acted upon as programmed by software. The action of the contact can command any group of output relays to the desired state. Either 8 or 24-input channels as shown on the plans.
 - 5. Output Relays
 - a. Type: Momentary pulsed, mechanically latched with pilot light contact.
 - b. Rating: 20 Ampere, 277VAC
 - c. Number per panel: 16,32 or 48 as required to satisfy this project scope.
 - 6. The low voltage and high voltage sections of the lighting control cabinet shall be separated by a 14 gage steel barrier in which the relays are mounted. In areas where both 120 volt and 277 volt loads are present the high voltage compartment shall have a 14 gage steel barrier between the relays that carry 120 VAC and the relays that carry 277VAC. Each section shall be clearly labeled as to the voltage in that compartment.
 - 7. Panel power supply shall be dual primary 115/277 volts AC, 60 Hz. $\pm 10\%$. Low voltage side shall be protected from power line surges and spikes on the input power. The low voltage section shall be protected against short circuit faults and relay failures.
 - 8. Panels shall be UL approved and shall have a short circuit withstand current rating at 14,000 AIC.
 - 9. Manufacturer: Lighting Control and Design, or G.E. or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Lighting Control System shall be installed and wired completely as required by the equipment manufacturer by the contractor, who shall make all necessary wiring connections to the lighting fixtures, override switches, photo cells and equipment.
- B. The Contractor shall provide on-site programming time with factory-trained personnel for the system set-up. The Contractor shall set up the software program and program the entire system in accordance with the Owner's instructions.
- C. Documentation
 - 1. Accurate "as-built" drawings shall be provided by the Contractor. These shall indicate the load controlled by each relay and the identification number for that switch connected to an input and the identification number of that input. Three sets of space plans or reflected

ceiling plans shall be provided by the contractor indicating which fixtures are controlled by each relay.

2. A separate data grade private line with RJ45 jack shall be furnished for each modem.

3.02 SERVICE AND SUPPORT

- A. Startup: After the system has been installed, the Contractor shall provide the services of a factory trained representative of the manufacturer to verify correct operation of all system components. The contractor shall guarantee all material and workmanship involving the system for three years after startup.
- B. Training: After system startup and after all the programming is completed, the Contractor shall arrange for a factory trained representative to train the Owner's personnel. The trainer shall instruct the Owner's personnel in how to program the system and demonstrate a typical operating program for an area. The Contractor shall allow for 24 hours' instruction time for the Owner's training.
- C. Factory Support: Factory support shall be available free of charge during the three-year warranty period to answer programming and application questions. The manufacturer, or his representative, shall have a remote terminal capable of programming the system to support the Owner's personnel during this period. The Contractor shall include a modem, necessary cabling and telephone extension to support this telecommunications operation. The Contractor shall provide a three-year maintenance service contract as part of the cost.
- D. The Contractor shall also provide a software site licensing so that the Owner will be able to transfer the software program from the main computer to the other computers. This transfer shall not be an extra cost to the Owner.

END OF SECTION

SECTION DIVISION 274116
AUDIOVISUAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

1. This section specifies the basic requirements for communications installations as indicated or required and includes requirements common to more than one specification section of this division (such as related documents, related sections, definitions, governing requirements, contractor requirements, warranty requirements, submittal requirements/procedures, and project closeout requirements/procedures, as well as other requirements). This section may expand upon and/or supplement the requirements specified in.
2. Examine the contract documents in their entirety (including drawings and specification sections in the other divisions) for requirements or work which may affect work under this section, regardless of whether such requirements or work are specifically indicated in this section.
3. Errors or Omissions in Drawings or Documentation
 - a. If any errors or omissions appear in Drawings, Specifications, or other documents, the bidding Contractor shall notify the Engineer no later than ten (10) days prior to submitting the bid.
 - b. Should conflict occur in or between Drawings and Specifications, the bidding Contractor is deemed to have estimated the more expensive way of doing the work, unless the bidding Contractor has asked for and obtained written decision (addendum) before submission of the bid as to which method or materials will be required.
4. System Performance Requirements
 - a. General Audio and Video System Performance
 - 1) Audiovisual systems shall provide clear, distortion-free program audio, consistent coverage, and full-range reproduction appropriate to the room type.
 - 2) All equipment shall be current-generation, commercially supported, and compliant with AVIXA, ANSI, AES, IEC, and applicable code requirements.
 - 3) Systems shall be designed for future scalability, including updated media formats, increased resolution, network bandwidth, and emerging audio/video transport standards.
 - 4) Where the Owner maintains standardized product lines or equipment families, new equipment shall be consistent with the same lineage to ensure compatibility, uniformity of operation, and ease of maintenance.
 - 5) Substitutions outside established product lines require Owner approval and must demonstrate measurable improvements in performance or lifecycle value..

- b. Training Room & Emergency Operations Center Audio Performance Requirements:
 - 1) Frequency Response
 - (a) Full-range program playback: 50 Hz – 16 kHz (± 3 dB)
 - (b) Speech reproduction: 125 Hz – 12 kHz (± 3 dB)
 - 2) Maximum Output Levels (at audience area)
 - (a) Program playback: 100 dB continuous, 105 dB peak
 - (b) Speech reinforcement: 90 dB continuous
 - (c) Achieve output with no audible distortion, rattles, or buzzes.
 - 3) Total Harmonic Distortion
 - (a) < 1% THD at specified output levels.
 - 4) Coverage Uniformity
 - (a) Comply with AVIXA 1M – Audio Coverage Uniformity (ACU):
 - (1) ± 3 dB uniformity over 75% of the audience area.
 - (2) No more than ± 6 dB variation across entire room.
 - 5) Low-Frequency Reproduction
 - (a) Provide subwoofers capable of extending response to 40–50 Hz.
 - (b) DSP shall provide proper alignment, phase, crossover, and limiting.
 - 6) System Headroom
 - (a) Minimum 10 dB of headroom above design output levels.
 - (b) System shall not exhibit compression at maximum specified levels.
- c. Conference Rooms – System Summary
 - 1) Provide complete audiovisual systems for all conference rooms as indicated in the Contract Documents. Systems shall support day-to-day collaborative use, remote conferencing, presentations, and hybrid meetings. Requirements include, but are not limited to:
 - 2) Integrated Video Conferencing
 - (a) Systems shall support high-quality hybrid meetings using Microsoft Teams or Owner-approved UC platforms. Videobar or discrete camera/microphone systems shall deliver clear far-end and near-end audio with proper echo cancellation, beamforming (where applicable), and consistent voice pickup throughout the seating area.
 - 3) Display and Presentation Systems
 - (a) Conference room displays shall meet required brightness, resolution, and viewing-angle performance for both soft conferencing and in-room presentation use. Provide wired and

wireless presentation inputs including HDMI, USB-C (as required), and Owner-approved wireless sharing protocols.

- 4) Audio Systems
 - (a) Provide ceiling- or table-mounted microphones, loudspeakers, and DSP processing necessary for clear voice reinforcement, conferencing audio, and program playback. Systems shall comply with AVIXA ACU requirements for coverage uniformity and shall maintain appropriate gain structure and headroom.
- 5) User Interface and Control
 - (a) Provide standardized room control via touch panels or button stations for system power, source selection, conferencing platform startup, camera control (where applicable), volume control, and room presets. All conference rooms shall share consistent GUI layouts and operational workflows.
- 6) Network & Integration
 - (a) AV-over-IP, control, and USB transport shall be designed to ensure secure, reliable, and scalable operation. Systems shall not interfere with adjacent rooms, and must prevent cross-room device association or wireless roaming.
- 7) Room Scheduling
 - (a) Provide room scheduling panels integrated with Owner's calendaring system for room availability, reservation, and status indication.
- d. Emergency Operations Center (EOC) – System Summary
 - 1) Provide a mission-critical audiovisual system for the Emergency Operations Center (EOC) capable of supporting real-time incident management, situational awareness, and multi-agency coordination. The system shall meet elevated reliability, redundancy, and performance requirements as follows:
 - 2) Mission-Critical Reliability
 - (a) All EOC systems shall operate continuously during emergency activation without single points of failure. Provide redundant power feeds, UPS support, network paths, and failover capability for essential AV processing and display systems. System architecture shall allow continued operation during partial equipment failure.
 - 3) Large-Format Display & Visualization Systems
 - (a) Provide video walls, large displays for real-time situational display, GIS visualizations, dashboards, and live media sources. Video wall processors shall support multiple simultaneous sources, presets, scaling, and drag-and-drop layout management. Displays shall maintain brightness and contrast per AVIXA PISCR considering high-ambient-light conditions.

- 4) Audio & Communications Systems
 - (a) Provide distributed audio systems capable of clear speech reproduction for briefings, alerts, and teleconferencing. DSP shall support zoned paging, operator monitoring, conferencing integration, and configurable routing. Audio systems shall maintain operational clarity even during concurrent program, paging, and conferencing activity.
- 5) Unified Conferencing, Broadcast, and Agency Integration
 - (a) Integrate soft-codec conferencing, SIP or VoIP telephony (where required), radio interoperability interfaces (if shown), and live broadcast inputs/outputs. Systems shall allow simultaneous conferencing sessions, press-briefing feeds, and remote-agency communication.
- 6) Control System Requirements
 - (a) Provide advanced control interfaces for operators, supervisors, and technical staff including system mode switching (Activation, Stand-Down, Briefing, Press Mode), video wall layout presets, audio zone control, environmental settings, and device health monitoring. Admin-level pages shall allow access to diagnostics, routing matrices, DSP configuration, and equipment status.
- 7) Source Inputs & Information Routing
 - (a) Provide multiple ingress points for laptops, emergency equipment, media feeds, security systems, and GIS-related sources. Routing systems shall provide low-latency transport, secure handling of sensitive feeds, and support for encrypted video/audio content where required.
- e. Video Performance Requirements:
 - 1) Resolution Requirements
 - (a) Minimum native display resolution: 1920 × 1080
 - 2) Systems shall support:
 - (a) 1280 × 720
 - (b) 1920 × 1080
 - (c) 3840 × 2160
 - 3) Image Quality
 - (a) Displays shall exhibit no dead pixels, discoloration, banding, or geometric distortion.
 - 4) Brightness & Contrast
 - (a) Display brightness shall be appropriate to ambient light conditions and room usage.
- f. Wireless System Requirements:

- 1) Wireless AV links, microphones, control devices, or assistive listening components shall not interfere with adjacent-room systems.
 - 2) Frequency coordination shall prevent cross-room device association.
 - 3) Channel assignments shall be locked to prevent auto-roaming.
 - 4) Integration with Assisted Listening Systems
- g. Control System Performance Requirements:
- 1) The control system shall provide reliable, synchronized, and deterministic operation of all audiovisual and ancillary systems within the room.
 - 2) Control processing shall be performed by a dedicated control processor capable of real-time execution without perceptible latency.
 - 3) All user interfaces (touch panels, wall stations, button panels) shall present a consistent, intuitive, and unified control experience across all spaces.
- h. GUI Touch Panel Requirements
- 1) Touch panels shall provide primary room control including, but not limited to:
 - (a) System power on/off
 - (b) Source selection
 - (c) Audio level control and muting
 - (d) Video routing (where applicable)
 - (e) Mode selection (Presentation, Reset/Default, etc.)
 - (f) Divisible partition (Conference 232 only)
 - 2) GUI pages shall follow a consistent layout and visual structure across all rooms.
 - (a) In Conference 232, GUI shall be mirrored when partition is open.
 - 3) All buttons shall include visible feedback (color change, status indicator, icon state).
 - 4) GUI shall prevent access to backend system configuration, DSP tuning, or device programming without credentialed access (PIN, login, or admin page).
 - 5) Navigation shall be logically structured so that all primary functions are accessible within two screen transitions from the home screen.
 - 6) The GUI shall incorporate Owner-approved branding elements including color palette and logo (where applicable).
 - 7) Touch panel processing shall support future expansion for additional scenes, sources, or equipment changes without requiring replacement of hardware.
 - 8) Support email or phone number shall be visible for contacting IT or help.

- i. DSP Integration
 - 1) All adjustments made via GUI or button interface shall be reflected in the DSP and vice versa.
 - 2) Scene recall shall be safe, ensuring that gain structure, routing, equalization, and dynamics do not cause system overload or instability.
 - 3) DSP processing shall handle:
 - (a) Crossovers
 - (b) Alignment
 - (c) Limiters
 - (d) EQ
 - (e) Time delays
 - (f) Routing matrices
- j. Video System Control
 - 1) Control system shall manage:
 - (a) Display power
 - (b) Lens adjustments (focus, zoom, shift) where available
 - (c) Shutter control
 - (d) Input switching
 - (e) Divisible partition
 - 2) Displays shall provide response feedback to the GUI (power status, input status, lamp hours, error/status messages).
- k. Environmental and Mechanical Integration
 - 1) Environmental controls shall include feedback to confirm device position/status.
- l. System Logic & Safety
 - 1) Control system shall prevent conflicting commands (e.g., simultaneous ON/OFF states, multiple routing paths to the same DSP input).
 - 2) Improper sequencing shall not cause system lockout, crashes, or infinite loops.
 - 3) Volume limits, DSP headroom thresholds, and system protection routines shall be enforced by the control logic.
 - 4) System shall maintain last-known volume and state information unless safety protocols dictate reset on power-cycle.
 - 5) The system shall allow technical/admin control pages behind PIN/credential access for advanced functions, including:
 - (a) DSP gain structure
 - (b) Preset management
 - (c) Diagnostic feedback

- (d) Device connectivity status
- m. Power Management
 - 1) Control system shall coordinate orderly shutdown and startup of AV and environmental devices to ensure proper system stability.
 - 2) Control system shall be capable of full system power cycling for all AV equipment within the room.
 - 3) Power sequencing shall protect amplifiers, DSPs, and powered loudspeakers from transient damage.

1.02 DEFINITIONS

1. "AHJ": Authority Having Jurisdiction
2. "Connect": To install patch cords, equipment cords, crossconnect wire, etc. to complete and electronic or optical signal circuit.
3. "Cord": a length of cordage having connectors at each end. The term "Cord" is synonymous with the term "Jumper" and "Lead".
4. "Furnish": To purchase, procure, acquire, and deliver complete with related accessories.
5. "ISP": Inside Plant
6. "NEMA": National Electrical Manufacturers Association
7. "OFCL": Owner-furnished contractor-installed; coordinate the integration of components furnished by the Owner; provide mounting hardware, cable, connectors, etc. to ensure proper integration of OFCL equipment.
8. "OFE": Owner Furnished Equipment
9. "OSP": Outside Plant
10. "Provide": To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation
11. "Approved Grounding Point": an approved grounding point is one that satisfies the applicable electrical code and provides a low impedance path to earth. Examples include the following though may manifest in different means: a telecommunications grounding busbar (such as for bonding an equipment rack within a telecom room), the ACEG of the electrical panel serving the equipment requiring bonding to ground (such as for bonding a credenza rack within a conference room), or the ground conductor of a branch circuit (such as for bonding a single piece of equipment).
12. "Audience Area": the portion of a presentation space intended to be occupied by an audience. An audience area includes the primary seating and standing spaces and may included the adjacent circulation spaces. An audience area generally excludes spaces reserved for presenters.
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14. "Custom" indicates systems or components the Contractor fabricates based on these specifications and drawings
15. "EDID": Extended display identification data
16. "HDCP": High-bandwidth digital content protection
17. "HDMI": High-definition multimedia interface
18. "OFE": Owner Furnished Equipment
19. "RU": rack unit, as defined in EIA/ECA-310
20. "Shall" denotes a mandatory requirement
21. "Should" denotes an advisory statement
22. "SPL": sound pressure level
23. "THD": total harmonic distortion
24. "System": The audiovisual components, cabling, and programming incorporated in the descriptions and equipment lists herein

1.03 REFERENCES

1. Most recent editions, revisions, addenda, and bulletins of the following documents:
 - a. ANSI/TIA-568 series
 - b. ANSI/TIA-569 Telecommunications Pathways and Spaces
 - c. ANSI/TIA-606 Administration Standard for Telecommunications Infrastructure
 - d. ANSI/TIA-607 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
 - e. ANSI/TIA-862 Structured Cabling Infrastructure Standard for Intelligent Building Systems
 - f. Telecommunications Distribution Methods Manual
 - g. Information Transport Systems Installation Methods Manual (ITSIMM)
2. Americans with Disabilities Act
3. California Electric Codes (CEC)
4. Local Codes and Standards – all applicable
5. NFPA 70 – National Electrical Code
6. NFPA 101 – Life Safety Code
7. UL 969, "Marking and Labeling Systems"
8. UL 1419, "Professional Video and Audio Equipment"
9. UL 60065, "Audio, Video and Similar Electronic Apparatus – Safety Requirements"
10. InfoComm 1M, "Audio Coverage Uniformity in Enclosed Listener Areas"
11. InfoComm 2M "Standard Guide for AV Systems Design and Coordination Processes"
12. InfoComm F501 01, "Cable Labeling for Audiovisual Systems"

13. "Sound Systems Engineering", 3rd Ed., Davis and Davis
14. EIA/ECA-310, "Cabinets, Racks, Panels, and Associated Equipment"
15. Local Authority Having Jurisdiction (AHJ)
16. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either
17. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

1.04 QUALIFICATIONS

1. The contractor shall hold a valid State of California C7 and C10 Contractor's license.
2. Contractor shall have a proven track record in the field of specified cabling and system installations, with at least (3) previous installations of comparable size and complexity undertaken within the last (5) years.
3. Contractor shall have advanced certifications (i.e. CTS-I, CTS-D).
4. Contractor shall have manufacturer-specified advanced certifications for critical system components (i.e. DMC-D, XTP, etc.).
 - a. If not in part 2, at a minimum, the contractor shall have at a minimum, all of the following:
 - 1) Crestron
 - (a) DM Certified Engineer
 - (b) Commercial Solutions Intermediate
 - (c) Crestron Construct Software
 - 2) Extron
 - (a) Extron Authorized Programmer
 - (b) Extron Control Specialist
 - (c) Extron AV Associate
 - (d) Extron Control Professional
 - (e) Extron XTP Systems Design Engineer
 - 3) QSYS
 - (a) Q-SYS Level One
 - (b) Q-SYS Level Two
 - (c) S-SYS Control & UCI
5. Contractor shall be a manufacturer's authorized distributor and warrantee station for the equipment offered, and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment.

1.05 SUBMITTALS

1. Make submittals in accordance with:

- a. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor.
- 2. Action Submittals:
 - a. Shop Drawings
 - 1) Owner will provide electronic files in CAD or Revit format, containing the contract document drawing files, for use in the preparing of the shop drawings.
 - 2) Drawings will be to scale.
 - 3) Submit the following sheets and details:
 - (a) Titlesheet and Cover Page: indicate project name and location; include sheet index
 - (b) Overall Floor Plans: floor plans showing the locations of devices not within enlarged plans; devices and cable routing paths with cable types, quantity called out, and device IDs; rack locations; wall elevations of displays; new pathways/conduits/boxes/etc.
 - (c) Enlarged Plans: Floor and reflected ceiling plans showing the locations of devices and cable routing paths with cable types, quantity called out, and device IDs; rack locations; wall elevations of displays; loudspeaker power; new pathways/conduits/boxes/etc.
 - (d) Rough-in and wiring details. Include button panel layouts.
 - (e) Single line diagrams showing full scope of wiring and cabling between equipment, indicating Contractor and Owner scopes of work.
 - b. Product submittal
 - 1) Contractor shall furnish products for a complete, turnkey system. Submit major components and ancillary accessories required for complete system. Minor accessories like screws and nuts are not required for submission, unless specified in Part 2.
 - 2) Product submittal shall be a single complete submittal. Incomplete submittals will be rejected without review.
 - 3) Partial submittals will be allowed for short lead items only with documentation on lead time included at the front of the submittal.
 - 4) Catalog cut sheets and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, material finish, and licenses. Clearly indicate on each sheet what is being submitted on.
 - 5) For touchscreen panels, submit separate PDFs per system with a page for each menu, submenu, and pop-up.
 - 6) Submit Owner logos where required by Owner standards.

- 7) Qualification Data: Submit at least three references for projects similar in scope to the project described herein. Include, for each customer reference, the following information: Company name, address, phone number, name and email address of contact and type of job completed.
 - (a) Provide copies of the Contractor's certification.
 - (b) Provide written guarantees from manufacturers of major equipment, that a service representative has been assigned.
 - (c) Provide copies of technician training certificates.
- 8) Submit test procedures for each room and standalone device. Group test procedures per room/standalone device. Refer to 1.01.D.System Performance Requirements for minimum requirements.

1.06 CLOSEOUT DOCUMENTS

1. Final close out documents including, but not limited to, test results on in digital PDF and physical CD-ROM or USB drive, in native tester format, project manual that includes manufacturer and contractor warranties, product cut sheets, material submittals, etc. Also, include the following:
 - a. Provide "As-Built" Drawings in AutoCAD or Revit.
 - 1) "As-Built" drawings indicating location of all equipment including but not limited to outlets, patch panels, on each segment and cable routing outlet and identifiers. Indicate labeling for each piece of equipment.
 - 2) As-Built drawings will contain all installed cabling and materials. Outlets will be labeled with each cable associated with the work area outlet.
 - 3) Red-lined shop drawings submitted as As-built drawings will be rejected without review.
 - 4) (1) printed, hard copy of final approved as-built drawings in native sheet size will be provided to Owner. Unapproved sheet sizes will be rejected.
 - b. Provide printed test reports in 3-ring binder and submit to Owner.
 - c. Owner's written acceptance of installed systems.
 - d. Print (2) printed copies of full-sized as-built drawings, and submit to Owner.
 - e. Provide pricing and contact information for emergency service work not covered by warranty.

1.07 QUALITY ASSURANCE

1. Standards for Materials and Equipment
 - a. The Contractor shall provide all materials, equipment, and installation in compliance with the latest applicable standards from AVIXA, ANSI, FCC, ASTM, EIA/TIA, IEEE, CEC, NFPA, NEMA, OSHA, REA, and UL.
2. Manufacturer's Warranty
 - a. Warranty shall meet the following criteria:

- 1) This warranty will cover all cables, terminations, and components provided by the Contractor.
 - 2) Minimum 1-year written warranty covering workmanship and materials from the date of project completion. All repairs shall be made at no cost to the Owner during the warranty period.
 - 3) Corrections shall start within 48-hours of notification from Owner.
- b. If the warranty is needed by the Owner within the warranted period and the original installer is no longer in business, System manufacturer shall find a substitute certified contractor and assume costs to fulfill the obligations of the warranty.
 - c. Upon acceptance of the warranty paperwork and test results from the Contractor, System manufacturer will mail a notification letter to the installer and a notification letter with warranty certificate to Owner.
 - d. The warranty period shall commence following the final acceptance of the project by Owner and written confirmation of warranty from System manufacturer.
 - e. Provide 5-year software service agreement. Include associated licenses and renewal fees for the agreement's duration. Agreement and licenses shall commence following the project's substantial completion, and not the Contract's purchase date.
3. Acceptance Testing
 - a. Provide tests specified below, when applicable or required by Owner, and as indicated under individual items of material, equipment, and work specified in this Specification.
 - 1) Furnish all test equipment and instruments required for the tests.
 - 2) Responsible, qualified employees of the contractor in the presence of the Owner or an authorized representative shall perform the cable testing.
 - 3) All individuals involved in the testing phase of the project shall not have been involved in the installation phase nor shall have immediate knowledge of the installation task.
 - b. End-to-end performance and calibration of all parts and channels shall be tested prior to testing in presence of Engineer.
 - c. Performance testing of typical rooms and 1-of-each-kind of standalone systems shall be performed in presence of Engineer. System shall be accepted by Engineer prior to testing in presence of Owner.
 - d. Performance testing of all rooms and standalone systems shall be performed in presence of Owner. Owner's written acceptance of system is a requirement of Closeout, and shall not conclude the Closeout Documentation stage.

1.08 DELIVERY, STORAGE, AND HANDLING

1. To prevent damage, theft, soiling, and misalignment, protect equipment during transit, storage, and handling

2. The contractor shall coordinate the secure storage of equipment and materials on site, or, if no on-site storage is available, shall provide their own secure storage at the Contractor's expense.
 - a. Do not store equipment where conditions fall outside the manufacturer's recommendations for environmental conditions.
 - b. Do not install damaged equipment. Remove environmental conditions from the site and replace damaged equipment with new equipment.
 - c. If off-site storage of materials is necessary, this shall be at the Contractor's expense.

1.09 PROJECT CONDITIONS

1. Project Environmental Requirements
 - a. Hazardous Materials Prohibition
 - 1) The Contractor shall ensure that all materials used in the project are asbestos-free, unless specifically authorized in writing by the Owner.
 - b. Existing Conditions
 - 1) Verify that all conditions on the project site are acceptable for the Work specified in this Section. Prior to bid opening, notify the Consulting Engineer, in writing, of any discrepancies, conflicts, or omissions. Otherwise, correct these issues at no additional cost to the Owner.
 - 2) Continue to monitor the project site. If conditions develop that require a variance from the Specifications or Drawings, then immediately notify the Owner in writing. Otherwise, make recommendations, submit drawings showing how the Work may be installed, and, upon approval, proceed with the necessary changes without additional cost to the Owner.
 - c. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and work above ceilings is complete.
 - d. Confirmation of Pathway and Cable Manager sizing:
 - 1) Wherever cabling pathways or managers are installed, it is the Contractor's responsibility to confirm pathway or manager sizing to represent no more than 25% fill upon installation according to manufacturer's fill tables.
 - 2) Pathways deemed overfilled upon installation will not be accepted and shall be remedied at Contractor expense.

1.10 USE OF THE SITE

1. Where the Owner deems it necessary to place restrictions, use the site as directed by the Owner.
2. When proceeding with the work, do not interfere with the ordinary use of streets, aisles, passages, exits, or operations of the Owner. During the day, set up cones and barriers in hallways and walkways. Do not string cable down the hallways during normal hours.

3. Request a hazardous materials worksheet that identifies potentially-hazardous locations. Do not proceed with any work in locations where hazardous materials are known to be. Obtain instructions from the Contractor's Project Manager on and when to work in these areas.
4. Multiple times each day, each contractor shall remove all trash and debris from the site. Before leaving the room each day:
 - a. The Contractor shall replace all ceiling tiles that they have removed.
 - b. The Contractor shall place all furniture and equipment that they have moved back into its original location.
 - c. The Contractor shall return any equipment that they have disconnected to working order.
 - d. The Contractor's Job Foreman shall inspect all work locations to ensure that the rooms are clean and that all of the tasks described above have been done.
 - e. It is recommended that the Contractor inspect the site and take pictures to document the condition of the ceilings and walls.

1.11 RESPONSIBILITIES AND COORDINATION

1. The Contractor shall provide all materials, qualified labor and services required to ensure a complete and operational system, installed in accordance with the intent of the Contract Documents.
2. The Contractor shall furnish and install all incidental items not actually shown or specified, but which are required by best practices to provide complete functional systems.
3. The Contractor shall coordinate the details of facility equipment and construction for all specification divisions, which affect the work covered under this Division.
4. The Contractor shall coordinate with all other trades. The Contractor will submit a schedule for the installation within 15 days of contract award.
 - a. The schedule shall include delivery, installation, and testing for conformance to specific job completion dates.
 - b. At minimum, the schedule shall provide dates for the start of demolition, the completion of demolition, the installation start date, the completion of copper cabling, the completion of backbone cabling, the completion of testing and labeling, cutover, the completion of the final punch list, final inspection, and acceptance.
5. The Contractor shall develop a bill of materials, perform material management and efficient use of the materials whether they are issued by Owner or purchased by the Contractor.
6. The Contractor shall ensure materials, in excess of, those required to complete the project are kept in their original condition and packaging for restocking.
7. The Contractor shall maintain existing cables and terminations not determined to be within the demolition scope of work. Cables damaged, removed, or unterminated

shall be reinstalled and recertified with the manufacturer's certified installer, and test results provided to the Owner.

1.12 DESIGN CRITERIA

1. Compliance by the contractor with the provisions of this Specification does not relieve him or she from the responsibilities of providing materials and equipment of proper design, mechanically and electrically suited to meet operating requirements at the specified service conditions.

1.13 LABELING

1. Refer to Owner's standards for labeling requirements.
2. Comply with TIA/EIA-606-A, TIA/EIA-606-A, Addendum 1 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
3. Labeling: Provide labeling for audiovisual system components. The components include, but are not limited to, the following:
 - a. Equipment racks and equipment enclosures
 - b. Rack-mounted equipment and devices: Provide a label on the back of each piece of equipment. If a serial number (of a given piece of equipment) is not visible in a final installed condition, provide a label on the equipment on a visible location duplicating the serial number.
 - c. Wall-mounted equipment and devices: Provide an equipment label on the back of each piece of equipment. If a serial number (of a given piece of equipment) is not visible in a final installed condition, provide a label on the equipment on a visible location duplicating the serial number.
 - d. Wires and cables: Provide a cable label at each end of each piece of wire, cable, and cord.
 - e. Terminal blocks, patch panels, and other termination apparatus: Provide a label on each termination block, piece of termination apparatus and termination position on patch panels.
 - f. Handheld and wireless devices
 - g. User interfaces, devices, faceplates

PART 2 PRODUCTS

2.01 GENERAL

1. This Section includes General Requirements for each section in Division 27 and shall be used in conjunction with specifications, other related Divisions and related Contract Documents to establish the total requirements for the project.
2. All materials and products shall be:
 - a. Appropriate for the intended use
 - b. Permitted by the Authority Having Jurisdiction (AHJ)
3. All products shall be new, of the latest version at time of bid, and brought to the job site in original manufacturer's packaging. Used equipment and damaged material will be rejected.

4. Provide attachments and accessories necessary for complete installation.
5. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
6. Take care during installation to prevent scratches, dents, chips, etc. Equipment with significant or disfiguring cosmetic flaws will be rejected.
7. All components will be approved by the Engineer and shall have the most aesthetic value possible while maintaining specified functionality. Hardware shall:
 - a. Be in compliance with the Construction Documents.
 - b. Have fit and finish compatible with the existing surrounding structure.
 - c. Be unobtrusive.
 - d. Provide the required functionality.
8. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of the equipment and its installation.
9. Provide products that are suitable for the intended use, including, but not limited to environmental, regulatory, and electrical factors.

2.02 SUBSTITUTION POLICY

1. Substitution of specified products or systems is not allowed.
2. Contractor shall assume all costs for removal and replacement of any product installed in substitution of those specified. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

2.03 MANUFACTURERS

1. Displays:
 - a. General Requirements
 - 1) Commercial-grade flat panel displays suitable for continuous operation.
 - 2) Native resolution: minimum 3840 × 2160 (UHD).
 - 3) LED-backlit LCD technology with anti-glare treatment.
 - 4) Landscape orientation, wall-mounted unless noted otherwise.
 - 5) Integrated control via RS-232, IP, or manufacturer-supported API.
 - 6) Rated for minimum 16/7 operation (conference rooms, training rooms) and 24/7 operation where required (EOC).
 - 7) Compliance with ENERGY STAR or equivalent efficiency program.
 - b. Conference Rooms
 - 1) Display size: 65"–86" diagonal, based on room size and viewing distance.
 - 2) Brightness: minimum 500 nits.
 - 3) Input support: HDMI 2.0 or better; DisplayPort acceptable.

- 4) Suitable for collaboration, video conferencing, and wireless presentation content.
- c. Emergency Operations Center (EOC)
 - 1) Display size: 75"–98" diagonal, or video wall-compatible displays where indicated.
 - 2) Brightness: minimum 700 nits.
 - 3) 24/7 rated panels with thermal management designed for continuous operation.
 - 4) Narrow bezel options preferred for adjacent or arrayed installations.
 - 5) Designed for mission-critical visualization, situational awareness, and data dashboards.
- d. Training Rooms
 - 1) Display size: 75" diagonal.
 - 2) Brightness: minimum 500 nits.
 - 3) Optimized for presentation content, instructional video, and hybrid learning.
 - 4) Support for extended viewing sessions without image retention.
- e. Basis-of-Design Manufacturers
 - 1) NEC
 - 2) Panasonic
 - 3) Samsung
- 2. Encoders & Decoders
 - a. Support for network-based AV distribution over standard Ethernet infrastructure.
 - b. Video formats: HDMI input/output, up to 4K resolution.
 - c. Low-latency transport suitable for live presentation and conferencing.
 - d. Powered via PoE/PoE+ or local power supply.
 - e. Full integration with control and audio processing platform.
 - f. Multicast and unicast support.
 - g. Manufacturer:
 - 1) Q-sys NV-21 -HU
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
- 3. Loudspeakers
 - a. 6.5-inch coaxial ceiling loudspeaker with integrated back can.
 - b. Transformer-tapped for 70V/100V distributed audio systems.

- c. Wide dispersion pattern for uniform speech coverage.
 - d. Plenum-rated enclosure.
 - e. UL listed.
 - f. Manufacturer
 - 1) Q-sys AD-C6T-ZB
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
4. Soundbar
- a. Integrated loudspeakers, microphones, and processing suitable for conferencing.
 - b. Designed for wall mounting above or below displays.
 - c. Network-connected and software-configurable.
 - d. Optimized for small to medium conference rooms.
 - e. Manufacturer
 - 1) Q-sys NL-SB42
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
5. Audio Amplifiers
- a. Four-channel amplifier with minimum total output power of 2000 watts.
 - b. Support for both low-impedance and distributed (70V/100V) systems.
 - c. Network monitoring and control.
 - d. Built-in protection for thermal, short circuit, and overload conditions.
 - e. Manufacturer
 - 1) Q-sys CX-Q 2K4
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
6. Audio Processors
- a. Fully programmable DSP supporting routing, mixing, AEC, dynamics, and EQ.
 - b. Native integration with control, video distribution, and monitoring systems.
 - c. Scalable architecture supporting future expansion.
 - 1) Manufacturer
 - 2) Q-sys
 - (a) Core 24f

- (b) Core 8 Flex
 - 3) Crestron
 - 4) Extron
 - 5) Or Approved Equal
- 7. Touch Screen Panels
 - a. Capacitive touchscreen with network connectivity.
 - b. Conference Rooms and Training Rooms:
 - 1) Minimum 7-inch diagonal display.
 - c. Emergency Operations Center (EOC):
 - 1) Minimum 15-inch diagonal display.
 - d. Support for custom graphical user interfaces.
 - e. Powered via PoE
 - f. Manufacturer
 - 1) Q-sys TSC-70-G3
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
- 8. Tabletop Microphones
 - a. Low-profile tabletop form factor.
 - b. Optimized for speech intelligibility and conferencing.
 - c. Network-connected or analog as required by system design.
 - d. Manufacturer
 - 1) Q-sys NM-T1
 - 2) Crestron
 - 3) Extron
 - 4) Or Approved Equal
- 9. Ceiling Microphones
 - a. Ceiling-mounted beamforming microphone array.
 - b. Automatic coverage with steerable pickup lobes.
 - c. Network audio connectivity.
 - d. Suitable for medium to large conference and training rooms.
 - e. Manufacturer
 - 1) Shure MXA920
 - 2) Sennheiser
 - 3) Or Approved Equal
- 10. PTZ Cameras:

- a. Minimum 4K imaging sensor.
 - b. Optical zoom suitable for medium to large rooms.
 - c. Network-based video transport.
 - d. Preset control via control system interface.
 - e. Manufacturer
 - 1) Q-sys NC-90-G2
 - 2) Vaddio
 - 3) Huddly
 - 4) Or Approved Equal
11. Wireless Presentation
- a. Native support for Windows, macOS, iOS, Android, and ChromeOS.
 - b. Secure screen sharing without required client software.
 - c. Support for multiple simultaneous presenters.
 - d. Manufacturer
 - 1) ScreenBeam 1100 Plus
 - 2) Or Approved Equal
12. Room schedulers:
- a. Network-connected room scheduling displays.
 - b. Integration with enterprise calendaring platforms.
 - c. LED or on-screen room availability indicators.
 - d. Manufacturer
 - 1) Crestron
 - 2) Extron
 - 3) Biamp
13. Equipment racks:
- a. Standard 19-inch EIA rack format.
 - b. Adequate depth and load rating for AV electronics.
 - c. Integrated grounding provisions.
 - d. Accessories for cable management and ventilation.
 - e. Manufacturer
 - f. Middle Atlantic
 - 1) CPI
 - 2) Or Approved Equal
14. AV Switch
- a. Designed specifically for AV-over-IP applications.
 - b. Support for VLANs, QoS, multicast, and IGMP.

- c. Preconfigured AV profiles for common AV protocols.
- d. Manufacturer
 - 1) Netgear M4250 Series
 - 2) Or Approved Equal
- 15. Table Connectivity System
 - a. Modular, recessed table-mounted connectivity enclosure.
 - b. Heavy-duty metal construction suitable for frequent use.
 - c. Retractable or lift-assisted lid mechanism designed for quiet operation.
 - d. Modular architecture supporting HDMI, USB-C, USB, power, and control modules.
 - e. Cable management designed to protect connectors and cabling from strain.
 - f. Power modules UL listed and compliant with NEC requirements.
 - g. Grounded metal enclosure.
 - h. Manufacturer
 - 1) Extron Cable Cubby 700
 - 2) Or approved equal
- 16. Digital Signage Systems
 - a. General Requirements
 - 1) Digital signage systems shall be commercial-grade and rated for continuous operation.
 - 2) Systems shall support scheduled playback of video, graphics, text, and emergency messaging content.
 - 3) Provide all hardware, software licenses, firmware, and accessories required for a complete and operational system.
 - 4) Systems shall be capable of centralized content management.
 - 5) Digital signage shall be logically and physically separated from life-safety systems unless explicitly noted otherwise.
 - 6) Products shall be from a single manufacturer per system type unless approved otherwise.
 - b. On-Premises Digital Signage Systems
 - 1) Dedicated solid-state digital signage media player.
 - 2) Supports 4K video playback, HTML5, still images, and streaming media.
 - 3) Ethernet network interface; optional Wi-Fi where required.
 - 4) Capable of local content storage and playback without internet connectivity.
 - 5) Supports GPIO and serial interfaces for external triggers where required.

- 6) Designed for 24/7 commercial operation.
- 7) Manufacturer:
 - (a) BrightSign XD6 Series
 - (b) Videotel VP92+
 - (c) Or Approved Equal.
- c. Cloud-Based Digital Signage Systems
 - 1) Cloud-hosted digital signage content management system.
 - 2) Designed for use with Samsung commercial displays with embedded media players.
 - 3) Web-based portal for content creation, scheduling, monitoring, and reporting.
 - 4) Supports multi-display and multi-location management.
 - 5) Provides content caching at the display for limited offline operation.
 - 6) Requires active internet connection for management and updates.
 - 7) Manufacturer
 - (a) Samsung LYNK Cloud C13
 - (b) Or Approved Equal.

2.04 AV CABLING

- 1. General Requirements
 - a. All AV cabling shall be commercial-grade, factory-manufactured, and listed for the intended installation environment.
 - b. Cabling shall be plenum-rated (CMP) where installed in air-handling spaces; riser-rated (CMR) where permitted by code.
 - c. All cabling shall comply with applicable NEC, UL, and local code requirements.
 - d. Cable construction shall be suitable for permanent installation and not rely on field-terminated consumer-grade assemblies.
 - e. Provide continuous cable runs without splices except at approved termination points.
 - f. Bend radius, pull tension, and installation practices shall conform to manufacturer recommendations.
- 2. Category Cabling (AV over IP, Control, and Peripheral Connectivity)
 - a. Category 6A minimum for all new AV network connections supporting AV-over-IP, control, and PoE devices.
 - b. Solid copper conductors; stranded cable not permitted for permanent links.
 - c. Minimum bandwidth: 500 MHz.
 - d. Tested and certified to ANSI/TIA-568 standards.

- e. Shielded (F/UTP or U/FTP) cabling shall be provided where required for EMI mitigation or manufacturer recommendations.
- 3. Fiber Optic Cabling
 - a. Singlemode fiber: OS2, low-water-peak glass.
 - b. Multimode fiber: OM4 laser-optimized.
 - c. Plenum-rated jackets where required.
 - d. Factory-polished connectors; field polishing not permitted.
 - e. Suitable for 10G and higher AV transport where required.
- 4. HDMI and Video Signal Cabling
 - a. HDMI cabling shall be Premium High Speed or Ultra High Speed rated, as required by signal resolution and distance.
 - b. Active optical HDMI cables shall be used where copper distance limitations are exceeded.
 - c. Cables shall support HDCP compliance as required by source content.
 - d. Provide strain relief at all equipment terminations.
- 5. Audio Cabling
 - a. Balanced audio cabling for all analog audio signals.
 - b. Minimum 22 AWG stranded copper conductors.
 - c. Shielded twisted pair construction.
 - d. Plenum-rated where required.
- 6. Control Cabling
 - a. Control wiring shall be minimum 22 AWG, stranded, shielded where required.
 - b. Rated for RS-232, RS-422, RS-485, and GPIO applications as applicable.
 - c. Jacket rating appropriate to installation environment.
- 7. Acceptable Manufacturers
 - a. Belden
 - b. Liberty AV
 - c. West Penn
 - d. Or Approved Equal

PART 3 EXECUTION

3.01 WORKMANSHIP

- 1. Manufactured products, materials, equipment, and components shall be provided, conditioned, applied, installed, connected, and tested in accordance with the manufacturer's specifications and printed instructions.
- 2. The installation of all system components shall be carried out under the direction of qualified personnel. Appearance shall be considered as important as mechanical and electrical efficiency. Workmanship shall meet or exceed industry standards.

3.02 INTENT OF DRAWINGS

1. The Audiovisual drawings show only general locations of equipment, devices, raceways, cable trays, boxes, etc., unless specifically dimensioned.
2. The Contractor shall be responsible for the proper placement and routing of equipment, cable, raceways, cable runway, and related components, according to the Contract Documents and subject to prior review by the Owner and structured cabling engineer.
3. The Contractor shall refer any conflicts within the Contract Documents to the Construction Manager and/or Owner for resolution.

3.03 GROUNDING

1. Comply with requirements in both 26 0526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
2. Comply with ANSI/TIA-607 and the local Electrical Code.

3.04 SERVICE CONTINUITY

1. Maintain continuity of communications services to all functioning portions of the process or buildings during hours of normal use.
2. Arrange temporary outages for cutover work with General Contractor. Keep outages to a minimum number and a minimum length of time in order to provide minimum impact.

3.05 LAYOUT AND TOLERANCES

1. Follow as closely as practicable the schematic design shown on the drawings. Make all necessary measurements in the field to verify exact locations and ensure precise location and fit of specified items in accordance with the drawings. Make no substantial
2. Alterations without prior approval of the owner and the engineer.

3.06 INSTALLATION

1. Anchor and brace enclosures and cabinets where seismic bracing is required.
2. Coordinate cooling for fully enclosed equipment (i.e. fans and vents for racks inside credenzas).
3. Fully secure ceiling mounted equipment and raceways.
4. Loudspeakers in series shall not exceed 75% of rated wattage.
5. Provide service loops in backbox or nearest J-hook.
6. Maintain signal and cable separation per Code and ANSI/BICS standards.
7. Provide strain relief for cables and connectors.
8. Configure EDID management for audio and video parameters are sent to source devices.
9. Ensure HDCP is supported and working. HDCP may be disabled in educational institutions only for "fair use" conditions.
10. Change passwords prior to final acceptance, and enable two-factor authentication.
11. Ensure most current software is installed on devices and headend equipment.

12. Coordinate GUI layout with Owner. Ensure button spacing is consistent and even.

3.07 CONSTRUCTION REVIEW

1. The Engineer and Owner will review and observe installation work to ensure compliance by the contractor with requirements of the Contract Documents.
2. Review, observation, assistance, and actions by the Engineer and Owner shall not be construed as undertaking supervisory control of the work or of methods and means employed by the contractor. The Engineer and Owner review and observation activities shall not relieve the contractor from the responsibilities of these Contract Documents.
3. The fact that the Engineer and Owner does not make early discovery of faulty or omitted work shall not bar the Owner from subsequently rejecting this work and withholding payment until the contractor makes the necessary corrections.
4. Regardless of when discovery and rejection are made, and regardless of when the contractor is ordered to correct such work, the contractor shall have no claim against the Engineer or Owner for an increase in the Subcontract price, or for any payment on account of increased cost, damage, or loss.

3.08 PROJECT RECORD DOCUMENTS

1. Provide detailed project record documentation for sections listed in Part 1.
2. Maintain separate sets of redlined record drawings, which show the exact placement, and identification of as-built system components. These are subject to weekly review by the General Contractor, Owner, or their representative.

3.09 ADDITIONAL CONTRACTOR REQUIREMENTS

1. Contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job.
2. All work areas will be cleaned at the conclusion of the project and no tools or materials shall be left in a manner as to pose a safety hazard.
3. Projects are not considered finished and will not be paid by Owner until all debris, dust, etc. has been cleaned and removed to the Owner's satisfaction.
4. Contractor shall remove all abandoned cable per Article 800 of the National Electrical Code and per TIA, BICSI, and AVIXA standards, recycling these materials where possible. Removal of orphaned cable is mandatory. Contractors shall consider this when placing bids.

3.10 FINAL ACCEPTANCE

1. The Contractor is required to notify the Engineer/Owner of a proposed appointment for Final Inspection at least 72 hours before the appointment.
2. Owner may visit site during construction to ensure installation is in compliance with their requirements. Punch items discovered by Owner shall be resolved within 10 days of discovery.
3. System acceptance shall be defined as that point in time when the following requirements have been fulfilled:

- a. All submittals and documentation have been submitted, reviewed, and approved.
- b. The complete system has successfully completed all testing requirements.
- c. All punch list items have been corrected and accepted.

3.11 TRAINING

- 1. Provide a minimum of (2) 8-hour training session with a minimum of (4) Owner's staff at the project site (or other location designated by the Owner) by a qualified instructor (presence of equipment manufacturer if needed for additional assistance). Topics shall include system usage, operation and maintenance, and minor modifications.

3.12 WARRANTY

- 1. Maintenance
 - a. Contractor shall perform preventative maintenance every (6) months after final completion.
 - b. Contractor shall perform at a minimum:
 - 1) Cleaning of vents, filters, lenses
 - 2) Dust removal
 - 3) System performance re-validation
 - 4) Documentation of equipment requiring replacement (i.e. broken pixels/lenses/lamps, failing motors, etc.)
 - c. Costs shall be provided for extended services not covered by warranty.

END OF SECTION

**SECTION 280000
COMMON WORK RESULTS FOR SECURITY**

PART 1 GENERAL

1.01 SUMMARY

1. This section specifies the basic requirements for Communications installations as indicated or required and includes requirements common to more than one specification section of this Division (such as related documents, related sections, definitions, governing requirements, contractor requirements, warranty requirements, submittal requirements/procedures, and project closeout requirements/procedures, as well as other requirements). This section may expand upon and/or supplement the requirements specified in.
2. Examine the contract documents in their entirety (including Drawings and Specification sections in the other divisions) for requirements or work which may affect work under this section, regardless of whether such requirements or work are specifically indicated in this section.
3. Errors or Omissions in Drawings or Documentation
 - a. If any errors or omissions appear in Drawings, Specifications, or other documents, the bidding Contractor shall notify the System Designer no later than ten (10) days prior to submitting the bid.
 - b. Should conflict occur in or between Drawings and Specifications, the bidding Contractor is deemed to have estimated the more expensive way of doing the work, unless the bidding Contractor has asked for and obtained written decision (addendum) before submission of the bid as to which method or materials will be required.
4. Related Sections:
 - a. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor Section 260526 – Grounding and Bonding for Electrical Systems
 - b. Section 281000 – Access Control and Alarm Management System
 - c. Section 282000 – Video Surveillance System

1.02 DEFINITIONS

1. AES – Advanced Encryption Standard. ANSI – American Northern Standards Institute
2. AWG – American Wire Gauge
3. BICSI – Building Industry Consulting Service International
4. BLE – Bluetooth Low Energy
5. DHCP – Dynamic Host Configuration Protocol
6. DHS – Department of Homeland Security
7. DNS – Domain Name System
8. DPDT – Double Pole Double Throw

9. EIA – Electronics Industry Alliance
10. GUI – Graphical User Interface
11. Hazmat – Hazardous Materials
12. HTTP – Hypertext Transfer Protocol
13. IAM – Identity and Access Management
14. IDM – Identity Management
15. IEC – International Electrotechnical Commission
16. IEEE – Institute of Electrical and Electronic Engineers
17. IP – Internet Protocol
18. IPAC – Internet Protocol Access Control
19. ISO – International Standards Organization
20. KVM – Keyboard, Video (Monitor), Mouse
21. LAN – Local Area Network
22. NECA – National Electrical Contractors Association
23. NFC – Nearfield Communications
24. NFPA – National Fire Protection Agency
25. NIST – National Institute of Standards and Technology
26. NVR – Networked Video Recorder
27. PoE – Power over Ethernet
28. PTZ – Pan-Tilt-Zoom
29. SIA – Security Industry Association
30. SMS – Security Management System
31. SOC – Security Operations Center
32. SSH – Secure Shell
33. SSO – Single Sign-on
34. TIA – Telecommunications Industry Association
35. TLS – Transport Layer Security
36. UAS – Unmanned Aerial System
37. UL – Underwriters Laboratory
38. WAN – Wide Area Network
39. Provide: Furnish, install, terminate, label, test and certify a complete system.
40. Contract Documents (CD): Design drawings, specifications, sketches and schedules provided by the System Designer as they directly relate to this scope of work and this project.
41. NET-POP Rooms/MPOE (Main Point of Entry): The area where the outside plant media/carrier services appear in the facility. The NET-POP contains equipment

used by owner or carrier to hand-off/transition cable from outside plant into inside plant type.

42. Network Center/Main Distribution Frame (MDF) Areas: This technology space houses Layer 2/3 network switching gear and other main network distribution equipment and acts as the mid-connection point between the Core/Network and the TR/IDF/access zones for all connections.
43. Telecommunications Room (TR)/Intermediate Distribution Frame (IDF): is the location for the termination of backbone cables and for termination of horizontal cables, and for the interconnection of each. The space also hosts access-layer switches and user network connections within each floor.
44. Active Equipment: electronic equipment used to develop various WAN, LAN, and voice services, e.g., digital multiplexers, RS-232 controllers, Ethernet hubs, switches, routers, PBX, etc.
45. Horizontal: cabling system consisting of media and termination hardware interconnecting the Telecommunication Outlets (TOs) and the TRs.
46. Bonding: permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to conduct safely any current likely to be imposed on it.
47. Cable Tray: vertical or horizontal open supports, usually made of aluminum or steel, which are fastened to the building structure. Cables are laid in and fastened to the trays.
48. Cabinet: free standing, floor-mounted or wall-mounted modular enclosure designed to house and protect rack-mounted electronic equipment and passive terminations.
49. Channel: The end-to-end transmission path between two points at which application specific equipment is connected; encompasses all the elements of the horizontal cabling link, plus the equipment cords in the telecommunications spaces and work area.
50. Grounding: a conducting connection to earth, or to some conducting body that serves in place of earth.
51. Jack: receptacle used in conjunction with a plug to make electrical contact between communications circuits, e.g., eight-position/eight-contact modular jacks.
52. Media: twisted-pair/fiber optic cable or cables, or other forms of transmission used to provide signal paths.
53. Outside Plant (OSP): generally, any and all portions of the cable system that runs outside of an environmentally enclosed structure and/or building with each end terminated at different buildings. This specifically includes inter-building cables, conduits, manholes, hand-holes, and innerduct.
54. UTP: Unshielded Twisted Pair.
55. Passive Equipment: non-electronic hardware and apparatus, e.g., equipment racks, cable trays, electrical protection, patch panels, wiring blocks, fiber optic shelves, etc.

- 56. Patch Cords: a length of wire or fiber cable with connectors on one or both ends used to join communications circuits at a cross-connect.
- 57. Patch Panel: system of terminal blocks or connectors used with patch cords that facilitate administration of cross-connect fields.
- 58. Pathway: facility for the placement of communications cable. A pathway facility can be composed of several components including conduit, wireway, cable tray, surface raceway, under floor systems, overhead systems, raised floor, ceiling support wires, etc.
- 59. Protectors: electrical protection devices used to limit foreign voltages on metallic communications circuits.
- 60. Raceway: an enclosed channel designed expressly for holding wires or cables; may be of metal or insulating material. The term includes conduit, tubing, wire ways, under floor raceways, overhead raceways and surface raceways; does not include cable tray.
- 61. Racks: An open, freestanding, floor-mounted structure, typically made of aluminum or steel, used to mount equipment; usually referred to as an equipment rack.
- 62. Wireway: An enclosure with removable lid whose purpose is for routing cable and storing cable slack.
- 63. Contractor – The successful bidder engaged to provide the work of this specification
- 64. Access Control and Alarm Management System (ACAMS): System whose primary function is to control access through building via credentials, credential management, and electrified locking hardware. It's secondary function is to provide alarm monitoring and management for various sensors associated with access control breaches throughout the building.
- 65. Video Surveillance System (VSS): System whose primary function is video recording and storage of select areas in or around the building. The VSS is forensic in nature and is managed by the VMS.
- 66. Video Management System (VMS): System application that manages viewing and forensic analysis of VSS video feeds.
- 67. Intrusion Detection System (IDS): System whose primary function is the monitoring and management of alarms associated with breaches through a secured building or perimeter.
- 68. Perimeter Intrusion Detection System (PIDS): System whose primary function is the detection, tracking, monitoring, and management of alarms associated with breaches from an external perimeter to a secondary or exterior boundary.
- 69. Visitor Management System: System whose primary function is to provide temporary access credentials for entry through specified access-controlled portals. This system is integrated with the ACAMS.
- 70. Antipassback: Antipassback controls are intended to prevent an authorized user from bypassing access control for another individual, by passing back an access

credential (card or mobile device) after using it to allow an accompanying individual to present the same credential and gain access.

71. Application Programming Interface (API): Documented set of definitions and protocols for developing integrations between networked software applications, including software running on IoT devices.
72. Availability Zones: Physically separate datacenter locations within each data center geographical region that are tolerant to local failures. Failures can range from software and hardware failures to events such as earthquakes, floods, and fires. Availability zones must be designed so that if one zone is affected, cloud services, capacity, and high availability are fully supported by at least two other zones within the geographical region.
73. Biometric: Unique identifying physical or physiological characteristic of an individual that can be used to identify that individual, such as a facial image or fingerprint.
74. BUS: Short for communication bus, a collection of wires forming a communication system that transfers data between components inside a computer, or between computers.
75. CAN BUS: Controller area network (CAN) communication bus standard designed to allow microcontrollers and devices to communicate with each other's applications without a host computer.
76. Cloud-Native Software: Web application developed specifically for deployment as a cloud service, designed per the NIST five essential characteristics of cloud computing.
77. Container: A discrete computing environment for running software code, typically set up with only those parts of an operating system and other code libraries that are necessary for the software code to run correctly. A container may hold a complete application, a set of software functions, or a single function that performs just one task – such as responding to an access control system event. Each container is autonomous, can be launched in milliseconds, and runs in its own isolated environment, ensuring it does not disrupt other running applications or its underlying system. For example, in a physical access control cloud application supporting tens of millions of users and millions of card reader events per day, parallel processing using containers is a critical element of high performance.
78. Credential: Piece of information, usually digital, which serves as a means of identifying a user to an access control system for the purposes of authenticating the user and determining what that user's permissions are within the system. In a physical access control system, credentials are typically PIN codes, smart card encoded values, biometric data, mobile credentials, etc.
79. Destination Dispatch: Destination dispatch is an optimization technique used for multi-elevator installations, in which groups of passengers heading to the same destinations use the same elevators, thereby reducing waiting and travel times. Using destination dispatch, passengers request travel to a particular floor using a keypad, touch screen, or electronic credential prior in the lobby and are immediately directed to an appropriate elevator car.

80. Digital Certificate: Electronic document, issued by a Certificate Authority, for uniquely identifying a party (such as a software application or hardware device) in a networked communication session.
81. General Data Protection Regulation (GDPR): Regulation in European Union (EU) law on data protection and privacy in the EU and the European Economic Area (EEA). It also addresses the transfer of personal data outside the EU and EEA areas.
82. IOT-Native Device: Networkable cybersecure device specifically engineered to operate independently and communicate via local network and/or continuous, periodic or ad-hoc Internet connection.
83. LEAF Consortium: Association of industry manufacturers whose purpose is to foster interoperability in the access control and identity credentials markets.
84. National Institute of Standards and Technology (NIST): U.S. federal technology agency that works with industries to develop and apply technology, measurements, and standards.
85. Principle of Least Privilege: Information security concept in which a user is given the minimum levels of access – or permissions – needed to perform the user's job functions.
86. Representational State Transfer (REST): Set of architectural guidelines for the design and development of HTTP-based communications between computer systems on the web.
87. Reader: One of the several types of devices, mounted at a facility door or gate, or in an elevator cab or elevator lobby, which serves as an input device for credentials such as smartcards, PIN codes, biometrics, mobile credentials, etc.
88. RESTful API: API that conforms to the constraints of REST architectural guidelines.
89. Serverless: Serverless is a cloud-native development model that allows developers to build and run applications without having to manage individual virtual or physical servers directly, which are managed by the cloud service provider, chiefly through highly cost-effective automation. Serverless apps may be deployed in containers (see definition above) that automatically launch on demand when called.
90. Single Sign-On (SSO): Single Sign-On occurs when a user logs in (signs on) to one application or system, and is then automatically logged in to other applications or systems during the same session, regardless of the application, system, domain or network the user accesses during the session.
91. System Administrator: Individual who has the ability to login to an account and, based on assigned roles, view or change account information and perform manual access control actions.
92. User: Individual to whom a system access credential is provided that the access control system uses to perform authentication of the user and provide authorized access.
93. X.509: Standard for a public key infrastructure (PKI) to manage digital certificates and public-key encryption.

1.03 REFERENCES

1. Most recent editions, revisions, addenda, and bulletins of the following documents:
 - a. ANSI/TIA-568 series
 - b. ANSI/TIA-569 Telecommunications Pathways and Spaces
 - c. ANSI/TIA-606 Administration Standard for Telecommunications Infrastructure
 - d. ANSI/TIA-607 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
 - e. ANSI/TIA-862 Structured Cabling Infrastructure Standard for Intelligent Building Systems
 - f. Telecommunications Distribution Methods Manual
 - g. Information Transport Systems Installation Methods Manual (ITSIMM)
2. Americans with Disabilities Act
3. California Electric Codes (CEC)
4. Local Codes and Standards – all applicable
5. NFPA 70 – National Electrical Code
6. NFPA 72 – National Fire Alarm and Signaling Code
7. NFPA 101 – Life Safety Code
8. NFPA 730 – Guide for Premises Security
9. NFPA 731 – Standard for the Installation of Electronic Premises Security Systems
10. NFPA 780 – Standard for the Installation of Lightning Protection Systems
11. NFPA 1982 – Standard on Personal Alert Safety Systems
12. UL444 – Standard for Safety of Communications Cable
13. UL 96 – Installation Requirements for Lightning Protection Systems
14. UL 294 – Standard for Access Control System Units
15. UL 365 – Police Station Connected Burglar Alarm Units and Systems
16. UL 603 – Standard for Power Supplies for Use with Burglar-Alarm Systems
17. UL 681 – Standard for Installation and Classification of Burglar and Holdup Alarm Systems
18. UL 827 – Standard for Central-Station Alarm Services
19. UL 1034 – Standard for Burglary-Resistant Electric Locking Mechanisms
20. UL 1666 – Standard for Safety of Flame Propagation Height
21. UL 1076 – Standard for Proprietary Burglar Alarm Units and Systems
22. UL 1610 – Standard for Central-Station Burglar-Alarm Units
23. UL 2610 – Commercial Premises Security Alarm Units and Systems
24. Local Authority Having Jurisdiction (AHJ)

25. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either
26. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense

1.04 QUALIFICATIONS

1. The Contractor shall hold a valid State of California C7 and C10 Contractor's license.
2. Contractor shall have a proven track record in the field of specified system installations, with at least (3) previous installations of comparable size and complexity undertaken within the last (5) years.
3. Contractor shall be a manufacturer's authorized distributor and warrantee station for the equipment offered, and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment.

1.05 SUBMITTALS

1. Make submittals in accordance with:
 - a. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor
2. Action Submittals:
 - a. Shop Drawings
 - 1) Owner will provide electronic files in CAD or Revit format, containing the contract document drawing files, for use in the preparing of the shop drawings.
 - 2) Drawings will be to scale.
 - 3) Submit the following sheets:
 - (a) Titlesheet and Cover Page: indicate project name and location; include sheet index
 - (b) Site Plan
 - (c) Overall Floor Plans: floor plans showing the locations of devices and cable routing paths with cable types, quantity called out, and device IDs; headend locations; cable routes; new pathways/conduits/boxes/etc.
 - (d) Alarm zone schedule indicating protected areas.
 - (e) Enlarged Plans: Headend rooms with equipment types and quantity called out; coordinated wall elevations; rack elevations; CFCI and OFCI equipment called out.
 - (f) Panel schedules or risers: Show all devices connected to headend equipment ports; devices IDs; interconnections between all boards, power supplies, batteries, relays, etc.
 - (g) Rough-in and wiring details.

- (h) Calculations: longest cable voltage drop per headend location; battery storage calculations; video storage calculations; power calculations per circuit per headend location for peak and average power; pixel density calculations for expected camera field of view where specified
- b. Product submittal
 - 1) Contractor shall furnish products for a complete, turnkey system. Submit major components and ancillary accessories required for complete system. Minor accessories like screws and nuts are not required for submission, unless specified in other Specifications sections.
 - 2) Product submittal shall be a single complete submittal. Incomplete submittals will be rejected without review.
 - 3) Partial submittals will be allowed for short lead items only with documentation on lead time included at the front of the submittal.
 - 4) Catalog cut sheets and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, material finish, and licenses. Clearly indicate on each sheet what is being submitted on.
 - 5) Qualification Data: Submit at least three references for projects already completed, similar in scope to the project described herein. Include, for each customer reference, the following information: Company name, address, phone number, name and email address of contact and type of job completed.
 - (a) Provide copies of the Contractor's certification.
 - (b) Provide written guarantees from manufacturers of major equipment, that a service representative has been assigned.
 - (c) Provide copies of technician training certificates.
 - 6) Submit test procedures for each door and standalone device.
- c. Acceptance testing submittal
 - 1) Installer shall provide a test plan including system acceptance inspections and test demonstrations to be jointly performed by Installer and Owner. Owner shall designate personnel to observe and/or perform test steps as agreed with Installer.
 - (a) Include the following verifications in the test plan:
 - (1) Security System Operator Permissions: Operator permissions have been established per operator job and task requirements, and that all system operator actions can be performed per assigned duties – for Owner technical and administrative personnel, contracted security officer personnel, and security system services provider technicians – per Owner preferences.

- (2) User Building Access Permissions: Credential-holder permissions have been defined per user groups. Access is granted and denied at each reader location according to defined user groups.
 - (3) Integrations: All integrations are working fully as expected. Checklists shall include rough-in inspections, installation/quality checks, functional reviews, and configuration inspections.
 - (4) OSDP-shall be enabled where specified.
 - (5) Changed default passwords and logins.
- 2) Contractor may use manufacturer's commissioning journals where available to create testing plan.

1.06 CLOSEOUT DOCUMENTS

1. Final close out documents including, but not limited to, test results on in digital PDF and physical CD-ROM or USB drive, in native tester format, project manual that includes manufacturer and contractor warranties, product cut sheets, material submittals, etc. Also, include the following:
 - a. Provide "As-Built" Drawings in AutoCAD or Revit.
 - 1) "As-Built" drawings indicating location of all equipment including but not limited to devices, headend equipment locations, wall elevations, cable routes, identification/labels, custom wiring, etc.
 - 2) Red-lined shop drawings submitted as As-built drawings will be rejected without review.
 - 3) (1) printed, hard copy of final approved as-built drawings in native sheet size will be provided to Owner. Unapproved sheet sizes will be rejected.
 - b. Spreadsheet of the following:
 - 1) ACAMS
 - (a) Panel/enclosure identification
 - (b) IP and MAC address(es) for each panel
 - (c) Location of each panel
 - (d) Patch panel and switch ports each panel is connected to
 - 2) VSS
 - (a) Camera identification
 - (b) Make and model for each camera
 - (c) IP and MAC address for each camera
 - (d) Location of each camera
 - (e) Patch panel and switch ports each camera is connected to

- c. Place a laminated full-size, minimum "C" sized, floor plan of these drawings and panel schedule (coordinate with Owner) on the interior of each headend enclosure, showing area covered, data locations, and identification.
- d. Owner's written acceptance of installed systems.
- e. Print (2) printed copies acceptance test reports.
- f. Print (2) printed copies of full-sized as-built drawings and submit to Owner.
- g. Provide pricing and contact information for emergency service work not covered by warranty.

1.07 QUALITY ASSURANCE

- 1. Standards for Materials and Equipment
 - a. The Contractor shall provide all materials, equipment, and installation in compliance with the latest applicable standards from ASIS, ANSI, FCC, ASTM, EIA/TIA, IEEE, NEC, NFPA, NEMA, OSHA, REA, and UL.
- 2. Acceptance Testing
 - a. Verify by inspection and formalize by signed-off inspection documentation that system installation has been performed as specified.
 - b. Execute test plan and formalize by documentation sign-off that system performance has been demonstrated to the satisfaction of Owner. Owner's Representative retains right to suspend and/or terminate testing at any time upon failure of the system to perform as specified. Owner's written acceptance of system is a requirement of Closeout, and shall not conclude the Closeout Documentation stage.
 - 1) Collaborate with Owner's Representative prior to start of testing, to establish criteria pass/fail criteria and classification of test execution problems, such as:
 - (a) Pass/fail: Criteria determining what constitutes a test pass or failure.
 - (b) Suspension and resumption: Criteria determining when testing must be suspended and resumed later.
 - (c) Show Stopper: Stop test, fix problem and restart test from beginning.
 - (d) Major Problem: Fix problem before test can be resumed or concluded.
 - (e) Minor Problem: Add problem to "punch list", complete test.
 - (f) Special Issue: Investigate to determine which problem category above category applies.
 - c. Provide tests specified below, when applicable or required by Owner, and as indicated under individual items of material, equipment, and work specified in this Specification.
 - 1) Furnish all test equipment and instruments required for the tests.

- 2) Responsible, qualified employees of the contractor in the presence of the Owner or an authorized representative shall perform the cable testing.
- 3) All individuals involved in the testing phase of the project shall not have been involved in the installation phase nor shall have immediate knowledge of the installation task.
- d. End-to-end performance and calibration of all parts and channels shall be tested prior to testing in presence of System Designer.
- e. Performance testing of randomly-selected doors and standalone devices shall be performed in presence of System Designer. System shall be accepted by System Designer prior to testing in presence of Owner.

1.08 WARRANTY & SUPPORT

- 1. Warranty
 - a. Warranty shall meet the following criteria:
 - 1) This warranty will cover all cables, terminations, and components provided by the Contractor.
 - 2) Minimum 1-year written warranty covering workmanship and materials from the date of project completion. All repairs shall be made at no cost to the Owner during the warranty period.
 - 3) Corrections shall start within 48-hours of notification from Owner.
 - b. If the warranty is needed by the Owner within the warranted period and the original installer is no longer in business, System manufacturer shall find a substitute certified contractor and assume costs to fulfill the obligations of the warranty.
 - c. Upon acceptance of the warranty paperwork and test results from the Contractor, System manufacturer will mail a notification letter to the installer and a notification letter with warranty certificate to Owner.
 - d. The warranty period shall commence following the final acceptance of the project by Owner and written confirmation of warranty from System manufacturer.
 - e. Provide 5-year software service agreement. Include associated licenses and renewal fees for the agreement's duration. Agreement and licenses shall commence following the project's substantial completion, and not the Contract's purchase date.
- 2. Manufacturer Support:
 - a. For the duration of the System subscription, automatically provide documented feature and security updates to cloud-based System software and Mobile Apps at no additional charge. Software, Mobile App and firmware updates shall be provided on a continuous basis.
 - b. Provide direct live telephone technical support free of charge both to end users and installing/maintaining security services contractors.

- c. Provide optional additional-cost professional services for on-site deployment support to installing/maintaining services firm.
- 3. Maintenance and Service: Servicing Contractor shall:
 - a. General Requirements:
 - 1) Provide all services required and equipment necessary to maintain the entire integrated electronic security system in an operational state as specified for a period of one year after formal written acceptance of the system. Provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Minimize impacts on facility operations when performing scheduled adjustments or other non-scheduled work.
 - b. Description of Work:
 - 1) Provide adjustment and repair of the Cloud-Based Physical Access Control System on-site equipment consistent with Manufacturer guidance and instructions.
 - c. Personnel:
 - 1) Ensure service personnel are certified in the maintenance and repair of the selected type of equipment and qualified to accomplish all work promptly and satisfactorily.
 - d. Schedule of Work:
 - 1) Perform work during regular working hours, Monday through Friday, excluding federal holidays.
 - e. Emergency Service:
 - 1) Provide staffed emergency service center service 24 hours a day 365 days a year. Provide emergency service center telephone number for the Owner to request service when system is not functioning properly. Owner has sole authority for determining catastrophic and non-catastrophic system failures within parameters stated in General Project Requirements.
 - 2) For catastrophic system failures, provide same day four-hour service response with a defect correction time not to exceed eight hours from notification. Catastrophic system failures are defined as any system failure that Owner determines will place the security of one or more sites at increased risk.
 - 3) For non-catastrophic failures, provide eight-hour service response with a defect correction time not to exceed 24 hours from notification.
 - f. Operation:
 - 1) In performance of scheduled adjustments and repair, at completion of work document the following:
 - (a) For routine maintenance, briefly describe the work done.
 - (b) For problem resolution, describe the problem, the troubleshooting work done, root cause discovered, and remedial action taken.

- (c) Verify operation of the system relative to any changes, repairs or part replacements made.

1.09 DELIVERY, STORAGE, AND HANDLING

1. To prevent damage, theft, soiling, and misalignment, protect equipment during transit, storage, and handling
2. The contractor shall coordinate the secure storage of equipment and materials on site, or, if no on-site storage is available, shall provide their own secure storage at the Contractor's expense.
 - a. Do not store equipment where conditions fall outside the manufacturer's recommendations for environmental conditions.
 - b. Do not install damaged equipment. Remove environmental conditions from the site and replace damaged equipment with new equipment.
 - c. If off-site storage of materials is necessary, this shall be at the Contractor's expense.

1.10 PROJECT CONDITIONS

1. Project Environmental Requirements
 - a. Hazardous Materials Prohibition
 - 1) The Contractor shall ensure that all materials used in the project are asbestos-free, unless specifically authorized in writing by the Owner.
 - b. Existing Conditions
 - 1) Verify that all conditions on the project site are acceptable for the Work specified in this Section. Prior to bid opening, notify the System Designer, in writing, of any discrepancies, conflicts, or omissions. Otherwise, correct these issues at no additional cost to the Owner.
 - 2) Continue to monitor the project site. If conditions develop that require a variance from the Specifications or Drawings, then immediately notify the Owner in writing. Otherwise, make recommendations, submit drawings showing how the Work may be installed, and, upon approval, proceed with the necessary changes without additional cost to the Owner.
 - c. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and work above ceilings is complete.
 - d. Confirmation of Pathway and Cable Manager sizing:
 - 1) Wherever cabling pathways or managers are installed, it is the Contractor's responsibility to confirm pathway or manager sizing to represent no more than 25% fill upon installation according to manufacturer's fill tables.
 - 2) Pathways deemed overfilled upon installation will not be accepted and shall be remedied at Contractor expense.

1.11 USE OF THE SITE

1. Where the Owner deems it necessary to place restrictions, use the site as directed by the Owner.
2. When proceeding with the work, do not interfere with the ordinary use of streets, aisles, passages, exits, or operations of the Owner. During the day, set up cones and barriers in hallways and walkways. Do not string cable down the hallways during normal hours.
3. Request a hazardous materials worksheet that identifies potentially-hazardous locations. Do not proceed with any work in locations where hazardous materials are known to be. Obtain instructions from the Contractor's Project Manager on and when to work in these areas.
4. Multiple times each day, each contractor shall remove all trash and debris from the site. Before leaving the room each day:
 - a. The Contractor shall replace all ceiling tiles that they have removed.
 - b. The Contractor shall place all furniture and equipment that they have moved back into its original location.
 - c. The Contractor shall return any equipment that they have disconnected to working order.
 - d. The Contractor's Job Foreman shall inspect all work locations to ensure that the rooms are clean and that all of the tasks described above have been done.
 - e. It is recommended that the Contractor inspect the site and take pictures to document the condition of the ceilings and walls.

1.12 RESPONSIBILITIES AND COORDINATION

1. The Contractor shall provide all materials, qualified labor and services required to ensure a complete and operational system, installed in accordance with the intent of the Contract Documents.
2. The Contractor shall furnish and install all incidental items not actually shown or specified, but which are required by best practices to provide complete functional systems.
3. The Contractor shall coordinate the details of facility equipment and construction for all specification divisions, which affect the work covered under this Division.
4. The Contractor shall coordinate all activities with the overall construction schedule.
5. The Contractor shall coordinate with all other trades. The Contractor will submit a schedule for the installation within 15 days of contract award.
 - a. The schedule shall include delivery, installation, and testing for conformance to specific job completion dates.
 - b. At minimum, the schedule shall provide dates for the start of demolition, the completion of demolition, the installation start date, the completion of copper cabling, the completion of backbone cabling, the completion of testing and labeling, cutover, the completion of the final punch list, final inspection, and acceptance.

6. The Contractor shall develop a bill of materials, perform material management and efficient use of the materials whether they are issued by Owner or purchased by the Contractor.
7. The Contractor shall ensure materials, in excess of, those required to complete the project are kept in their original condition and packaging for restocking.
8. The Contractor shall maintain existing cables and terminations not determined to be within the demolition scope of work. Cables damaged, removed, or unterminated shall be reinstalled and recertified with the manufacturer's certified installer, and test results provided to the Owner.
- 9.

1.13 DESIGN CRITERIA

1. Compliance by the contractor with the provisions of this Specification does not relieve him or she from the responsibilities of providing materials and equipment of proper design, mechanically and electrically suited to meet operating requirements at the specified service conditions.

1.14 LABELING

1. Refer to Owner's standards for labeling requirements.
2. Comply with TIA/EIA-606-A, TIA/EIA-606-A, Addendum 1 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 2 PRODUCTS

2.01 GENERAL

1. This Section includes General Requirements for each section in Division 28 and shall be used in conjunction with specifications, other related Divisions and related Contract Documents to establish the total requirements for the project.
2. All materials and products shall be:
 - a. Appropriate for the intended use
 - b. Permitted by the Authority Having Jurisdiction (AHJ)
3. All products shall be new, of the latest version at time of bid, and brought to the job site in original manufacturer's packaging. Used equipment and damaged material will be rejected.
4. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
5. Take care during installation to prevent scratches, dents, chips, etc. Equipment with significant or disfiguring cosmetic flaws will be rejected.
6. All components will be approved by the System Designer and shall have the most aesthetic value possible while maintaining specified functionality. Hardware shall:
 - a. Be in compliance with the Construction Documents.
 - b. Have fit and finish compatible with the existing surrounding structure.
 - c. Be unobtrusive.

- d. Provide the required functionality.
7. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of the equipment and its installation.
8. Provide products that are suitable for the intended use, including, but not limited to environmental, regulatory, and electrical factors.
9. Provide Torx screws for all devices specified in technical sections. Additionally, provide Torx screws for pathways associated with devices specified in technical sections below 10' AFF.

2.02 SUBSTITUTION POLICY

1. Substitution of specified products or systems is not allowed.
2. Contractor shall assume all costs for removal and replacement of any product installed in substitution of those specified. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

2.03 WORKSTATION

1. Workstation for viewing security systems will be OFCI.

PART 3 EXECUTION

3.01 WORKMANSHIP

1. Manufactured products, materials, equipment, and components shall be provided, conditioned, applied, installed, connected, and tested in accordance with the manufacturer's specifications and printed instructions.
2. The installation of all system components shall be carried out under the direction of qualified personnel. Appearance shall be considered as important as mechanical and electrical efficiency. Workmanship shall meet or exceed industry standards.

3.02 INTENT OF DRAWINGS

1. The Security drawings show only general locations of equipment, devices, raceways, cable trays, boxes, etc., unless specifically dimensioned.
2. The Contractor shall be responsible for the proper placement and routing of equipment, cable, raceways, cable runway, and related components, according to the Contract Documents and subject to prior review by the Owner and System Designer.
3. The Contractor shall refer any conflicts within the Contract Documents to the Construction Manager and/or Owner for resolution.

3.03 GROUNDING

1. Comply with requirements in both 26 0526 "Grounding and Bonding for Electrical Systems" and 28 0526 "Grounding and Bonding for Security Systems" for grounding conductors and connectors.
2. Comply with ANSI/TIA-607 and the local Electrical Code.

3.04 SERVICE CONTINUITY

1. Maintain continuity of communications services to all functioning portions of the process or buildings during hours of normal use.
2. Arrange temporary outages for cutover work with General Contractor. Keep outages to a minimum number and a minimum length of time in order to provide minimum impact.

3.05 LAYOUT AND TOLERANCES

1. Follow as closely as practicable the schematic design shown on the drawings. Make all necessary measurements in the field to verify exact locations and ensure precise location and fit of specified items in accordance with the drawings. Make no substantial alterations without prior approval of the Owner and the System Designer.

3.06 CONSTRUCTION REVIEW

1. The System Designer and Owner will review and observe installation work to ensure compliance by the contractor with requirements of the Contract Documents.
2. Review, observation, assistance, and actions by the System Designer and Owner shall not be construed as undertaking supervisory control of the work or of methods and means employed by the contractor. The System Designer and Owner review and observation activities shall not relieve the contractor from the responsibilities of these Contract Documents.
3. The fact that the System Designer and Owner does not make early discovery of faulty or omitted work shall not bar the Owner from subsequently rejecting this work and withholding payment until the contractor makes the necessary corrections.
4. Regardless of when discovery and rejection are made, and regardless of when the contractor is ordered to correct such work, the contractor shall have no claim against the System Designer or Owner for an increase in the Subcontract price, or for any payment on account of increased cost, damage, or loss.

3.07 PROJECT RECORD DOCUMENTS

1. Provide detailed project record documentation for sections listed in Part 1.
2. Maintain separate sets of redlined record drawings for the communications work, which show the exact placement, and identification of as-built system components. These are subject to weekly review by the General Contractor, Owner, or its representative.

3.08 ADDITIONAL CONTRACTOR REQUIREMENTS

1. Contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job.
2. All work areas will be cleaned at the conclusion of the project and no tools or materials shall be left in a manner as to pose a safety hazard.
3. Projects are not considered finished and will not be paid by Owner until all debris, dust, etc. has been cleaned and removed to the Owner's satisfaction.

4. Contractor shall remove all abandoned cable per Article 800 of the National Electrical Code and per TIA, BICSI, and ASIS standards, recycling these materials where possible. Removal of orphaned cable is mandatory. Contractors shall consider this when placing bids.

3.09 INTEGRATIONS

1. Coordinate with trades, Owner's staff and/or IT representatives, and other providers where required.

3.10 FINAL ACCEPTANCE

1. The Contractor is required to notify the System Designer and Owner of a proposed appointment for Final Inspection at least 72 hours before the appointment.
2. Owner may visit site during construction to ensure installation is in compliance with their requirements. Punch items discovered by Owner shall be resolved within 10 days of discovery.
3. System acceptance shall be defined as that point in time when the following requirements have been fulfilled:
 - a. All submittals and documentation have been submitted, reviewed, and approved.
 - b. The complete system has successfully completed all testing requirements.
 - c. All punch list items have been corrected and accepted.

3.11 TRAINING

1. Provide a minimum of (1) 8 hour training session with a minimum of (4) Owner's staff at the project site (or other location designated by the Owner) by a qualified instructor (presence of equipment manufacturer if needed for additional assistance). Topics shall include system usage, operation and maintenance, and minor modifications.

3.12 WARRANTY

1. Maintenance
 - a. Contractor shall perform preventative maintenance every (6) months after final completion.
 - b. Contractor shall perform at a minimum:
 - 1) Cleaning of lenses
 - 2) Dust removal
 - 3) Camera readjustments
 - 4) System performance re-validation
 - 5) Documentation of equipment requiring replacement (i.e. broken lenses/domes, broken locks, loose handles, etc.)
 - 6) Costs shall be provided for extended services not covered by warranty.
2. Software
 - a. Contractor shall perform firmware upgrades every (6) months after final completion.

- 1) Contractor shall coordinate firmware upgrades for software applications to remain compatible.
 - 2) Coordinate roll-back of software versions with Owner's IT staff.
- b. Contractor shall provide licenses as required to maintain software applications.

END OF SECTION

SECTION 281000
ACCESS CONTROL AND ALARM MANAGEMENT SYSTEM

PART 1 GENERAL

1.01 SUMMARY

1. Contractor Shall Provide and Install
 - a. The materials and labor required for the installation of access control and alarm management systems include, but are not limited to:
 - 1) Access control system application and servers
 - 2) Access control panels and enclosures
 - 3) Power supplies and enclosures
 - 4) Credentials
 - 5) Credential readers
 - 6) Request-to-exit devices
 - 7) Electrified locksets
 - 8) Exit buttons
 - 9) Through-wire electrified transfer hinges
 - 10) Door contacts
 - 11) End-of-line resistors
 - 12) Duress buttons
 - 13) Cabling
 - b. Although such work is not specifically mentioned herein or on the Drawings, the Contractor shall furnish and install all miscellaneous items, accessories, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, without claim for additional payment.
2. Related Sections:
 - a. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor
 - b. Section 260526 – Grounding and Bonding for Electrical Systems
 - c. Section 260533.13 – Conduit for Electrical Systems
 - d. Section 260533.16 – Boxes for Electrical Systems
 - e. Section 280000 – Common Work Results for Security
 - f. Section 282000 – Video Surveillance System

1.02 SYSTEM DESCRIPTION

1. Access Control and Alarm Management System (ACAMS)
 - a. An access control system will be provided to facilitate access through Owner-designed portals via credential readers, electrified locksets, door contacts, and request-to-exit devices. Cabling, control panels, and power supplies will be provided to support devices.

- b. System will be tested to ensure failures are remediated, and that the system will be turnkey.
- c. Credentials will be provided for proper access through the project boundaries. In addition, access levels/groups, user information, and visitor information will be coordinated.

PART 2 PRODUCTS

2.01 ACCESS CONTROL SYSTEM APPLICATION AND SERVERS

1. Basis of Design: Pro-Watch Security Management System Suite as manufactured by Honeywell Commercial Security.
 - a. Function as an electronic access control system and integrates alarm monitoring, CCTV, digital and network video, ID badging and database management into a single platform. A modular and network-enabled architecture allows maximum versatility for tailoring secure and dependable access and alarm monitoring solutions.
 - b. Available in Four Scalable Editions:
 - 1) Pro-Watch Lite Edition: Utilizes the Microsoft SQL Express database for applications with one to four users and up to 32 controlled doors.
 - 2) Pro-Watch Professional Edition: Utilizes Microsoft SQL Express database for applications from one to five users and up to 64 controlled doors. Provides a set of tools to easily backup, restore and maintain the Database. Allows expansion to Corporate and/or Enterprise Edition without changing the user interface or database structure.
 - 3) Pro-Watch Corporate Edition: Utilizes Microsoft SQL Server database for applications from unlimited users and up to 20,000 controlled doors. Provides a set of tools to easily backup, restore and maintain the database. Allows for expansion Enterprise Edition without changing the user interface or database structure.
 - 4) Pro-Watch Enterprise Edition: Incorporate regional server architecture. Regional sites operate autonomously with all information required to maintain security locally. The enterprise server maintains any critical system information via synchronization with each regional site. A single enterprise server provides global management of all regional servers and acts as a central collecting point for all hardware configurations, cardholder and clearance code data and transaction history.
 - c. The contractor is to determine which edition best suites the application.
 - d. Security Management Software for Project.
 - 1) Edition: Pro-Watch Enterprise.
2. Software Requirements: The Security Management System; a modular and network-enabled access control system capable of controlling multiple remote sites with alarm monitoring, ID badging, video integration, and intercom and allowing for easy expansion or modification of inputs via remote monitoring stations. The System to be controlled at a central computer location under the

control of a single software program and provide full integration of all components. It is to be alterable at any time depending upon facility requirements. Reconfiguration may be accomplished online through system programming.

- a. Multi-User/Network Capabilities: Support multiple operator workstations via local area network/wide area network (LAN/WAN).
 - 1) Communications Between the Workstations: The server computer utilizes the TCP/IP standard over industry standard IEEE 802.3 (Ethernet).
 - 2) Supervised communications between the server and workstations, automatically generate alarm notifications when the server is unable to communicate with a workstation.
 - 3) Network server operators have the capability to log on to workstations and remotely configure devices for the workstation.
 - 4) Standard operator permission levels shall be enforced with a full operator audit.
- b. Concurrent Licensing: Provides the ability for any client workstation to connect to the database server as long as the maximum number of concurrent connections purchased has not been exceeded.
- c. Terminal Services: Supports Windows Server Terminal Services.
 - 1) The Security Management System server application may reside on the Windows Terminal Server. Operating systems supporting a standard web browser must be capable of utilizing the thin client architecture.
 - 2) Unlimited connections, based on concurrent licensing to the Software. Obtain full functionality through the intranet connection allowing full administration and monitoring without needing a local installation.
- d. Relational Database Management System: Supports industry standard relational database management systems. This includes Microsoft SQL Server 2016 SP1, 2017 and 2019.
- e. Database Partitioning: Provides option to restrict access to sensitive information by user ID.
- f. Memory: Proprietary software programs and control logic information used to coordinate and drive system hardware are to be stored in read-only memory.
- g. LDAP/ Microsoft Active Directory Services: Support of Lightweight Directory Access Protocol (LDAP) for enabling users to locate organizations, individuals, and other resources such as files and devices in a network, whether on the public internet or on a private intranet.
 - 1) Provide a direct link to Microsoft Active Directory Services. Allow transfer of Active Directory users into the database via the Data Transfer Utility.
 - 2) Conversely, Users will be capable of being exported to the Active Directory.

- h. Unicode: Utilize Unicode worldwide character set standard. Support double-byte character sets to facilitate adaptation of the System user interface and documentation to new international markets.
 - 1) Language Support: Includes English, Spanish, Portuguese, French, German and Simplified Chinese.
- i. Encryption: Provide multiple levels of data encryption.
 - 1) True 128-bit AES data encryption between the host and intelligent controllers.
 - (a) Encryption: Data integrity to be compliant with FIPS-197 requirements and SCIF environments.
 - (b) Master Keys: Downloaded to the intelligent controller, which shall then be authenticated through the Security Management System based on a successful match.
 - 2) Transparent database encryption, including log files and backups.
 - 3) SQL secure connections via SSL or TLS1.2 with PW7K hardware.
- j. Supervised Alarm Points: Supervised and non-supervised alarm point monitoring.
 - 1) Upon Alarm Recognition: System to be capable of switching CCTV cameras that are associated with the alarm point.
- k. Compliance and Validation: Incorporate signature authentication where modifications to System resources will require either a single or dual signature authentication.
 - 1) Administrators: Have ability to select specified devices in the System where data manipulation will be audited, and signatures will be required to account for the data modification.
 - 2) Upon Resource Modification: User will be required to enter a reason for change or select a predefined reason from a list.
 - 3) Data will be securely stored and maintained in the database and can be viewed using the reporting tool.
 - 4) Functionality will meet the general requirements of Validation and Compliance through Digital Signatures with special attention to the case of Title 21 CFR Part 11 Part B compliance.
- l. Clean Room Solution:
 - 1) Overview: System provides a clean room solution which enables users to manage their "Clean Environments" or other areas requiring special restricted access through a process-oriented graphical user interface (GUI).
 - 2) Configuration: Users have the capability of adding, editing, or deleting clean rooms.
 - 3) Each "Clean Room:" Capable of having a contamination level set.

- (a) Entry to a higher-level contamination area will automatically restrict access to cleaner level areas.
 - (b) Individual cards must be capable of being reset on an immediate one time, automatic, or per-hour basis.
- 3. Security Management System Operational Requirements:
 - a. System Operations:
 - 1) Windows Authentication Login: Use an integrated login method which accepts the user ID of the person who has logged on to Windows.
 - 2) Password: Use an integrated authentication method which utilizes Windows user accounts and policies.
 - 3) Information Access: Capable of limiting operators' access to sensitive information. Operators must have proper authorization to edit information.
 - 4) Shadow Login: Lets users login over a currently logged-on user without having the current user log off the System or out of the Windows operating system.
 - 5) Graphical User Interface: Compliant with Microsoft graphical user interface standards, with the look and feel of the software being that of a standard Windows application, including hardware tree-based system configuration.
 - 6) Guard Tour Module: Allows users to program guard tours for their facility. Tours do not require the need for independent or dedicated readers.
 - 7) Secure Mode Verification Control (e.g., force guard to do a visual verify): From the verification viewer. Allow user or guard to decide the access of an individual who presents their card at a designated secure mode reader.
 - 8) Database Partitioning: A System in which partitions are set up at installation and cannot be easily changed is not acceptable.
 - 9) Status Groups: Real-time system status monitors that graphically depicts all logical devices.
 - 10) Automatically Disable Card upon Lack of Use: Set a predefined time period in which cardholders may swipe their card through a card reader.
 - 11) User Functions and ADA Ability: Provide user functions and ADA (Americans with Disabilities Act) ability that provides the capability to trigger an event at the System intelligent controller when a defined card is presented.
 - 12) Pathways: Support pathways programming. A pathway is an object that combines input points to be masked (shunted) for a set duration, and an output point to be activated, when a particular card receives a local grant at a reader.

- 13) Database Audit Log: Capable of creating an audit log in the history file following any change made to System database by an operator.
 - 14) Operator Log: Capable of creating an action log in the history file following actions performed by an operator.
 - 15) Alarm Routing: Capable of defining routing groups that determine what event information is to be routed to a user or class of users.
 - 16) Global and Nested Anti-Pass back: Support use of an optional Anti-Pass back mode, in which cardholders are required to follow a proper in/out sequence within the assigned area.
 - 17) Two Person Rule: Support a "two-person rule" to restrict access to specific access areas unless two cardholders present two different valid cards to the reader one after the other within a period time defined by the door unlock time multiplied by a factor of 2.
 - 18) Occupancy Restrictions: Allow user to define the minimum and maximum occupancy allowed in a designated area.
 - 19) Multiple Sequential Card Swipes to Initiate Procedure: Allow the user to define a logical device, quantity of consecutive identical events, a time period and a System procedure to trigger when the event occurs a maximum quantity of times in the allocated time period.
 - 20) Hardware Templates: Include ability to define hardware templates (door templates) to simplify the process of creating an access control system. Hardware templates allow a user to define a "typical" door configuration and then use that template over and over in the process of defining doors.
 - 21) Mercury Digital Terminal (MRDT) with Keypad: Accommodate Mercury Intrusion hardware like the MRDT.
 - 22) MRDT works with PW-6000/7000 panel to provide intrusion functionality. Mercury Intrusion requires a special Pro-Watch license.
 - 23) Panel Conversion Utility: PW6K hardware can be converted to PW7K hardware.
- b. Access Control Functional Requirements: Include validation based on time of day, day of week, holiday scheduling, site code verification, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card/PIN, card, and video. The following features are programmable and capable of being modified by a user with the proper authorization:
- 1) Time Zones: Define the period during which a reader, card, alarm point, door, or other system feature is active or inactive. In addition to Monday-Sunday, there shall be at least one day of the week called Holiday.
 - 2) Holidays: Allow holidays to be entered into the System. Holidays will have a start date plus duration defining multiple days. Holidays have a holiday type of 1, 2, or 3, which may be defined by the user.

- 3) Response Codes: Allow user to enter a predefined code to represent a response to an alarm occurring in the facility.
- 4) Clearance Codes: Allow user to establish groups of readers at a facility for the purpose of granting or denying access to badge holders. Clearance codes may be assigned to companies and individuals employed by the company and may be modified for individual users in the badge holder maintenance application.
- 5) Companies: Each badge holder entered into the Security Management System must be assigned a company code identifying the individual's employer. The company information dialog box displays and maintains information related to companies having access to the facility.
- 6) Access Groups: Allow a user or group of users via company selection, a temporary denial of access to specific readers or areas based on a preconfigured event. The group access function limits access to a group of cardholders, overriding other access criteria.
- 7) Event: Definitions are shipped with system software but are capable, upon installation, of being modified, added to, or deleted from the System.
- 8) Alarm Pages: Create an unlimited number of customized alarm pages for the alarm monitor and each are assignable to users and user classes.
- 9) Event Types: Definitions are shipped with system software but are capable, upon installation, of being modified, added to, or deleted from the System.
- 10) Dynamic Graphical Maps: Provides the user with the means to add maps and indicator icons to maps that represent input/output points, logical devices, or cameras located throughout the System.
 - (a) Maps display the state and condition of alarm points.
 - (b) Provides the ability to monitor the channels or panels.
- 11) Brass Keys: Maintain information related to assets issued in the facility, including brass keys, laptops, RSA keys, cell phones, company cards, etc.
- 12) ID Badging Client: Maintain information related to a badge holder's card access privileges. Upon entering this application, a window shall appear on the screen and all actions (add, modify, or delete) involving badges and cards are to be initiated from this window.
 - (a) Access Privileges: Linked to cards used to gain access to facility doors.
 - (b) Modifications are made by adding or deleting clearance codes, or by door types assigned to the cards or to a badge holder.
- 13) ID Badging System: Includes seamlessly integrated ID badging system.

- 14) Users: Information related to users of the System software is stored in the database. Users entered into the System are assigned access privileges of the class to which they are assigned.
- 15) p. Data Transfer Unit (DTU): Enables data to be imported from an external system directly into the System database and exported to an external system.
 - (a) Insert Only: If a "data file key column number" is to be provided, the DTU will only insert a new badge record if the key column value is not found.
 - (1) An error will be displayed in the log file if an existing badge record is found.
 - (2) If no "data file key column number" is provided, every record will be inserted into the System.
 - (b) Updates only: The DTU uses the "data file key column number" to look for the matching System record. An error is logged in the log file if the badge holder is not found in the System database.
 - (c) Inserts, Updates: The DTU uses the "data file key column number" to look for the matching System record. If a matching record is not found, the DTU inserts the data. If a matching record is found, the record is updated.
 - (d) Supports SOAP web services.
- 16) Generic Channel Interface: Ability to define generic communications channels over serial port or TCP/IP network socket including IP address and port/socket, to support custom integration of external foreign devices. Generate events based on data received from channel matching operator pre-defined instructions.
- c. Application Localization: Support at least seven languages including English.
 - 1) Available Languages: German, French, Spanish, Italian, Chinese (simplified), Portuguese (Brazil), Norwegian, Chinese (Traditional), Danish, and Dutch.
 - 2) Database resources will be localized and will include a standard U.S. English help file.
- d. Event Manager: Utilize an event manager as a component of system administration and offer ability to have users control the amount of data stored as well as a quick snapshot of the logged data in the system.
 - 1) Using the various logs in event manager, the user will be able to gather information about events, auditing, and operator actions.
 - 2) Defined Logs: Event log, audit log, and unacknowledged alarms.
4. Intelligent Controllers - Hardware Requirements:
 - a. Distributed Architecture: Allows controllers to operate independently of the host. The architecture places key access decisions, event/action processing

and alarm monitoring functions within the controllers, eliminating degraded mode operation.

- b. Flash Memory Management: Supports firmware updates and revisions to be downloaded to the System. Upgrades to hardware and software occur seamlessly without the loss of database, configurations, or historical report data.
- c. The security management system is to be equipped with access control field hardware required to receive alarms and administer access granted/denied decisions.
- d. Field hardware must meet UL requirements.
- e. Subject to compliance with requirements, provide Field Controllers or comparable products by one of the following:
 - 1) Intelligent Controller Board:
 - (a) Honeywell Security PW7K1IC.
 - (b) Honeywell Security PW7K1ICE.
 - (c) Honeywell Security Legacy PW hardware.
 - 2) Single Reader Module (SRM):
 - (a) Honeywell Security PW7K1R1.
 - (b) Honeywell Security PW7K1R1E.
 - 3) Dual Reader Module (DRM):
 - (a) Honeywell Security PW1K1R2B.
 - 4) Alarm Input Module (AIM):
 - (a) Honeywell Security PW7K1IN.
 - 5) Relay Output Module (ROM):
 - (a) Honeywell Security PW7K1OUT.
 - 6) Multiplexer:
 - (a) Honeywell Security PW5K2MX8PS.
 - 7) Mercury Family Hardware:
 - (a) LP-1501.
 - (b) LP-1502.
 - (c) LP-2500 with Wiegand Reader.
 - (d) MR16IN (16 Input Board).
 - (e) MR16OUT (16 Output Board).
 - (f) MR50-S3 (Single Reader Board).
 - (g) MR52-S3B (2-Reader Board).
 - 8) Enclosures - Hardware Requirements:
 - (a) Honeywell Security:
 - (1) PW5KENC1.

- (2) PW5KENC2.
- (3) PW5KENC3.
- (4) PW5KENC4.

(b) Life Safety Standard Power Supplies with PW7K hardware:

- (1) HWP-4DR-E2HWTC.
- (2) HWP-4DR-E2HWTD.
- (3) HWP-8DR-E4H1WPC.
- (4) HWP-8DR-E4H1WPD.
- (5) HWP-16DR-E8H1WTC.
- (6) HWP-16DR-E8H1WPD.
- (7) HWP-24DR-E12HWPC.
- (8) HWP-24DR-E12HWPD.
- (9) HWP-4DR-RGHWTC.
- (10) HWP-4DR-RGHWTD.
- (11) HWP-8DR-RGXHWTC.
- (12) HWP-8DR-RGXHWTD.

(c) Life Safety Managed Power Supplies with PW7K hardware:

- (1) HWP-4DRN-E2HWTC.
- (2) HWP-4DRN-E2HWTD.
- (3) HWP-8DRN-E4H1WPC.
- (4) HWP-8DRN-E4H1WPD.
- (5) HWP-16DRN-E8H1WTC.
- (6) HWP-16DRN-E8H1WPD.
- (7) HWP-24DRN-E12HWPC.
- (8) HWP-24DRN-E12HWPD.
- (9) HWP-4DRN-RGHWTC.
- (10) HWP-4DRN-RGHWTD.
- (11) HWP-8DRN-RGXHWTC.
- (12) HWP-8DRN-RGXHWTD.

5. Third Party Integrations (SDK and API):

- a. Permit custom integration with other third-party systems through an SDK or API.
 - 1) SDK: To support OBIX communication protocol and interface directly with the Niagara Framework for support of additional communications protocols.
 - 2) API: Utilizes SOAP and REST protocols.
- b. Acceptable Products:

- 1) Manufacturer and Part Number: Honeywell Security HSDK.
- 2) Manufacturer and Part Number: Honeywell Security API.

2.02 CREDENTIAL READERS

1. Credential readers shall:
 - a. Operate at both 125 kHz and 13.56 MHz.
 - b. Operate at the same frequency as credentials.
 - c. Communicate via OSDP with the access control panel.
2. Credential readers shall match Owner's standard manufacturer.
3. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. HID Signo
 - b. Or equal

2.03 REQUEST-TO-EXIT (REX) DEVICES

1. REX devices shall be integrated with the door hardware. Refer to Division 8.
2. For doors without integrated REX, REX devices shall:
 - a. Operate at 12 or 24V DC.
 - b. Mount to a single gang mud ring.
 - c. Have adjustable coverable patterns.
 - d. Selectable relay triggers.
3. Non-integrated REX shall match Owner's standard manufacturer.
4. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. Bosch DS160
 - b. Bosch DS161
 - c. Tyco T. Rex
 - d. Or equal

2.04 ELECTRIFIED LOCKSETS

1. Electrified locksets shall be integrated with the door hardware. Refer to Division 8.

2.05 THROUGH-WIRE ELECTRIFIED TRANSFER HINGES

1. Through-wire electrified transfer hinges shall be provided with the door hardware. Refer to Division 8.

2.06 EXIT BUTTONS

1. Exit buttons shall:
 - a. Have the text: PUSH-TO-EXIT
 - b. Be in English
 - c. Have an adjustable timer
 - d. Have stainless steel finish
 - e. Mount to single gang ring or two-gang backbox

- f. Be SPDT or DBDT Form C
- 2. Credentials shall match Owner's standard manufacturer.
- 3. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. SDC 413N
 - b. Camden CM-30AT
 - c. Or equal

2.07 DOOR CONTACTS

- 1. Door contacts shall be provided with the door hardware. Refer to Division 8.
- 2. Where Division 8 does not specify door contacts, contacts devices shall:
 - a. Be form C dry contact.
 - b. Be DPDT.
 - c. Match door frame color or be paintable.
- 3. Door contacts shall match Owner's standard manufacturer.
 - a. Manufacturer shall be able to provide the following types of door contacts:
 - 1) Recessed Reed Switch
 - 2) Surface
 - 3) Multiple form factors and environmental conditions.
- 4. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. George Risk Industries
 - b. Tane Alarm
 - c. Honeywell
 - d. Magnasphere
 - e. Or equal

2.08 END-OF-LINE RESISTORS

- 1. End-of-line resistors shall be capable of multiple configurations.
- 2. Provide (1) of the following:
 - a. George Risk Industries
 - b. TE Connectivity
 - c. Or equal

2.09 DURESS BUTTONS

- 1. Duress buttons shall:
 - a. Be DPDT.
 - b. Have resettable mushroom button.
 - c. Have clear lid.
- 2. Clear markings for duress or emergency.
- 3. Duress buttons shall match Owner's standard manufacturer.

4. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. STI-USA
 - b. Or equal

2.10 CABLING

1. Cabling shall be listed and rated for the environment.
2. Provide surge protection where cabling enters building with a dedicated path to building ground.
3. Conductor sizes shall fit into device terminals. Minimum conductor size shall be 18 AWG.
4. Provide the following cable types:
 - a. S1:
 - 1) Credential readers
 - (a) 24 AWG, 4 conductors, twisted-pair, shielded, RS-485, 120-ohm
 - b. Door contacts
 - 1) 4 conductors, shielded
 - c. Electrified locksets
 - 1) 4 conductors, shielded
 - d. Request-to-exit devices or exit buttons
 - 1) 4 conductors, shielded
5. Door cabling shall:
 - a. Be provided with 120-ohm termination resistors where card readers are OSDP.
 - b. Have multiple components for every door device in an overall composite.
 - 1) Credential reader component cable shall be compliant with RS-485/OSDP standards.
 - 2) Lock and credential reader gauge shall be sized for maximum 10% voltage drop from panel to device.
 - c. Be coordinated with device and hardware conductor gauges.
6. RS-485 cabling
 - a. Shall be compliant with RS-485 standards.
7. Manufacturers:
 - a. Smartwire
 - b. Paige Datacom
 - c. Belden
 - d. Or equal

PART 3 EXECUTION

3.01 GENERAL

1. The Contractor shall input the credential data into the access control software.
2. Provide any required screws, anchors, clamps, hook and loop, miscellaneous grounding and support hardware, etc. needed to facilitate the installation of the cable plant system.
3. Furnish any special installation equipment or tools necessary to properly complete the installation.
4. Do not roll or store cable reels without an appropriate support structure.
5. Failure to follow the appropriate guidelines may require the installer to provide additional material and labor required to properly rectify the situation. This shall also apply to any and all damages caused to the cables by the installer during the implementation.
6. Provide fire blocking at all fire-rated penetrations.
7. Plug conduits where cabling has been installed in the main equipment room, backbone, and other cable entrance locations with re-enterable duct seal of flame retardant putty.
8. All techniques and fixtures used in the installation must minimize complexity and must allow for easy maintenance of, and ready access to, all components for test measurements.
9. All materials used in installation shall be resistant to fungus growth and moisture deterioration.
10. All of the pathways shown on the drawings are suggested routes for the Contractor to use as guidelines. Prior to construction, the Contractor shall coordinate in the field with other trades to determine the exact feeder, tie, and riser backbone cabling pathways. In any case where the communication pathway must be removed and re-routed, due to conflicts with other trades with which the Contractor did not previously coordinate, the Contractor is responsible for all costs associated with the removal and relocation.

3.02 ACCESS CONTROL SYSTEM APPLICATION AND SERVERS

1. Coordinate location, mounting, and power of servers with Owner.
2. Ensure application is viewable from Owner-selected workstation.
3. Coordinate access levels and group configurations with Owner.
4. Coordinate integration of active directory and new users with Owner.
5. Coordinate door scheduling with Owner.
6. Coordinate integration with Video Surveillance System and visitor management system.
7. Coordinate system application, programming, notifications, and GUI configuration with Owner.
8. Coordinate change of default passwords with Owner.
9. Ensure the following door statuses are functioning:
 - a. Access granted

- b. Access denied
- c. Door forced open
- d. Door held open

3.03 ACCESS CONTROL PANELS AND ENCLOSURES

- 1. Enclosures shall be mounted to plywood.
- 2. Patch cords will be provided for connecting to the network.
- 3. Coordinate and document board MAC and IP addresses with Owner.
- 4. Wire enclosure tamper switches.

3.04 POWER SUPPLIES AND ENCLOSURES

- 1. Enclosures shall be mounted to plywood.
- 2. Circuits shall be dedicated and not shared with other systems.
- 3. Input power shall be hardwired.
- 4. Provide input surge protection.
- 5. Provide lock diodes where not integral to the lock. Coordinate with Division 8.

3.05 CREDENTIALS

- 1. Coordinate required part numbers and ordering information with Owner.
- 2. Ensure facility codes do not exceed that of specified access control panels.

3.06 CREDENTIAL READERS

- 1. Mount square to device backbox.
- 2. Provide spacers where read range is impacted by nearby readers or backplanes.
- 3. Terminations shall be pigtailed.
- 4. Coordinate LED and sounder programming with Owner.
- 5. Ensure rough-in is ADA-compliant, and that junction boxes/pathways are on the secured side of the door.
- 6. Remove non-factory paint after walls are finished.

3.07 REQUEST-TO-EXIT DEVICES

- 1. For integrated REX devices, coordinate terminations and wire handoff with Division 8.
 - a. Ensure REX is functioning prior to installation.
- 2. For non-integrated REX devices:
 - a. Mount square to device backbox.
 - b. Aim detection pattern as close as possible to door handle.
 - c. Detection pattern shall not reflect off of adjacent surfaces or pass through openings to allow accidental device activation.

3.08 ELECTRIFIED LOCKSETS

- 1. Coordinate terminations and wire handoff with Division 8.
 - a. Ensure electrified lockset is functioning prior to installation.

2. Coordinate wiring for doors with automatic push plates and door operators. Under no circumstance shall a push plate activate the door operator without an authorized credential read.
3. For doors with power supplies above the door, coordinate system configuration with Divisions 26 and 8.
4. Doors shall be failsecure with mechanical egress.
5. Provide fire relays at headend locations and at doors with power supplies above the door. Coordinate fire alarm integration with Fire Alarm Contractor.

3.09 EXIT BUTTONS

1. Mount square to device backbox.
2. Coordinate terminations and wire handoff with Division 8.
3. Set timer to allow for Code-minimum close times prior to locks re-engaging and for door to fully close.

3.10 THROUGH-WIRE ELECTRIFIED TRANSFER HINGES

1. Coordinate terminations and wire handoff with Division 8.
 - a. Ensure through-wire electrified transfer hinge is functioning prior to installation.
2. Measure voltage drop at the lock termination from the power source.

3.11 DOOR CONTACTS

1. Shall be recessed for door frames. Provide surface-mounted contacts where recessing is not possible.
2. Coordinate door frame drilling and mounting with Division 8.
3. Contacts shall be secured and flush to mounting surface.
4. Contact color shall be closely matched with door frame.
5. In locations where armored loops are required, locate rough-in as close as possible to door for minimal loop length.
6. No more than (1) contact will be allowed per door leaf. For doors with multiple leaves, normally-open or normally-closed configuration shall be consistent throughout project.

3.12 END-OF-LINE RESISTORS

1. Provide configurations compliant with access control panel manufacturer.
2. Provide on device side. Resistors at the headend will be rejected.

3.13 DURESS BUTTONS

1. Mount square to device backbox.
2. Ensure buttons are able to be reset. For key-reset, coordinate handoff of keys with Owner.

3.14 CABLING

1. All cable runs must be continuous from the panel to the device location.
2. Group and bundle all cabling. Do not bundle with other systems.

- a. Division 27 cabling provided for Division 28 cabling are allowed to be bundled together.
3. Device wiring shall be consistent and documented. Color codes shall be uniform.
4. All cables shall originate and terminate at active or passive devices. Cables shall not be spliced. Where several devices are in close proximity, use approved housing to housing connectors and adapters.
5. Strip and terminate cabling utilizing manufacturer's recommended tools. Pins, plugs, and terminals shall not be damaged.
6. All cables terminated in a connection plate mounted in an enclosure shall be dressed to allow cables to be removed from the enclosure and shall be of sufficient cable length to allow for service or re-termination. The plate shall either set on the floor or freely swing clear.
7. Cabling shall not be visible when walking through the facility. Cabling shall be in conduits, in cable tray, or in j-hooks above accessible ceiling.
8. All cables installed in vertical tray or chases shall be supported by means of appropriately-sized vertical cable supports on every third floor. Do not use nylon cable ties.
9. Cables shall not be pulled across sharp edges. Provide protection where edges exist or manually grind down edges for a smooth, polished surface.
10. Cables shall not be jammed between assemblies or equipment.
11. Abide by manufacturer's pulling tension and bend radii.
12. Cable Installation in Conduit
 - a. Through the entire length of all underground conduits, pull mandrel that is one size smaller than the conduit.
 - b. When pulling cable, use water-based pulling lubrication. Lubricants that harden after installation are not allowed.
 - c. During long or difficult runs, use a dynamometer to measure pulling tension. Place the dynamometer between the cable puller and the pull line to monitor pulling tension. Do not exceed the manufacturer's maximum pulling tension.
 - d. Apply pulling grips suitable for use with copper cables to the ends of the cable. Consult the cable manufacturer to determine the appropriate pulling grip and method of attachment. Use breakaway or fuse links at the pulling grip and ensure that the correct "fuse pin" is installed in the fuse link. Channel locks and pliers used for pulling are now allowed.
 - e. To protect the cable ends until they are terminated, use cable caps (heat-shrinking type) to seal the ends of the cable.
 - f. Use cable blocks to facilitate the bending of cable. For bends between 5° and 45°, use a 45° cable block. For bends between 45° and 90°, use a 90° cable block.
 - g. The bend radius for all cables shall conform to manufacturer's specifications.

13. Provide 6' service loop in overhead runway in Technology rooms or at headend location.
14. Provide 6' service loop in device backbox, nearest cable tray, or j-hook, wherever is closest to the cable termination.
15. Do not expose cable to water, paint overspray, paint removal products, or water-based pulling lubricants, as these substances can negatively impact the performance of the cable.
16. Use cable bundling and securing materials as required to ensure that cable runs are securely held in place both vertically and horizontally.
17. Do not tighten bundling materials or securing devices so as to cause deformation of the inherent cable geometry or construction.
18. Cables shall be dressed, bundled, and neatly arranged.
19. Do not use cable ties or hook and latch tape to secure cable runs to other building systems (such as electrical conduit, EMT, sprinkler pipes, ceiling suspension members, etc.). Staples and drive rings are not allowed.
20. In areas considered environment air-handling spaces, only use appropriately-listed materials.

3.15 LABELING

1. Batteries shall be labeled with installation date.

END OF SECTION

**SECTION 282000
VIDEO SURVEILLANCE SYSTEM**

PART 1 GENERAL

1.01 SUMMARY

1. Contractor Shall Provide and Install
 - a. The materials and labor required for the installation of access control and alarm management systems include, but are not limited to:
 - 1) Video surveillance system application and servers
 - 2) Networked video recorder
 - 3) Surveillance cameras
 - 4) Cabling
 - b. Although such work is not specifically mentioned herein or on the Drawings, the Contractor shall furnish and install all miscellaneous items, accessories, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, without claim for additional payment.
2. Related Sections:
 - a. Document 0070000 – General Conditions of the Standard Form Construction Contract between County and Contractor
 - b. Section 260526 – Grounding and Bonding for Electrical Systems
 - c. Section 260533.13 – Conduit for Electrical Systems
 - d. Section 260533.16 – Boxes for Electrical Systems
 - e. Section 280000 – Common Work Results for Security
 - f. Section 281000 – Access Control and Alarm Management System

1.02 SYSTEM DESCRIPTION

1. Video Surveillance System (VSS)
 - a. A video surveillance system will be provided for remote viewing of cameras and forensic analysis of recorded video. Cabling, servers, recorders, and uninterrupted power supplies will be provided to support the system.
 - b. System will be tested to ensure failures are remediated, and that the system will be turnkey.
 - c. System will be integrated with the Access Control and Alarm Management System (ACAMS) for activations within ACAMS to trigger recording in the VSS.

PART 2 PRODUCTS

2.01 VIDEO SURVEILLANCE SYSTEM APPLICATION AND SERVERS

1. System shall be capable of the following:
 - a. Customizable GUI with the ability for customizable icons to be placed onto a floor plan.
 - b. Centralized user management.

- c. Export of events in CSV and PDF formats for auditing.
 - d. Flexible rule-based system, driven by schedules and events.
 - e. Native integrations and additional integrations via SDK/API.
 - f. Unrestricted number of users, devices, servers, and sites with options for intelligent video walls.
 - g. Capable of virtual platforms and environments.
 - h. Federated system architecture.
 - i. ONVIF compliance.
 - j. Encryption between servers and clients.
 - k. Supports active directory.
 - l. Capable of failover recording.
 - m. Have gateway for future third party analytics/artificial intelligence applications to access events, cameras, video streams, and meta data.
 - n. Videowall-capabilities and adaptive streaming.
 - o. Independent playback for viewing multiple streams and recordings.
 - p. Capable of privacy masking camera views.
2. Servers shall:
 - a. Be capable of hosting system applications.
 - b. Server shall be able to be in RAID5 or RAID6 configuration.
 3. Refer to manufacturer's recommendations and guidelines for additional performance requirements.
 4. Provide licenses to support complete installation.
 - a. Manufacturer:
 - 1) Honeywell MaxPro
 - 2) Milestone XProtect Corporate
 - 3) Genetec Omnicast
 - 4) Johnson Controls VideoEdge
 - 5) Or equal
 5. Provide uninterrupted power supply (UPS) to backup system for (24) hours.
 - a. Manufacturer:
 - 1) APC
 - 2) Schneider
 - 3) Or equal

2.02 NETWORKED VIDEO RECORDER & STORAGE

1. Networked video recorder & storage shall:
 - a. Be able to process live and recorded at the same time.
 - b. Have multiple storage containers.

- c. Have multiple networked interface cards.
 - d. Server shall be able to be in RAID5 or RAID6 configuration.
 - e. Be hot-swappable.
 - f. Be sized for (30) days of storage.
2. Manufacturer
- a. Genetec
 - 1) Streamvault SV-2000E
 - 2) Streamvault SV-4000E
 - b. Salient PowerProtect
 - 1) PowerElite
 - 2) PowerPlatinum
 - c. American Dynamics
 - 1) ADVER112R5N2J
 - 2) ADVER200R6DK
 - 3) ADVER160R6DK
 - 4) ADVEC01
 - 5) ADVC-CENTLIC
 - 6) ADVC-VECAM
 - d. Or Approved Equal
3. Provide uninterrupted power supply (UPS) to backup system for (24) hours.
- a. Where standards do not specify a manufacturer, provide (1) of the following:
 - 1) APC
 - 2) Schneider
 - 3) Or equal

2.03 SURVEILLANCE CAMERAS

- 1. Surveillance cameras shall:
 - a. Be ONVIF-compliant.
 - b. Have built-in onboard analytics.
 - c. Have wide dynamic range.
 - d. Support H.265.
 - e. Input/output connectivity.
- 2. Form factors shall be:
 - a. Type 1: indoor 2-megapixel fixed dome
 - b. Type 2: outdoor 2-megapixel fixed dome
 - c. Type 3: (4) 4-megapixel multi-sensor 270/360 degree (multidirectional dome)
- 3. Provide mounts and adaptors as required to meet design intent.

4. Surveillance cameras shall match Owner's standard manufacturer.
5. Where standards do not specify a manufacturer, provide (1) of the following:
 - a. Hanwha
 - 1) Type 1: XNV-C6083
 - 2) Type 2: XNP-6040HW
 - 3) Type 3: PNM-C32083RVQ
 - b. Axis
 - 1) Type 1: P3265-LV
 - 2) Type 2: P3265-LVE
 - 3) Type 3: P3748-PLVE
 - c. Illustra
 - 1) Type 1: ProGen4 Compact Minidome
 - 2) Type 2: ProGen4 Compact Minidome
 - 3) Type 3: ProGen4 Multisensor

2.04 CABLING

1. Cabling shall be listed and rated for the environment.
2. Provide surge protection where cabling enters building with a dedicated path to building ground.
3. Cabling shall be provided by Division 27.
 - a. Provide category cabling for channel lengths (patch cables & horizontal cable) below 330 feet.
 - b. Provide fiber media transceivers and fiber optic cabling for channel lengths greater than 330 feet.
 - c. Provide patch cords.

PART 3 EXECUTION

3.01 GENERAL

1. Provide any required screws, anchors, clamps, hook and loop, miscellaneous grounding and support hardware, etc. needed to facilitate the installation of the cable plant system.
2. Furnish any special installation equipment or tools necessary to properly complete the installation.
3. Failure to follow the appropriate guidelines may require the installer to provide additional material and labor required to properly rectify the situation. This shall also apply to any and all damages caused to the cables by the installer during the implementation.
4. All techniques and fixtures used in the installation must minimize complexity and must allow for easy maintenance of, and ready access to, all components for test measurements.

5. All materials used in installation shall be resistant to fungus growth and moisture deterioration.

3.02 VIDEO SURVEILLANCE SYSTEM APPLICATION AND SERVERS

1. Coordinate location, mounting, and power of servers with Owner.
2. Ensure application is viewable from Owner-selected workstation.
3. Coordinated federated servers with Owner.
4. Coordinate user permissions with Owner.
5. Coordinate integration of active directory and new users with Owner.
6. Coordinate integration with Access Control and Alarm Management System.
7. Coordinate system application, programming, notifications, and GUI configuration with Owner.
8. Coordinate change of default passwords with Owner.

3.03 NETWORKED VIDEO RECORDER & STORAGE

1. Coordinate location, mounting, and power of NVRs and storage with Owner.
2. Coordinate change of default passwords with Owner.
3. Coordinate location, mounting, and power of recorder with Owner.
4. Ensure UPS is functioning by temporarily unplugging primary power.

3.04 SURVEILLANCE CAMERAS

1. Mount square to device backbox.
2. Provide varifocal lenses for fixed view cameras.
3. Camera field-of-view shall be squared with no distortions, discolorations, or glare from other sources.
4. Cameras shall be set to encode streams at H.265.
5. Cameras shall output maximum resolution to networked video recorder.
6. Cameras shall be set to continuous with motion-triggered recording.
 - a. Continuous recording shall be at 15 fps.
 - b. Motion-triggered recording shall be at 25 fps.
7. Door alarms shall notify closest camera or set of cameras to record.
8. Privacy masks shall be coordinated with Owner.
9. Built-in analytics shall be coordinated with Owner.
10. Third party analytic applications shall be coordinated with Owner.
11. Remove non-factory paint after walls are finished.

3.05 CABLING

1. Cables shall be dressed, bundled, and neatly arranged.

END OF SECTION

GENERAL CONDITIONS OF
THE STANDARD FORM CONSTRUCTION CONTRACT
BETWEEN COUNTY AND CONTRACTOR

(LONG FORM)

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GENERAL CONDITIONS OF
THE STANDARD FORM CONSTRUCTION CONTRACT
BETWEEN COUNTY AND CONTRACTOR

(LONG FORM)

ARTICLE 1
GENERAL PROVISIONS

1.1 DEFINITIONS

1.1.1 **Acceptance.** "Acceptance" means the point that the Project is formally accepted by the Board of Supervisors and a Notice of Completion is recorded by County.

1.1.2 **Act of God.** "Act of God" means earthquake, natural flood, tornado or other unusually severe natural or weather phenomenon occurring at the Site and causing Delay to performance of the Work at the Site; provided, however, that precipitation and winds shall not be an Act of God unless it exceeds in any given month the 10-year average of monthly levels as established by the National Oceanic and Atmospheric Administration ("NOAA") according to NOAA's records of measurable precipitation and winds taken at NOAA's recording station located within the Riverside County basin area that is nearest to the Site.

1.1.3 **Addendum.** "Addendum" means written or graphic information (including, without limitation, Drawings or Specifications) issued prior to the Bid Closing Deadline, which modifies or interprets the Bidding Documents by additions, deletions, clarifications or corrections.

1.1.4 **Admitted Surety.** "Admitted Surety" means a surety insurer that is duly certified pursuant to California Insurance Code §995.120 to transact business as a surety in the State of California.

1.1.5 **Allowable Costs.** "Allowable Costs" means those costs listed in Paragraph 7.7.3, below, that are used in calculating Contract Adjustments to the Contract Price.

1.1.6 **Allowable Markups.** "Allowable Markups" means those percentage markups listed in Paragraph 7.7.5, below, used in calculating Contract Adjustments to the Contract Price.

1.1.7 **Alternate.** "Alternate" means a proposed alternative described in the Bidding Documents adding to, or deleting from, the Bidding Documents a particular material, system, product or method of construction.

1.1.8 **Applicable Laws.** "Applicable Laws" means all statutes, ordinances, rules, regulations, policies and guidelines enacted by Governmental Authorities (including, without limitation, Environmental Laws and Disability Laws), codes adopted or promulgated by Governmental Authorities (including, without limitation, building and health and safety codes), lawful orders of Governmental Authorities and common law, including, but not limited to, principles of equity applied by the courts of the State of California, which are in effect at the time the Work is performed.

1.1.9 **Application for Payment.** "Application for Payment" means Contractor's itemized application for Progress Payment or Final Payment prepared, submitted and substantiated in accordance with the requirements of the Contract Documents.

1.1.10 **Architect.** "Architect" means the design professional retained by County that is primarily responsible for the preparation of the Drawings and Specifications for the Project.

1.1.11 **Award.** "Award" means either (1) a minute order duly adopted by the Board of Supervisors approving County's entering into the Construction Contract with Contractor or (2) execution of the Construction Contract by the Clerk of the Board.

1.1.12 **Base Bid.** "Base Bid" means the sum of money stated in a Bid for which the Bidder proposes to perform the Work, exclusive of adjustments for Alternates.

1.1.13 **Bid.** "Bid" means the completed and signed Bid Form and other Bid Submittals submitted by a Bidder to County in response to the Notice Inviting Bids and in accordance with the Instructions to Bidders.

1.1.14 **Bid Amount.** "Bid Amount" means the dollar amount that is used as the basis for determining which Bidder has submitted the lowest Bid price for purposes of Award pursuant to the County's chosen method of Award set forth in Paragraph 4.5.3 of the Instructions to Bidders.

1.1.15 **Bid Bond.** "Bid Bond" means alternative form of Bid Security submitted by a Bidder that consists of a surety bond issued by a Surety.

1.1.16 **Bid Closing Deadline.** "Bid Closing Deadline" means the deadline (date and time) for receipt of Bids by County that is stated in the Bidding Documents, as adjusted by Addendum.

1.1.17 **Bid Form.** "Bid Form" means the form prescribed by the Bidding Documents to be completed and signed by a Bidder showing the dollar amount(s) of its Bid.

1.1.18 **Bid Security.** "Bid Security" means a deposit of cash, certified or cashier's check or bond submitted by a Bidder in accordance with the Bidding Documents guaranteeing that if Award is made to the Bidder, the Bidder will enter into the Construction Contract and furnish the Performance Bond and Payment Bond and other Post-Award Submittals.

1.1.19 **Bid Submittal.** "Bid Submittal" means a document that Bidder is required by the Bidding Documents to submit with or as part of its Bid.

1.1.20 **Bidder.** "Bidder" means a person or entity submitting a Bid for Award of the Construction Contract.

1.1.21 **Bidding Documents.** "Bidding Documents" means the following collection of documents prepared and issued by County relating to the Project:

- .1 Notice Inviting Bids;
- .2 Instructions to Bidders;
- .3 Bid Form;
- .4 Standard Form of Construction Contract Between County and Contractor (unsigned);
- .5 General Conditions to Standard Form of Construction Contract Between County and Contractor (Long Form);
- .6 Specifications;
- .7 Plans and Drawings;
- .8 Addenda;
- .9 Reference Documents;
- .10 Safety Program; and
- .11 those documents, or those portions or provisions of documents, that, although not listed in Subparagraph 1.1.22.2 through Subparagraph 1.1.22.10, above, are expressly cross-referenced therein or attached thereto, including, without limitation, all documents submitted by Contractor as part of its Bid or Post-Award Submittals.

1.1.22 **Board of Supervisors.** "Board of Supervisors" means the Board of Supervisors for the County of Riverside.

1.1.23 **Change.** "Change" means a modification, change, addition, substitution or deletion in the Work or in Contractor's means, methods, manner, time or sequence of performing the Work arising from any cause or circumstances, including, without limitation, either directly at the request of County or constructively by reason of other circumstances. Use of the term "Change," in any context, in the Contract Documents shall not be interpreted as implying that Contractor is entitled to a Contract Adjustment on any basis other than as permitted by the terms of the Contract Documents for Compensable Change, Deleted Work or Compensable Delay.

1.1.24 **Change Order.** "Change Order" means a written instrument, signed in accordance with the requirements of the General Conditions, setting forth the agreement of County and Contractor on the terms of a Contract Adjustment.

1.1.25 **Change Order Request.** "Change Order Request" means Contractor's written request for a Contract Adjustment pursuant to Paragraph 7.6.2, below.

1.1.26 **Claim.** "Claim" means a written demand or assertion by Contractor seeking, as a matter of right, an interpretation of contract, payment of money, recovery of damages or other relief. A Claim does not include the following: (1) tort claims for personal injury or death; (2) stop payment notice claims; (3) a determination of the right of County to specific performance or injunctive relief to compel performance; (4) a determination of the right of County to suspend, revoke or limit the Contractor's Prequalification status or rating or to debar Contractor from bidding or contracting with County; or (5) a determination of the right of County under Applicable Laws to terminate the Construction Contract and/or recovery of penalties imposed upon Contractor for violation of statutory obligations under Public Contract Code §4100 *et seq.*

1.1.27 **Close-Out Documents.** "Close-Out Documents" means all Record Documents, warranties, guarantees, technical information, operations manuals, replacement parts, excess and attic stock and other documents (including, without limitation, electronic versions and hard copies) and things required to be submitted by Contractor under the Contract Documents as a condition of Final Completion or Final Payment.

1.1.28 **Compensable Change.** "Compensable Change" means circumstances involving the performance of Extra Work:

- .1 that are the result of
 - (1) Differing Site Conditions,
 - (2) amendments or additions to Applicable Laws, which amendments or additions are enacted after the Bid Closing Deadline,
 - (3) a Change requested by County in accordance with the conditions of authorization applicable to Compensable Changes set forth in Article 7, below, or
 - (4) other circumstances involving a Change in the Work for which Contractor is given under the Contract Documents a specific and express right to a Contract Adjustment to the Contract Price;
- .2 that are not caused, in whole or in part, by an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, or violation of an Applicable Law, or by a failure of Contractor or a Subcontractor, of any Tier, to comply with the Contract Documents;
- .3 for which a Contract Adjustment is neither prohibited by nor waived under the terms of the Contract Documents; and
- .4 that if performed would require Contractor to incur additional and unforeseeable Allowable Costs that would not have been required to be incurred in the absence of such circumstances.

1.1.29 **Compensable Delay.** "Compensable Delay" means a Delay to the critical path of activities affecting Contractor's ability to achieve Substantial Completion of the entirety of the Work within the Contract Time:

- .1 that is the result of
 - (a) a Compensable Change,
 - (b) the active negligence of County, Architect, a County Consultant or a Separate Contractor,
 - (c) a breach by County of an obligation under the Contract Documents, or
 - (d) other circumstances involving Delay for which Contractor is given under the Contract Documents a specific and express right to a Contract Adjustment adjusting the Contract Price;
- .2 that is not caused, in whole or in part, by an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, or a violation of an Applicable Law, or a failure by Contractor or any Subcontractor, of any Tier, to comply with the Contract Documents; and
- .3 for which a Contract Adjustment to the Contract Time is neither prohibited by nor waived under the terms of the Contract Documents.

1.1.30 **Construction Change Directive.** "Construction Change Directive" means a written instrument signed in accordance with the requirements of Article 7, below, that: (1) directs the performance of a Change that does not involve a Contract Adjustment; (2) establishes a mutually agreed basis for compensation to Contractor for a Compensable Change under circumstances where performance of the Compensable Change needs to proceed in advance of the County performing a full evaluation of the Contractor's rights relative to a Contract Adjustment; or (3) directs performance of Work or a Change with respect to which there exists a dispute or question regarding the terms of a Contract Adjustment.

1.1.31 **Construction Contract.** "Construction Contract" means the written form of Standard Form of Construction Contract Between County and Contractor included in the Bidding Documents signed by County and Contractor.

1.1.32 **Construction Schedule.** "Construction Schedule" means the detailed, critical path schedule prepared by Contractor in accordance with the requirements of the Contract Documents showing Contractor's plan for performance of the Work within the Contract Time.

1.1.33 **Contract Adjustment.** "Contract Adjustment" means an adjustment, additive or deductive, to the Contract Price or Contract Time that is permitted by the Contract Documents due to circumstances constituting a Compensable Change, Compensable Delay or Deleted Work.

1.1.34 **Contract Documents.** "Contract Documents" means the following collection of documents:

- .1 Construction Contract;
- .2 Addenda;
- .3 General Conditions;
- .4 Specifications;
- .5 Plans and Drawings;
- .6 Modifications;

- .7 Reference Documents;
- .8 Change Orders;
- .9 Unilateral Change Orders;
- .10 Construction Change Directives;
- .11 Safety Program;
- .12 other documents that comprise exhibits, attachments or riders to the documents listed in preceding Subparagraph 1.1.35.1 through Subparagraph 1.1.35.11, above;
- .13 executed Declaration of Sufficiency of Funds;
- .14 executed Non-Collusion Declaration; and

.15 if the Bidding Documents limit bidding to Prequalified Bidders, those written representations, obligations or responsibilities made, acknowledged or assumed by the Bidder as part of the applicable Prequalification conducted by County, including, without limitation, any continuing obligations assumed by Contractor to disclose false or misleading information, report changes in ownership or management and comply with minimum safety requirements.

1.1.35 **Contract Price.** "Contract Price" means the dollar amount set forth in the Construction Contract as the total compensation payable by County to Contractor for complete performance by Contractor in accordance with the Contract Documents of the Work and other obligations assumed by Contractor under the Contract Documents.

1.1.36 **Contract Time.** "Contract Time" means the total number of Days set forth in the Construction Contract within which Contractor is obligated to achieve Substantial Completion and/or Final Completion of the Work, as extended or shortened by Contract Adjustments.

1.1.37 **Contractor.** "Contractor" means the person or entity identified by County as the Bidder receiving Award of the Construction Contract.

1.1.38 **Contractor Amount.** "Contractor Amount" means the component amount calculated on behalf of Contractor pursuant to Paragraph 15.1.5, below, that is used to determine the total net amount payable to Contractor or County in the event of a partial or full termination or discontinuance of the Work.

1.1.39 **Contractor's Own Expense.** "Contractor's Own Expense" means that Contractor agrees to assume sole responsibility to pay and be responsible for any resulting or associated Loss and Delay, without any Contract Adjustment and without any other form of compensation or reimbursement, of any kind, by County.

1.1.40 **County.** "County" means the County of Riverside, a political subdivision of the State of California.

1.1.41 **County Amount.** "County Amount" means the component amount calculated on behalf of County pursuant to Paragraph 15.1.5, below, that is used to determine the total net amount payable to Contractor or County in the event of a partial or full termination or discontinuance of the Work.

1.1.42 **County Consultant.** "County Consultant" means a consultant, other than Architect, engaged by County (or engaged as a subconsultant to the Architect or a County Consultant) to provide professional advice to County with respect to the design, construction or management of the Project.

1.1.43 **County Review Date.** "County Review Date" means an end date set forth in the Construction Schedule or Submittal Schedule within which County, Architect or a County Consultant is to provide information, review documents or render decisions, approvals or disapprovals.

1.1.44 County Review Period. “County Review Period” means a period of time set forth in the Construction Schedule or Submittal Schedule within which County, Architect or a County Consultant is to provide information, review documents or render decisions, approvals or disapprovals.

1.1.45 County Risk Manager. “County Risk Manager” means the individual employee of the County acting as its risk manager.

1.1.46 County Website. “County Website” means the website maintained by County at <http://www.rivcofm.org/RFP-RFQ>

1.1.47 Date of Commencement. “Date of Commencement” means the starting date used for calculation of the Contract Time, and is the date, no earlier than the first working day following issuance of the Notice to Proceed, that is fixed in the Notice to Proceed issued by the County or, if no Notice to Proceed is issued, the Day that the Contractor actually commences Work at the Site in accordance with Paragraph 8.1.1, below.

1.1.48 Day. “Day”, whether capitalized or not, and unless otherwise specifically provided, means calendar day, including weekends and Holidays.

1.1.49 Declaration of Sufficiency of Funds. “Declaration of Sufficiency of Funds” means the declaration, in the form included in the Bidding Documents, required to be submitted by Contractor under circumstances where Contractor has not executed a collective bargaining agreement covering the workers who will be employed to perform the Work.

1.1.50 Defective Work. “Defective Work” means materials, equipment, labor, workmanship, construction services or other construction work comprising the Work by Contractor or a Subcontractor that (1) is faulty, omitted, incomplete, or deficient, or (2) does not conform to Applicable Laws, the Contract Documents, or the requirements of any inspection, reference standard, test, code or approval specified in the Contract Documents.

1.1.51 Delay. “Delay” means any circumstances involving delay, disruption, hindrance or interference.

1.1.52 Deleted Work. “Deleted Work” means Work that is eliminated or its scope or cost reduced pursuant to a Change Order or Unilateral Change Order.

1.1.53 Department of Industrial Relations. “Department of Industrial Relations” means The Department of Industrial Relations of the State of California.

1.1.54 Design Discrepancy. “Design Discrepancy” means an error, omission, conflict, ambiguity, lack of coordination or noncompliance with Applicable Laws contained in the Bidding Documents, Contract Documents, Reference Documents or other information made available by County to Contractor prior to or after the Bid Closing Deadline.

1.1.55 Design Documents. “Design Documents” means all originals, copies and drafts of plans, drawings, tracings, specifications, programs, reports, calculations, presentation materials, models, building information models and other writings or materials containing designs, specifications or engineering information related to the Work or Project prepared by Architect, County Consultants, Contractor, Separate Contractors or Subcontractors including, without limitation, computer aided design materials, electronic data files and paper copies. The term “Design Documents” includes both the written documents and all building and other designs depicted therein.

1.1.56 Design Intent. “Design Intent” means the general intended design objectives of the Design Documents prepared by Architect and County Consultants, as described in Paragraph 1.2.1, below.

1.1.57 Designation of Subcontractors. “Designation of Subcontractors” means the list of proposed Subcontractors prepared by the Bidder pursuant to California Public Contract Code §§4100 et seq.

1.1.58 Differing Site Condition. “Differing Site Condition” means an unforeseen condition that constitutes a basis for Contract Adjustment pursuant to Paragraph 4.3.8, below.

1.1.59 Director of Facilities Management. “Director of Facilities Management” means the Director for Facilities Management, or his/her designee.

1.1.60 Disability Laws. “Disability Laws” means applicable federal, state, local or municipal laws, rules, orders, regulations, statutes, ordinances, codes, decrees, or requirements of any Government Authority, which regulate, relate to or impose liability or standards of conduct with respect to, or accessibility for, persons with disabilities, including, without limitation, the Americans with Disabilities Act (42 USCA §§ 12101 et seq.) and the Fair Housing Amendments Act of 1988 (42 USCA §§ 3604 et seq.).

1.1.61 Discovery Date. “Discovery Date”, generally used in reference to Contractor’s obligation to give written notice of certain facts, conditions or circumstances, means the earlier of the dates that Contractor or any Subcontractor either: (1) discovered such facts, conditions or circumstances; or (2) should have discovered such facts, conditions or circumstances in the exercise of the level of care required by the terms of the Standard of Performance.

1.1.62 Drawings. “Drawings” means graphic and pictorial documents showing the design, location and dimensions of the Project, and generally includes plans, elevations, subparagraphs, details, schedules and diagrams. The term “Drawings” is used interchangeably with “Plans”.

1.1.63 Environmental Laws. “Environmental Laws” means all applicable federal, state, local or municipal laws, rules, orders, regulations, statutes, ordinances, codes, decrees and permits or other requirements of any Governmental Authority, which regulate, relate to, or impose liability or standards of conduct concerning any Hazardous Substance (including, without limitation, the use, handling, transportation, production, disposal, discharge or storage thereof), occupational or environmental conditions on, under, or about the Site or Existing Improvements (including, without limitation, soil, groundwater, and indoor and ambient air conditions), environmental protection (natural or manmade resources), or occupational health or industrial hygiene (but only to the extent related to Hazardous Substances on, under, or about the Site or Existing Improvements), as now or may at any later time be in effect, including without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C.A. §§ 9601 et seq.]; the Resource Conservation and Recovery Act of 1976 [42 U.S.C.A. §§ 6901 et seq.]; the Clean Water Act (also known as the Federal Water Pollution Control Act) [33 U.S.C.A. §§ 1251 et seq.]; the Toxic Substances Control Act [15 U.S.C.A. §§ 2601 et seq.]; the Hazardous Substances Transportation Act [49 U.S.C.A. §§ 1801 et seq.]; the Insecticide, Fungicide, Rodenticide Act [7 U.S.C.A. §§ 136 et seq.]; the Superfund Amendments and Reauthorization Act [42 U.S.C.A. §§ 6901 et seq.]; the Clean Air Act [42 U.S.C.A. §§ 7401 et seq.]; the Safe Drinking Water Act [42 U.S.C.A. §§ 300f et seq.]; the Solid Waste Disposal Act [42 U.S.C.A. §§ 6901 et seq.]; the Surface Mining Control and Reclamation Act [30 U.S.C.A. §§ 1201 et seq.]; the Emergency Planning and Community Right to Know Act [42 U.S.C.A. §§ 11001 et seq.]; the Occupational Safety and Health Act [29 U.S.C.A. §§ 655 and 657]; the Residential Lead-Based Paint Exposure Act (Title X of the Housing and Community Development Act of 1992) [15 U.S.C.A. §§ 2681 et seq.]; the Lead-Based Paint Poisoning Prevention Act [42 U.S.C.A. §§ 4821 et seq.]; the Federal Endangered Species Act, the California Endangered Species Act, the Migratory Bird Treaty Act, the National Environmental Policy Act, the California Environmental Quality Act, Porter Cologne Water Quality Act (California Water Code §§ 13000 et seq), and all similar federal, state or local laws, rules, orders, regulations, statutes, ordinances, codes, decrees, or requirements.

1.1.64 Escrow Agent. “Escrow Agent” means an entity serving as escrow agent pursuant to California Public Contract Code §22300 in connection with the deposit of securities or retention.

1.1.65 Escrow Bid Documents. “Escrow Bid Documents” means all written documentation and electronic files reflecting the basis for and calculation of a Bid, including, without limitation, estimates, quantity take-offs, price quotations, product data, pricing data, memoranda, narratives, add/deduct sheets and reports (including, without limitation, reports on conditions at, under, or in the vicinity of the Site). The term “Escrow Bid Documents” does not include copies of Bidding Documents if they are not needed to comply with the requirements of the Bidding Documents applicable to submission of Escrow Bid Documents.

1.1.66 Event of Contractor Default. “Event of Contractor Default” means any of the events constituting default by Contractor as set forth in Paragraph 15.1.1, below.

1.1.67 Evidence of Insurance. “Evidence of Insurance” means the statement, completed by Bidder in the form included in the Bidding Documents, evidencing the Bidder’s compliance with the insurance requirements of the Bidding Documents.

1.1.68 Excusable Delay. "Excusable Delay" means a Delay, other than a Compensable Delay, to Contractor's ability to achieve Substantial Completion or Final Completion of the Work within the Contract Time that is: (1) not caused, in whole or in part, by an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, a violation of an Applicable Law or a failure by Contractor or any Subcontractor, of any Tier, to comply with the Contract Documents; (2) unforeseeable, unavoidable and beyond the control of Contractor and the Subcontractors, of every Tier; and (3) the result of a Force Majeure Event. Without limitation to the foregoing, neither the bankruptcy, insolvency nor financial inability of Contractor or a Subcontractor, of any Tier, nor any failure by a Subcontractor, of any Tier, to perform any obligation imposed by contract or Applicable Laws shall constitute a ground for Excusable Delay.

1.1.69 Existing Improvements. "Existing Improvements" means all improvements located on the Site as of the Bid Closing Deadline, whether above or below the surface of the ground, including, but not limited to, existing buildings, utilities, infrastructure improvements and other facilities.

1.1.70 Extra Work. "Extra Work" means labor, materials, equipment, services or other work, not reasonably inferable by Contractor or its Subcontractors from the design and other information set forth in the Bidding Documents, the performance of which requires the expenditure by Contractor of additional and unforeseen Allowable Costs. References to Extra Work shall not be interpreted to mean or imply that Contractor is entitled to a Contract Adjustment unless such Extra Work constitutes a Compensable Change.

1.1.71 Final Completion, Finally Complete. "Final Completion" and "Finally Complete" mean the point at which the following conditions have occurred with respect to the entire Work:

- .1** the Work is fully completed, including all minor corrective, or "punch list," items;
- .2** all permits, approvals and certificates by Governmental Authorities, such as, but not necessarily limited to, a permanent or temporary certificate of occupancy required to occupy and use the Work have been issued free of any conditions that are the result of an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, a violation of an Applicable Law or a failure by Contractor or any Subcontractor, of any Tier, to comply with the Contract Documents;
- .3** the Work and the related portions of the Site have been thoroughly cleared of all construction debris and cleaned in accordance with the requirements of the Contract Documents, including, but not necessarily limited to where applicable, the following: removal of temporary protections; removal of marks, stains, fingerprints and other soil and dirt from painted, decorated and natural-finished woodwork and other Work; removal of spots, plaster, soil and paint from ceramic tile, marble and other finished materials; all surfaces, fixtures, cabinet work and equipment are wiped and washed clean and in an undamaged, new condition; all aluminum and other metal surfaces are cleaned in accordance with recommendations of the manufacturer; and all stone, tile and resilient floors are cleaned thoroughly in accordance with the manufacturer's recommendations and buff dried by machine to bring the surfaces to sheen;
- .4** all conditions set forth in the Contract Documents for Substantial Completion of the Work have been, and continue to be, fully satisfied;
- .5** all conditions pertaining to the Work and required for the release of County's obligations (including, but not limited to, release of County's bond obligations) to Governmental Authorities (including, but not limited to, matters involving grading, flood control, public works, transportation and traffic) have been satisfied; and
- .6** Contractor has delivered to County all Close-Out Documents.

1.1.72 Final Completion Punch List. "Final Completion Punch List" means the list of minor items of Work to be completed or corrected by Contractor for Final Completion.

1.1.73 Final Payment. "Final Payment" means payment by County to Contractor of the entire unpaid balance of the Contract Price due to Contractor following Final Completion.

1.1.74 FM. "FM" means Facilities Management for the County of Riverside.

1.1.75 Force Majeure Event. "Force Majeure Event" means, and is restricted to, any the following: (1) Acts of God occurring at the Site; (2) terrorism or other acts of a public enemy; (3) orders of Governmental Authorities (including, without limitation, unreasonable and unforeseeable Delay in the issuance of permits or approvals by Governmental Authorities that are required for the Work); (4) epidemics or quarantine restrictions; (5) strikes and other organized labor action occurring at the Site and the effects thereof on the Work to the extent such strikes and other organized labor action are beyond the control of Contractor and its Subcontractors, of every Tier, and to the extent the effects thereof cannot be avoided by use of replacement workers or implementation of a dual gate system of entry to the Site; or (6) unusual shortages in materials that are supported by documented proof that (a) Contractor made every effort to obtain such materials from all available sources, (b) such shortage is due to the fact that such materials are not physically available from single or multiple sources or could have been obtained only at exorbitant prices entirely inconsistent with current rates taking into account the quantities involved and the usual industry practices in obtaining such quantities, and (c) such shortages and the difficulties in obtaining alternate sources of materials could not have been known or anticipated as of the Bid Closing Deadline.

1.1.76 Fragnet. "Fragnet" means a contemporaneous, fragmentary scheduling network, which graphically identifies the sequencing of all critical and non-critical new activities and/or activity revisions affected by a Compensable Delay or Excusable Delay with logic ties to all affected existing activities noted on the Construction Schedule, that isolates and quantifies a time impact of a specific issue, determines and demonstrates any such specific Delay in relation to past and/or other current Delays and provides a method for incorporating all Contract Adjustments to the Contract Time into an update of the approved Construction Schedule.

1.1.77 General Conditions. "General Conditions" means the herein set forth general terms and conditions governing performance of the Work.

1.1.78 General Requirements. "General Requirements" means the portion of the Specifications so titled setting forth additional requirements for administration of the Work.

1.1.79 Good Faith Determination. "Good Faith Determination" means a determination made by the Director of Facilities Management or other authorized representative of County, which he/she believes in good faith to be a proper exercise of County's rights and to have a reasonable basis in fact, whether or not such determination is in fact proper, reasonable or correct or adjudged to be so.

1.1.80 Governmental Authority. "Governmental Authority" means the United States, the State of California, the County of Riverside (acting in its regulatory, rather than proprietary, capacity), the City in which the Project is located, any other local, regional, state or federal political subdivision, authority, agency, department, commission, board, bureau, court, judicial or quasi-judicial body, and any legislative or quasi-legislative body, or instrumentality of any of them, which exercises jurisdiction over the Project, Work, Site, Contractor or County, including, without limitation, any Governmental Authority having jurisdiction to review and approve or reject the Contract Documents or the Work based on compliance or non-compliance with Applicable Laws.

1.1.81 Governmental Authority Review Period. "Governmental Authority Review Period" means a period of time set forth in the Construction Schedule or Submittal Schedule for Governmental Authority review, and/or approval, of the Work.

1.1.82 Guarantee To Repair Period. "Guarantee To Repair Period" means the period of time set forth in Section 13.3, below, for repair or replacement of Defective Work.

1.1.83 Hazardous Substance. "Hazardous Substance" means either of the following: (1) any chemical, material or other substance defined as or included within the definition of "hazardous substances," "hazardous wastes," "extremely hazardous substances," "toxic substances," "toxic material," "restricted hazardous waste," "special waste," "contamination" or words of similar import under any Environmental Law, including, without limitation, the following: petroleum (including crude oil or any fraction thereof), asbestos, asbestos-containing materials, polychlorinated biphenyls ("PCBs") and PCB-containing materials, whether or not occurring naturally; or (2) any substance that because of its quantity, concentration or physical or chemical characteristics poses a significant present or potential hazard to human health and safety or to the environment, and which has been determined by any Governmental Authority to be a hazardous waste or hazardous substance.

1.1.84 **Holiday.** “Holiday” means a Day recognized by County as being a legal holiday for its staff and employees.

1.1.85 **Indemnitees.** “Indemnitees” means those persons or entities listed in Paragraph 3.18.1, below, as the “Indemnitees”.

1.1.86 **Inspector of Record.** “Inspector of Record” means a person designated by the County to perform inspections on behalf of the County, who may be an employee or an independent consultant to County.

1.1.87 **Installation Subcontractor.** “Installation Subcontractor” means a Subcontractor who performs a portion of the Work that includes providing substantial, rather than minor and incidental, services for the installation of temporary or permanent materials, equipment or facilities at the Site.

1.1.88 **Instructions to Bidders.** “Instructions to Bidders” means the portion of the Bidding Documents setting forth the requirements to be followed by Bidders in preparing and submitting Bids.

1.1.89 **Intellectual Property Rights.** “Intellectual Property Rights” means all intellectual property rights, including, without limitation, patent, trademark, trade dress, copyright, industrial design rights, priority rights and trade secrets.

1.1.90 **Key Personnel, Key Persons.** “Key Personnel” and “Key Persons” mean those individuals employed by Contractor as described in Paragraph 3.8.1, below, and any replacements thereto approved by County, whose personal performance is deemed of the essence to the Construction Contract.

1.1.91 **Loss, Losses.** “Loss” and “Losses” mean any and all economic and non-economic losses, costs, liabilities, claims, damages, cost escalations, actions, judgments, settlements, expenses, fines, penalties and punitive damages including, without limitation, actual attorney’s fees, expert and non-expert witness fees, arbitrator and arbitration fees, court costs (statutory and non-statutory), and mediation and mediator fees.

1.1.92 **Modification.** “Modification” means a document, other than a Change Order or Construction Change Directive, approved and signed by County and Contractor after execution of the Construction Contract, agreeing to alter, amend or modify the Contract Documents.

1.1.93 **Mold.** “Mold” means mold, mildew, spores or other microorganisms of any type, nature or description, or any by-product thereof, the presence of which poses an actual or potential threat to human health, including, without limitation, any species of organisms of the kingdoms of fungi or mycota, including yeasts, smuts, rusts, mildews, mold and mushrooms, or any microbial contamination, either airborne or surface, which arises out of or is related to the presence of fungi or spores (including, without limitation, aspergillus, cladosporium, penicillium and stachybotrys chartarum).

1.1.94 **Non-Collusion Declaration.** “Non-Collusion Declaration” means the form, so titled, required by California Public Contract Code §7106 and the Bidding Documents to be submitted by Bidder with its Bid.

1.1.95 **Notice Inviting Bids.** “Notice Inviting Bids” means the notice issued by or on behalf of County inviting submission of Bids for the Project.

1.1.96 **Notice Inviting Prequalification Statements.** “Notice Inviting Prequalification Statements” means the formal notice issued by County inviting contractors to participate in County’s process for Prequalification of Bidders.

1.1.97 **Notice of Change.** “Notice of Change” means a formal written notice required to be submitted by Contractor pursuant to Paragraph 7.6.1, below, notifying County of circumstances that Contractor believes may give rise to a Contract Adjustment.

1.1.98 **Notice of Completion.** “Notice of Completion” means a “notice of completion” as defined in California Civil Code §9204.

1.1.99 Notice of Delay. "Notice of Delay" means a formal written notice prepared and submitted by Contractor pursuant to Paragraph 8.2.2, below, notifying County of circumstances that Contractor believes may give rise to a Contract Adjustment to the Contract Time for Excusable Delay or Compensable Delay or a Contract Adjustment to the Contract Price for Compensable Delay.

1.1.100 Notice of Final Completion. "Notice of Final Completion" means the written notice by County confirming the date of actual Final Completion.

1.1.101 Notice of Intent to Award. "Notice of Intent to Award" means the written notice by or on behalf of County stating County's intent to Award the Construction Contract.

1.1.102 Notice of Substantial Completion. "Notice of Substantial Completion" means the written notice by County confirming the date of actual Substantial Completion.

1.1.103 Notice to Proceed. "Notice to Proceed" means the written notice issued by County to Contractor to begin the Work.

1.1.104 Payment Bond, Performance Bond. "Payment Bond" and "Performance Bond" mean the surety bonds required to be provided by Contractor pursuant to Article 12, below.

1.1.105 Plans. "Plans" means the graphic and pictorial portions of the Contract Documents prepared by Architect or its Subconsultants showing the design, location and dimensions of the Work, including, without limitation, plans, elevations, details, schedules and diagrams. The term "Plans" is used interchangeably with "Drawings".

1.1.106 Post-Award Submittals. "Post-Award Submittals" means the documents described in the Bidding Documents that the apparent successful Bidder is required to submit after opening of Bids as a condition of Award.

1.1.107 Pre-Bid Conference. "Pre-Bid Conference" means the conference, specified in the Notice Inviting Bids as either mandatory or optional, held prior to the Bid Closing Deadline for the purpose of, without limitation, introducing the Bidders to the Project, and which conference may, or may not, include a review of the Site.

1.1.108 Prequalification. "Prequalification" means a process for Prequalification of contractors for bidding that is conducted by County pursuant to California Public Contract Code §20101 or as otherwise permitted by Applicable Laws.

1.1.109 Prequalification Documents. "Prequalification Documents" means the collection of documents issued to and submitted by individuals or entities pursuant to a Prequalification conducted by County.

1.1.110 Prequalified Bidder. "Prequalified Bidder" means a contractor that is prequalified as part of a Prequalification conducted by County pursuant to Public Contract Code §20101.

1.1.111 Product Data. "Product Data" means illustrations, standard schedules, charts, instructional brochures, diagrams and other information furnished by Contractor to illustrate a material, product or system for the Work.

1.1.112 Progress Payment. "Progress Payment" means a monthly payment of a portion of the Contract Price prior to Final Completion based on Contractor's progressed performance of the Work.

1.1.113 Project. "Project" means the improvements comprising, or necessary or appurtenant to the use of, the work of improvements described generally in the Bidding Documents, of which the Work may be the entirety of such improvements or only a part.

1.1.114 Project Documents. "Project Documents" means all writings (hard copy and electronic) in the possession of Contractor at the Site or elsewhere that relate in any way to the Project or Work.

1.1.115 Project Team. "Project Team" means County, Architect, County Consultants, Contractor, the Subcontractors, the Separate Contractors, Inspectors of Record and other firms or individuals retained by County, or

retained by others with County's approval, participating in the planning, programming, design, construction or inspection of the Work.

1.1.116 Reasonable Order of Magnitude Estimate. "Reasonable Order of Magnitude Estimate" means a general estimate prepared by Contractor, or jointly by Contractor and County, without the benefit of complete or definitive pricing by Subcontractors, of the projected additional cost and time associated with Contractor's performance of a particular item or items of Extra Work or Deleted Work described in a Construction Change Directive. Unless otherwise agreed to in writing between County and Contractor, a Reasonable Order of Magnitude Estimate does not constitute either an authorization or agreement by County to any Contract Adjustment or a guarantee or promise by Contractor with respect to the amount of any Contract Adjustment that may be associated with a Compensable Change or Deleted Work.

1.1.117 Record Documents. "Record Documents" means the collection of documents assembled and prepared by Contractor (including, without limitation, the Record Drawings and Specifications) showing the condition of the Work as actually built.

1.1.118 Record Drawings, Record Specifications. "Record Drawings" and "Record Specifications" mean the Drawings and Specifications marked by Contractor to show the condition, location and placement of the Work as actually built, including, without limitation, the locations of mechanical, electrical, plumbing or similar portions of the Work that are depicted diagrammatically in the Drawings.

1.1.119 Reference Documents. "Reference Documents" means reports, studies, surveys and other information provided by County for Contractor's review and consideration in preparing its Bid, including, without limitation, information describing the Site (including surface or subsurface conditions), Existing Improvements or Hazardous Substances at the Site.

1.1.120 Request for Extension. "Request for Extension" means a formal written request submitted by Contractor pursuant to Paragraph 8.2.3, below, setting forth the justification and support for Contractor's request for a Contract Adjustment to the Contract Time.

1.1.121 Request for Information. "Request for Information" means a written request by Contractor for clarification of what it perceives to be a discrepancy in the Contract Documents (including, without limitation, information in the Contract Documents constituting a Design Discrepancy or a variance between the information in the Bidding Documents or Contract Documents and conditions at the Site or in Existing Improvements).

1.1.122 Safety Program. "Safety Program" means the formal, written program prepared by Contractor setting forth detailed procedures and precautionary measures for protecting persons and property from injury or damage.

1.1.123 Samples. "Samples" means physical examples that, when approved by County and Architect, illustrate materials, equipment or workmanship by which the Work is to be evaluated and judged as part of the Submittal process.

1.1.124 Schedule of Values. "Schedule of Values" means a detailed, itemized breakdown of the Contract Price, which provides for an allocation of the dollar values to each of the various parts of the Work.

1.1.125 Self-Performed Work. "Self-Performed Work" means Work related to a Compensable Change or Deleted Work that is performed or to be performed by Contractor's own laborers who are employed by Contractor, rather than by the employees of a Subcontractor, using materials and equipment purchased by Contractor directly from a supplier or manufacturer.

1.1.126 Separate Contractor. "Separate Contractor" means a contractor, subcontractor, supplier or vendor under contract directly to County to provide services, materials, labor, equipment or other work to the Project.

1.1.127 Shop Drawing. "Shop Drawing" means a drawing, diagram, schedule and other data specially prepared for the Work by Contractor or a Subcontractor to illustrate some portion of the Work.

1.1.128 **Site.** "Site" means: (1) the parcel of land owned by County on which the Project is to be constructed and such additional parcels as may be purchased by County for such construction; (2) all areas adjacent to such parcels that may be used by Contractor or the Subcontractors for staging, storage, parking or temporary offices; and (3) all land areas, both private and public, adjacent to such parcels on which Work is required to be performed under the Contract Documents, Applicable Laws or permits relating to the Project.

1.1.129 **Specifications.** "Specifications" means the portion of the Contract Documents consisting of the written requirements for materials, equipment, standards and workmanship for the Work and performance of related services.

1.1.130 **Standard of Performance.** "Standard of Performance" means the general standard governing Contractor's performance of its obligations under the Construction Contract and General Conditions as set forth in Section 2.2 of the Construction Contract.

1.1.131 **State Water Resources Control Board.** "State Water Resources Control Board" means the State Water Resources Control Board of the State of California.

1.1.132 **Storm Water Permit.** "Storm Water Permit" means any applicable storm water, urban runoff or statewide general NPDES permit issued by the State of California or the United States pursuant to the provisions of the Clean Water Act (Title 33 U.S.C. §§1251 et seq.) and/or Porter Cologne Water Quality Control Act (California Water Code §§13000 et seq.) and including any related regulations issued by the State of California or the United States.

1.1.133 **Sub-Bidder.** "Sub-Bidder" means a person or entity that submits a bid to a Bidder for some portion of the Work that is to be performed by that person or entity acting as a first-Tier Subcontractor.

1.1.134 **Subcontractor.** "Subcontractor" means a person or entity that has a contract to perform a portion of the Work, including without limitation, subcontractors, sub-subcontractors, suppliers, equipment operators, manufacturers and vendors, of any and every Tier.

1.1.135 **Submittal.** "Submittal" means a Shop Drawing, Product Data, Sample, detailed design, exemplar, fabrication and installation drawing, list, graph, operating instruction or other document required to be submitted by Contractor under the Contract Documents.

1.1.136 **Submittal Schedule.** "Submittal Schedule" means the schedule prepared by Contractor showing the timing for submission and review of Submittals during construction.

1.1.137 **Substantial Completion, Substantially Complete.** "Substantial Completion" and "Substantially Complete" mean the point at which the following conditions have occurred with respect to the entire Work or a portion of the Work designated by County in writing to be Substantially Completed prior to Substantial Completion of the entire Work:

.1 such Work is sufficiently and entirely complete in accordance with Contract Documents so that such Work can be fully enjoyed and beneficially occupied and utilized by County for its intended purpose (except for minor items which do not impair County's ability to so occupy and use such Work);

.2 all permits, approvals and certificates by Governmental Authorities, such as, but not necessarily limited to, a permanent or temporary certificate of occupancy required to occupy and use such Work have been issued free of any conditions that are the result of an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, a violation of an Applicable Law or a failure by Contractor or any Subcontractor, of any Tier, to comply with the Contract Documents; and

.3 all building systems included in such Work are operational as specified, all designated or required inspections and certifications by Governmental Authorities have been made and posted and instruction of County's personnel in the operation of the systems has been completed.

1.1.138 **Substantial Completion Punch List.** "Substantial Completion Punch List" means the list of items of Work to be completed or corrected by Contractor for Substantial Completion.

1.1.139 **Substitution.** "Substitution" means a material, product or item of material or equipment proposed by the Bidder or Contractor in place of that specified in the Bidding Documents or Contract Documents.

1.1.140 **Substitution Request Form.** "Substitution Request Form" means the form, so titled, that is included in the Bidding Documents for use by the Bidders when requesting a Substitution.

1.1.141 **Supplementary Conditions.** "Supplementary Conditions" means those portions of the Specifications that supplement, by addition, modification or deletion, a specific portion of the General Conditions.

1.1.142 **Surety.** "Surety" means Contractor's surety(ties) issuing the Bid Bond, Performance Bond or Payment Bond.

1.1.143 **Tier.** "Tier" means the contractual level of a Subcontractor with respect to Contractor. For example, a "first-tier" Subcontractor is under contract with Contractor. A sub-subcontractor under contract with a first-tier Subcontractor is in the "second tier," and so on. Use of the phrase "of every Tier", or similar phraseology, in the Contract Documents shall not be interpreted as implying that other provisions of the Contract Documents, where such phrase is not used, are intended to be limited in application to only the first Tier or to only certain other Tiers of Subcontractors.

1.1.144 **Time Impact Analysis.** "Time Impact Analysis" means a written report evaluating the impact of an Excusable or Compensable Delay, which shall include, at a minimum, the following: (1) a narrative description of the Delay and its impact on the critical path to achievement of a Substantial Completion or Final Completion of the Work or a portion of the Work designated by County within the Contract Time; (2) a Fragnet; (3) the number of Days of extension sought by Contractor as a Contract Adjustment to the Contract Time; (4) a computation of the Days of Compensable Delay multiplied times the liquidated damages payable to Contractor pursuant to Section 3.3 of the Construction Contract, if any, sought by Contractor; (5) a statement that Contractor has complied with the requirements of the General Conditions for written notice of Delays, along with the dates and copies of such notices; (6) the measures taken by Contractor and Subcontractors to prevent or minimize the Delay; and (7) Contractor's recommendations for reordering or re-sequencing the Work to avoid or minimize further Delay.

1.1.145 **Unexcused Delay.** "Unexcused Delay" means any Delay that is not a Compensable Delay or Excusable Delay or that constitutes a Compensable Delay or Excusable Delay for which Contractor is not entitled to a Contract Adjustment to the Contract Time, including, without limitation, the following: (1) Delay caused by an act or omission of Contractor or a Subcontractor, of any Tier, constituting negligence, willful misconduct, a violation of an Applicable Law or a failure by Contractor or any Subcontractor, of any Tier, to comply with the Contract Documents; (2) Delay for which Contractor has failed to provide a timely and complete Notice of Delay or Request for Extension; or (3) Delay associated with any circumstances where the costs or risk associated with such circumstances are designated in the Contract Documents as being at Contractor's risk or Contractor's Own Expense.

1.1.146 **Unilateral Change Order.** "Unilateral Change Order" means a writing signed by County in accordance with Article 7, below, in which County unilaterally sets forth its Good Faith Determination of the undisputed portion of an otherwise disputed Contract Adjustment.

1.1.147 **Work.** "Work" means all labor, materials, equipment, services, permits, licenses, taxes and other things necessary for Contractor to perform its obligations under the Contract Documents, including, without limitation, any Changes requested by County, in accordance with the Contract Documents and all Applicable Laws. The Work may constitute the whole or a part of the Project.

1.1.148 **Worker's Compensation Certificate.** "Worker's Compensation Certificate" means the statement, completed by Bidder in the form included in the Instruction to Bidders, evidencing the Bidder's compliance with the worker's compensation insurance requirements of the Bidding Documents and Applicable Laws.

1.2 CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

1.2.1 **Design Intent.** The intent of the Contract Documents is for Contractor to provide all items necessary to produce a work of improvement that is complete as a whole and that is, in all of its parts, suitable for use and occupancy for its intended purpose, including, without limitation, all equipment, casework, mechanical, electrical and similar devices of whatever nature, completely installed, hooked-up and made fully operational and functional.

1.2.2 Complementary. Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. Any Work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

1.2.3 Technical Words. Unless otherwise stated in the Contract Documents, technical words and abbreviations contained in the Contract Documents are used in accordance with commonly understood construction industry meanings and non-technical words and abbreviations are used in accordance with their commonly understood meanings.

1.2.4 Trade Names. It is not the intention of the Contract Documents to go into detailed descriptions of any materials or methods commonly known to the trade under a "trade name" or "trade term." The mere mention or notation of such "trade name" or "trade term" shall be considered a sufficient notice to the Contractor that it will be required to complete the Work so named with all its appurtenances according to first-class practices of the trade.

1.2.5 Incidental Items. The naming of any material or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and labor therefor, in accordance with first-class practices of the trade involved, unless specifically noted otherwise.

1.2.6 Drawing Dimensions. Figured, derived or numerical dimensions on scale Drawings shall govern over Drawings without figured dimensions. The Drawings shall not be scaled to determine dimensions, and (except in the case of diagrammatic Drawings) dimensions shall be calculated from figures shown on the Drawings. Obvious discrepancies between scale and figured dimensions, not marked "not to scale," must be brought to the Architect's attention before proceeding with the Work affected by the discrepancy. Contractor shall carefully check and compare all portions of the Drawings and Specifications so as to correctly interpolate the intended dimensions for any portion of the Work that is not explicitly dimensioned in the Contract Documents.

1.2.7 Drawings, Specifications. In general, the Drawings will show dimensions, positions, and kind of construction and the Specifications will define materials, quality and standards. Work not particularly shown, detailed, marked or specified shall be the same as similar parts that are shown, detailed, marked or specified.

1.2.8 Typical Work. Work not particularly shown, detailed, marked or specified shall be the same as similar parts that are shown, detailed, marked or specified.

1.2.9 Divisions of the Work. All the Work mentioned or indicated in the Contract Documents shall be performed by Contractor as part of the Work unless specifically indicated in the Contract Documents to be done by others. The organization of the Specifications into divisions, sections and articles and the arrangement of the Drawings shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by the Subcontractors.

1.2.10 Applicable Laws. Compliance with Applicable Laws shall be considered as a part of the Work.

1.2.11 Interpretations of Laws. In the event of a conflict between or among Applicable Laws governing performance of the Work, the more stringent shall govern. Contractor assumes, at Contractor's Own Expense, sole responsibility for, and the risk associated with, interpretations of Applicable Laws made by Contractor not predicated on written orders issued by Governmental Authorities that by their terms are applicable to the Project, including, without limitation, interpretations or assumptions made by Contractor based on decisions, orders or approvals (written or unwritten) issued by or on behalf of Governmental Authorities in connection with work on other projects or properties near or in the general vicinity of the Site.

1.2.12 Modifiers. The Contract Documents may omit modifying words such as "all" and "any," and articles such as "the" and "an." If a modifier or an article is not included in one statement and appears in another, it is not intended to affect the interpretation of either statement. The use of the word "including," when following any general statement, shall not be construed to limit such statement to specific items or matters set forth immediately following such word or to similar items or matters whether or not non-limiting language (such as "without limitation," "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement.

1.2.13 Singular, Gender, Captions. When appropriate to the context, the use of the singular number shall be deemed to include the plural and vice versa. Each gender shall be deemed to include any other gender, and each shall include corporation, partnership, trust or other legal entity whenever the context so requires. The captions and headings of the various subdivisions of the Contract Documents are intended only as a matter of reference and convenience and in no way define, limit, or prescribe the scope or intent of the Contract Documents or any subdivision thereof.

1.2.14 Cross-References. Any cross-references indicated between various paragraphs or other portions of the Specifications, Drawings or other Contract Documents are provided for the convenience of Contractor and shall not be deemed to be all-inclusive.

1.2.15 Diagrammatic Design. Drawings and diagrams for mechanical, plumbing, electrical, fire sprinkler, fire alarm and low voltage Work shall be considered as diagrammatic only and shall not be used for any structural guidance or physical layout. Because such Drawings are diagrammatic, Contractor shall be responsible to provide any and all numbers and lengths of fittings, wire, conduit, connections, attachments or similar materials or devices needed to complete the Work, without Contract Adjustment, whether or not they exceed the numbers of pieces or the lengths indicated by such Drawings. Contractor is solely responsible to carefully plan and coordinate in advance, by means of coordination drawings prepared by Contractor or a Subcontractor, the installation of any Work shown diagrammatically and shall do so in such a manner as to make maximum use of the space available and anticipate and avoid wherever possible conflict and interferences among such portions of the Work and with other portions of the Work, including structural members.

1.2.16 Demolition. Existing Improvements at the Site of which no specific description is made in the Contract Documents, but which could be reasonably assumed to interfere with the satisfactory completion of the Work, shall be removed and disposed of by Contractor without Contract Adjustment. If Contractor is unsure whether a specific Existing Improvement at the Site which is not specifically described in the Contract Documents should be removed and disposed of, Contractor shall promptly ask the County whether such Existing Improvement is to be removed or remain in place, and shall comply with any directive given in response.

1.2.17 Omissions. Items missing from the Contract Documents shall nevertheless be provided by the Contractor, without Contract Adjustment, to the extent reasonably inferable from the Contract Documents as being necessary to satisfy the Design Intent.

1.2.18 Conflicts. Notwithstanding the provisions of Paragraph 1.2.19, below, in the event of conflict between any of the Contract Documents, the provision placing a more stringent requirement or greater burden on the Contractor or requiring the greater quantity or higher quality material or workmanship shall prevail, unless otherwise directed by the County in writing.

1.2.19 Order of Precedence. Conflicts that cannot be resolved in accordance with the rules of interpretation set forth elsewhere in this Section 1.2, shall be interpreted in accordance with the following order of precedence (the first being the highest order of precedence):

.1 Applicable Laws (provided, however, and notwithstanding Subparagraph 1.2.19.10, below, where the Contract Documents or manufacturer's recommendations or specifications require standards higher than those of Applicable Laws, the Contract Documents or manufacturer's recommendations or specifications shall control);

.2 Change Orders, Unilateral Change Orders and Construction Change Directives;

.3 Addenda;

.4 Construction Contract;

.5 Supplementary Conditions;

.6 General Conditions;

.7 General Requirements;

.8 Specifications;

.9 Drawings, subject to the following: (1) large scale plans and details take precedence over small scale Drawings in all cases; (2) full scale Drawings have precedence over both large and small scale Drawings in all cases; (3) detailed Plans and/or Drawings shall have precedence over general Plans and/or Drawings; (4) architectural and structural Drawings take precedence over electrical and mechanical Drawings in regard to location and arrangement of fixtures, outlets, and equipment; and (5) electrical and mechanical Drawings take precedence in describing and specifying equipment and in describing the diagrammatic requirements;

.10 standard and reference specifications which include industry norms, such as, but not limited to, ANSI and ASTM; and

.11 Reference Documents.

1.2.20 **Conditions Precedent.** Wording used in the Contract Documents indicating that a right of the Contractor or an obligation of the County is subject to or conditioned upon the occurrence of a condition or event, whether or not such condition or event is within the control of Contractor, County or others and whether or not such condition or event is expressly stated to be a "condition precedent", shall be understood and interpreted to mean that the stated condition or event is a condition precedent to the existence, arising, performance and exercise of such right or obligation.

1.3 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

1.3.1 **Property of County.** Subject to the provisions of Paragraph 2.4.4, below, all Design Documents, Contract Documents and Project Documents that are prepared by Contractor or a Subcontractor, of any Tier, for use in connection with the Project, including any designs, building designs or other depictions underlying or shown in them, and the Intellectual Property Rights thereto, shall be deemed the sole and exclusive property of County and ownership thereof is irrevocably vested in County, whether the Project is executed or not.

1.3.2 **Assignment of Rights.** Contractor shall, without further consideration, obtain any and all Intellectual Property Rights in the Project Documents and Design Documents prepared by Contractor or any Subcontractor, of any Tier, for use in connection with the Project, including any designs, building designs or other depictions underlying or shown in them, free and clear of any liens or other encumbrances, claims or rights of third parties, transfer such rights, if necessary in writing, to County and cooperate with County in securing and registering such rights, such that County shall own all Intellectual Property Rights and any other tangible and/or intangible property rights associated therewith. Such transfer and assignment will be effective for the entire duration of the copyrights and include, but are not be limited to, all rights in related plans, specifications, documentation, derivative works and moral rights.

1.3.3 **Contractor's Warranty.** Contractor represents and warrants that the Project Documents and Design Documents prepared by Contractor or any Subcontractor for use on the Project, and the use of such Project Documents in the ordinary course, are free of any claim of infringement or any other violation of any Intellectual Property Right or other right of any third party.

1.3.4 **Non-Exclusive License.** Without derogation of County's rights under this Section 1.3, Contractor and Subcontractors, of every Tier, are granted a limited, non-exclusive license, revocable at will of County, to use and reproduce applicable portions of the Design Documents, Contract Documents and Project Documents as appropriate to and for use in the execution of the Work and for no other purpose.

1.3.5 **Reproduction.** Contractor shall do all reproduction and distribution of such reproducible prints of Contract Documents and Design Documents as are necessary for the complete pricing and performance of the Work, including, without limitation, all Changes. The costs of such reproduction shall be at Contractor's Own Expense.

1.3.6 Delivery to County. All Design Documents and Contract Documents (including originals and copies), and one (1) copy of all other Project Documents, in the possession of Contractor or Subcontractors shall be delivered to County upon the earlier of Final Completion of the Work or termination of the Construction Contract; provided, however, that Contractor shall have the right to retain one (1) copy of the Contract Documents and Submittals as a permanent record.

1.3.7 Subcontractors. Contractor shall take all necessary steps to ensure that a provision is included in all contracts with Subcontractors, of every Tier, who perform Work on the Project protecting and preserving County's rights as set forth in this Section 1.3.

ARTICLE 2 COUNTY RIGHTS AND OBLIGATIONS

2.1 INFORMATION, APPROVALS AND SERVICES REQUIRED OF COUNTY

2.1.1 Legal Descriptions. County shall furnish, within a reasonable time after written request by Contractor, a legal description of the Site and information describing legal limitations affecting the Site that are recorded with applicable Governmental Authorities, such as, but not limited to, easements.

2.1.2 Permits and Fees. County shall secure and pay for only those permits and fees which are expressly stated to be the responsibility of County under the Contract Documents. County shall pay for all hook-up fees (not including "tap fees", which are the responsibility of Contractor pursuant to Paragraph 3.14.3, below) in order to establish a new account with a utility provider.

2.1.3 County Approvals. Information, approvals and decisions required of County or a County Consultant for which a County Review Period or County Review Date is included in the Construction Schedule that is approved by County shall be provided in accordance with the Construction Schedule. If a County Review Period or County Review Date is not set forth in the Construction Schedule approved by County, then such information, approvals and decisions shall be provided upon written request by Contractor without unreasonable Delay. Notwithstanding the foregoing, failure by County, Architect or a County Consultant to provide any information, approvals or decisions shall not be considered as a basis for Contract Adjustment to the Contract Time unless and until, and in calculating a Contract Adjustment any Delay or extension of the Contract Time resulting from a late-issuance of such information, approval or decision shall not commence until after:

.1 in the case of information, approval or decision for which there is a County-approved County Review Period or County Review Date in the County-approved Construction Schedule, seven (7) Days have passed since the County and the individual from whom such information, approval or decision is sought have received from Contractor a written notice containing all the following:

- (1)** a detailed description of the information, approval or decision required;
- (2)** a statement that the County Review Period or County Review Date has expired or passed; and
- (3)** a statement, prominently displayed, that: "PURSUANT TO PARAGRAPH 2.1.3 OF THE GENERAL CONDITIONS, THE FAILURE TO PROVIDE THE REQUESTED INFORMATION, APPROVAL OR DECISION WITHIN 7 CALENDAR DAYS FROM THIS NOTICE MAY RESULT IN A REQUEST FOR A CONTRACT ADJUSTMENT"; or

.2 in the case of information, approval or decision for which there is no County Review Period or County Review Date set forth in the County-approved Construction Schedule, thirty (30) Days have passed since the County and the individual from whom such information, approval or decision is sought have received from Contractor a written notice that includes the statements set forth Clauses (1) and (2) of Subparagraph 2.1.3.1, above, and that includes a statement, prominently displayed, that: "PURSUANT TO PARAGRAPH 2.1.3 OF THE GENERAL CONDITIONS, THE FAILURE TO PROVIDE THE REQUESTED INFORMATION, APPROVAL OR DECISION WITHIN 30 CALENDAR DAYS FROM THIS NOTICE MAY RESULT IN A REQUEST FOR A CONTRACT ADJUSTMENT".

2.1.4 Approvals. Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of County, Architect or any other Project Team member, or by tests, inspections or approvals required or performed by persons other than the Contractor.

2.1.5 Non-Specified Items. County reserves the right to approve materials and sources of supply of materials that are not specified in the Contract Documents and that are used for the performance of the Work.

2.2 COUNTY'S RIGHT TO STOP THE WORK

If Contractor fails to correct Defective Work as required by Section 13.2 of these General Conditions, fails to perform the Work in accordance with the Contract Documents or violates any Applicable Law, County may immediately order Contractor to stop the Work, or any portion thereof, until the cause for such direction has been eliminated by Contractor. Contractor shall immediately comply with such notice at Contractor's Own Expense. Nothing stated herein or elsewhere in the Contract Documents shall be interpreted as placing upon County a duty or responsibility to Contractor or any other party to exercise its right to stop the Work.

2.3 COUNTY'S RIGHT TO CARRY OUT THE WORK

If Contractor fails to carry out the Work in accordance with the Contract Documents, fails to provide sufficient labor, materials, equipment, tools and services to maintain the Construction Schedule, or otherwise fails to comply with any requirement of the Contract Documents, and fails to cure such failure in the manner required by Subparagraph 15.1.1.4, below, County may correct such failure. In such case, County shall be entitled to recover from Contractor or deduct from payments then or thereafter due Contractor for any Loss resulting from such failure, including compensation for the additional services and expenses of County, County Consultants and others whose services are reasonably required and made necessary thereby. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall promptly pay the amount of the shortfall to County.

2.4 ACCOUNTING, RECORDS AND AUDIT

2.4.1 Accounting System. Contractor shall exercise such controls as may be necessary for proper financial management of the Work. Such accounting and control systems shall comply with prevailing custom and practice for similar projects, be satisfactory to County and shall include preservation of the books and records described in Paragraph 2.4.2, below, subject to Contractor's obligations under Paragraph 1.3.6, above, for a period of ten (10) years after Final Completion of the Work, or for such longer period as may be required by Applicable Laws.

2.4.2 Books and Records. Contractor shall keep, and shall require provisions to be included in all contracts entered into by Subcontractors, of every Tier, requiring the Subcontractors, of every Tier, to keep, full and detailed books, records, information, materials and data, of every kind and character (hard copy, as well as computer readable data if it exists) that have any bearing on or pertain to any matters, rights, duties or obligations relating to the Project, Work or Construction Contract, including, without limitation, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, change orders, change order requests, estimates, field orders, construction change directives, schedules, requests for information, diaries, logs, reports, shop drawings, samples, exemplars, drawings, specifications, invoices, delivery tickets, receipts, vouchers, cancelled checks, memoranda, accounting records; job cost reports, job cost files (including complete documentation of negotiated settlements), backcharges, general ledgers; documentation of cash and trade discounts earned, insurance rebates and dividends, and other documents relating in any way to any claims, charges or time extensions asserted by Contractor or any of the Subcontractors, of any Tier, or relating to any credits, rebates or discounts owing to County.

2.4.3 Inspection and Copying. Contractor shall allow, and shall require provisions to be included in all contracts entered into by Subcontractors, of every Tier, allowing, County and the auditor for the State of California (and the authorized representative(s), auditors, attorneys and accountants of each) upon twenty-four (24) hours notice to Contractor, full access to inspect and copy all its aforesaid books and records at a location within the Southern California area. Such right of audit may be exercised by either County or the auditor for the State of California as often as reasonably necessary to verify Contractor's continuing compliance with the Contract Documents.

2.4.4 Confidential Information. Nothing stated in this Section 2.4 or elsewhere in the Contract Documents shall be interpreted as a waiver by Contractor or any Subcontractor of any rights of privilege or confidentiality that are

provided for by Applicable Law nor as authorizing the inspection of books and records that contain information concerning estimating means or methods that is not, in whole or part, relevant to a charge or demand being asserted by Contractor or a Subcontractor involving Extra Work, Deleted Work, Delay or a Claim.

2.4.5 Withholding of Payment. In addition to and without limitation upon County's other rights and remedies for breach, including any rights of County to withhold payment that are set forth elsewhere in the Contract Documents, County shall have the right, exercised in its sole discretion, to withhold from any payment due to Contractor under an Application for Payment a sum of up to ten percent (10%) of the total amount set forth in such Application for Payment until Contractor and the Subcontractors have complied with any outstanding and unsatisfied obligation under this Section 2.4. Upon compliance with this Section 2.4, any such monies withheld shall be released to Contractor.

2.4.6 Specific Performance. Contractor agrees that any failure to provide access to books and records as required by this Section 2.4 will result in irreparable harm and prejudice to County and shall, without the necessity of posting of any bond or undertaking, be specifically enforceable by means of a mandatory injunctive order (temporary, preliminary, provisional or otherwise) issued by a court of competent jurisdiction, which order the County and Contractor hereby consent to being issued based upon affidavits and without the necessity of oral testimony.

2.5 COUNTY FURNISHED MATERIALS

2.5.1 Supply by County. County shall have the right to furnish materials, products or equipment directly for processing and incorporation by Contractor in lieu of Contractor providing materials, products or equipment specified in the Contract Documents to be provided by Contractor as part of the Work.

2.5.2 Deleted Work. If the materials, products or equipment provided by County pursuant to Paragraph 2.5.1, above, then a Change Order shall be executed deleting such materials, products or equipment from the Work along with a Contract Adjustment reducing the Contract Price in the manner provided for in Article 7, below, applicable to Contract Adjustments for Deleted Work.

2.5.3 Delivery Deadlines. Without limitation to Contractor's obligations under Article 8, below, upon receipt of written instruction by County of its intent to provide materials, products or equipment pursuant to this Section 2.6, Contractor shall notify County promptly in writing of any deadlines within which such materials, products or equipment must be received at the Site in order to avoid Delay.

2.5.4 Delivery to Site. Contractor shall, upon their delivery to the Site, properly receive and unload materials, products or equipment furnished by County pursuant to this Section 2.5.

2.5.5 Care, Custody and Control. Contractor assumes full and unconditional responsibility for care, custody and control of the materials, products or equipment that are furnished by County pursuant to this Section 2.5, whether or not they have been accepted by County, and assumes sole responsibility for any subsequent loss, injury or damage thereto occurring prior to Final Completion.

2.5.6 Notice of Deficiencies. Contractor shall carefully inspect any materials, products or equipment furnished by County pursuant to this Section 2.5 and immediately notify County of any defect or deficiency in such materials, products or equipment or any nonconformity in such materials, products or equipment with the requirements of the Contract Documents or with the requirements of the other documentation provided to Contractor setting forth the conditions of County's purchase. Contractor shall not accept any materials, products or equipment furnished by County with respect to which Contractor has provided such notice of defect, deficiency or non-conformity unless and until instructed to do so in writing by County.

2.5.7 Incorporation in Work. Contractor shall, as part of the Work and without Contract Adjustment, provide any and all processing, fabrication, cutting, shaping, fitting, assembly and installation of materials, products or equipment furnished by County pursuant to this Section 2.5 in full compliance with the requirements of the Contract Documents and the manufacturer's instructions and recommendations.

2.6 COUNTY INSTALLED ITEMS

Contractor shall notify County, a reasonable time in advance, of the Contractor's scheduled dates for installation of items that are specified in the Contract Documents to be placed on, attached to or incorporated into the Work by County or Separate Contractors. In the event that Contractor fails to do so or if due to Unexcused Delay the County is unable after such notice by Contractor to so place, affix or incorporate such items, then Contractor shall be responsible, in addition to any amounts due to County for liquidated damages, to reimburse County for costs of storage or rental of temporary replacement items until such time as the Work is in a condition suitable for such items to be placed, affixed or incorporated.

2.7 COUNTY'S ADDITIONAL RIGHTS

The rights stated in this Article 2 are in addition to and not in limitation of any other rights of County granted elsewhere in the Contract Documents or under Applicable Laws.

ARTICLE 3 CONTRACTOR PERFORMANCE

3.1 CONTRACTOR STATUS

3.1.1 Independent Contractor. Contractor is, and shall at all times be deemed to be, an independent contractor and is wholly responsible for the performance of the obligations required of it by the terms of the Contract Documents.

3.1.2 Agents, Employees. Contractor wholly assumes responsibility for the acts and omissions of its agents and employees and the agents and employees of each Subcontractor, of every Tier, as they relate to the Work. Contractor, its agents and employees, shall not be entitled to any rights or privileges of County's employees and nothing contained in the Contract Documents and no course of conduct shall be construed as creating the relationship of employer and employee, or principal and agent, between County and any agent or employee of Contractor or any Subcontractor. County shall have the right, but not the obligation, to monitor the employment and other activities of Contractor and the Subcontractors to determine compliance with the terms of the Contract Documents.

3.1.3 Licenses. Contractor and the Subcontractors, of every Tier, shall maintain, such contracting, professional and business licenses as may be required by Applicable Laws for the duration of time that Contractor is performing the Work under the Contract Documents, including the period of any warranty provided covering all or any portion of the Work.

3.1.4 Subcontractors. Contractor is responsible to County for acts and omissions of the Subcontractors and their agents and employees and other persons performing portions of the Work under a contract with a Subcontractor, of any Tier.

3.1.5 Design Services. Contractor shall provide professional services if such services are expressly, or by reasonable implication, required by the Contract Documents for a portion of the Work or are required in order for Contractor to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Professional design services or certifications so required of Contractor shall be furnished by design professionals exercising the highest standard of care and utilizing designs and engineering that comply with all systems, materials or equipment, performance and design criteria set forth in the Contract Documents. Certification by a properly licensed design professional, including such professional's signature and seal, shall appear on all drawings, calculations, specifications, certifications and other documents prepared by such professional. Submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted. County, Architect and County Consultants shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals.

3.2 REVIEW OF DOCUMENTS, SITE AND EXISTING IMPROVEMENTS

3.2.1 Contractor's Duty of Review. Contractor's submission of its Bid and execution of the Construction Contract constitutes its representation, acknowledgement and agreement that it had sufficient time, access and opportunity prior to the Bid Closing Deadline to conduct a careful and thorough examination, to its satisfaction, of:

.1 the Bidding Documents, Contract Documents, Reference Documents and other information provided by County to Contractor prior to the Bid Closing Deadline concerning the Project, Site or Existing Improvements;

.2 the visible conditions at the Site and its surroundings, visible conditions of Existing Improvements and their existing uses by County or the public, routes of ingress and egress, and local conditions in the vicinity of the Site (including, without limitation, sources and availability of labor, materials and equipment);

.3 the status of any construction at the Site concurrently under construction; and

.4 all information concerning visible and concealed conditions above and below the surface of the ground at the Site and in Existing Improvements (including, without limitation, surveys, reports, data, as-built drawings of Existing Improvements and utility sources, capacities and locations) that was either (1) provided by County to Contractor or other Bidders (including, but not limited to, the Bidding Documents and Reference Documents) or (2) reasonably available to Contractor for review in the public records of the County of Riverside or the City in which the Project is located.

3.2.2 Contract Adjustments.

.1 **Differing Site Conditions.** Except as otherwise provided in Subparagraph 3.2.3, below, the Contractor's right to a Contract Adjustment in the event Contractor encounters conditions at the Site or in Existing Improvements that vary from those indicated by the Contract Documents or other information that was either reviewed by Contractor or that Contractor was given the opportunity to review prior to the Bid Closing Deadline shall be governed exclusively by Paragraph 4.3.8, below, pertaining to Differing Site Conditions.

.2 **Design Discrepancies.** Except as otherwise provided in Subparagraph 3.2.3, below, and subject to the Contractor's compliance with the other provisions of the Contract Documents governing the Contractor's right to a Contract Adjustment (including, without limitation, Article 7 and Article 8, below), Contractor shall be entitled to a Contract Adjustment due to Design Discrepancies, subject to the following conditions and limitations:

(1) **Compensable Change.** There shall be no Contract Adjustment to the Contract Price for Extra Work that the Contractor is required to perform as a result of a Design Discrepancy unless all of the following conditions have been met prior to Contractor or any Subcontractor performing any portion of the Work involving or affected by such Design Discrepancy:

(a) the circumstances giving rise to such Extra Work conform to all of the requirements of Subparagraph 1.1.29.2 through Subparagraph 1.1.29.4, above, applicable to Compensable Changes;

(b) Contractor has submitted to County and Architect a Request for Information in compliance with Paragraph 3.2.5, below, seeking clarification of such Design Discrepancy;

(c) Contractor has submitted to County a timely and complete Notice of Change in accordance with Article 7, below, describing such Extra Work in detail;

(d) Contractor has received a Construction Change Directive signed by County in accordance with Article 7, below, directing that Contractor perform the portion of the Work in question; and

(e) unless otherwise provided in such Construction Change Directive, Contractor has submitted to County a Change Order Request in accordance with the requirements of Article 7, below, setting forth the particulars of its request for Contract Adjustment on account of such Extra Work.

(2) Compensable Delay. There shall be no Contract Adjustment to the Contract Price or Contract Time for Delay as a result of a Design Discrepancy unless all of the following conditions have been met prior to Contractor or any Subcontractor performing any portion of the Work involving or affected by such Design Discrepancy:

(a) if the Delay is the result, in whole or in part, of Extra Work, all of the requirements of Subparagraph 3.2.2.2 (1), (a) through (e), above, have been met;

(b) the circumstances giving rise to such Delay conform to all of the requirements of Subparagraph 1.1.30.2 and Subparagraph 1.1.30.3, above, applicable to Compensable Delay; and

(c) Contractor has submitted to County a timely and complete Notice of Delay and a timely and complete Request for Extension in accordance with Article 8, below, setting forth the particulars of its request for Contract Adjustment on account of such Compensable Delay.

(3) Differing Site Conditions. The Contractor's right to a Contract Adjustment as a result of variances between (a) the Contract Documents or other documents or information described in Paragraph 3.2.1, above, that, prior to the Bid Closing Deadline was either reviewed by Contractor or was available to Contractor for review prior to the Bid Closing Deadline and (b) conditions at the Site or in Existing Improvements shall, notwithstanding the fact that the circumstances asserted by Contractor as a basis for such Contract Adjustment may involve, relate to or arise out of a Design Discrepancy, be governed by the provisions of the Contract Documents setting forth the Contractor's right to Contract Adjustments on the grounds of Differing Site Conditions.

3.2.3 WAIVER BY CONTRACTOR.

CONTRACTOR AGREES THAT IT SHALL NOT BE ENTITLED TO, AND HEREBY CONCLUSIVELY WAIVES, ANY RIGHT TO CONTRACT ADJUSTMENT, AS WELL AS THE RIGHT TO ANY OTHER OR FURTHER RECOURSE OR RIGHT OF RECOVERY FROM COUNTY, ON ACCOUNT OF LOSSES OR DELAYS THAT ARE A RESULT OF EITHER A DIFFERING SITE CONDITION OR A DESIGN DISCREPANCY, IF PRIOR TO THE BID CLOSING DEADLINE SUCH DIFFERING SITE CONDITION OR DESIGN DISCREPANCY WAS:

(1) DISCOVERED BY CONTRACTOR AND CONTRACTOR, NOTWITHSTANDING SUCH DISCOVERY, FAILED TO REPORT SUCH DIFFERING SITE CONDITION OR DESIGN DISCREPANCY TO COUNTY IN WRITING PRIOR TO THE BID CLOSING DEADLINE;

(2) ALTHOUGH NOT ACTUALLY DISCOVERED BY CONTRACTOR PRIOR TO THE BID CLOSING DEADLINE WAS REASONABLY DISCOVERABLE BY CONTRACTOR UNDER THE STANDARD OF PERFORMANCE SPECIFIED IN THE CONSTRUCTION CONTRACT, INCLUDING, WITHOUT LIMITATION, A DIFFERING SITE CONDITION OR DESIGN DISCREPANCY THAT WAS OVERLOOKED BY CONTRACTOR DUE TO A FAILURE BY CONTRACTOR TO FULLY FAMILIARIZE ITSELF PRIOR TO THE BID CLOSING DEADLINE WITH ANY OF THE DOCUMENTS, INFORMATION OR CONDITIONS REFERRED TO IN PARAGRAPH 3.2.1, ABOVE.

3.2.4 Continuing Obligation. In addition and without limitation to Contractor's obligations under Paragraph 3.2.1, above, or elsewhere in the Contract Documents, Contractor shall have the continuing obligation until Final Completion to promptly report to County, by means of submission by Contractor of a Request for Information that complies with the requirements of Paragraph 3.2.5, below, any and all of the following:

.1 information contained in the Bidding Documents, Contract Documents, Reference Documents or other documentation that was either reviewed by Contractor or that Contractor was given the opportunity to review prior to the Bid Closing Deadline, as well as any visible conditions at the Site, in Existing Improvements or in the vicinity of the Project, that Contractor knows, or in the exercise by Contractor of its duties under the Standard of Performance should have known, may render a portion of the Work in any respect, wholly or partially, unsuitable or incomplete to meet the requirements of the Contract Documents, the Design Intent or Applicable Laws, and

.2 conditions in the Work that constitute Defective Work or that cause or are likely to cause any other portion of the Work to be Defective Work.

Without limitation to County's other rights under the Contract Documents, any portion of the Work, Existing Improvements or the work of Separate Contractors or County's own forces requiring replacement, repair or correction due to a failure by Contractor or any Subcontractor, of any Tier, to comply with its continuing obligation under this Paragraph 3.2.4 shall be promptly replaced, repaired or corrected to County's satisfaction, at Contractor's Own Expense.

3.2.5 Requests for Information.

.1 Time for Submittal. Requests for Information shall be submitted no later than three (3) Days after the date Contractor learns of the circumstances giving rise to the question contained in the Request for Information. Requests for Information shall be submitted by or through the Contractor and not directly by Subcontractors.

.2 Content. Each Request for Information shall, in addition to the Contractor's specific question or request, include the following:

(1) a detailed description of the circumstances giving rise to the Contractor's request or question, including, without limitation, any related Design Discrepancy;

(2) Contractor's request for clarification, including, without limitation, any request for further detailing or correction of the Contract Documents; and

(3) a statement of whether Contractor believes it is entitled to a Contract Adjustment by reason of the circumstances described.

.3 Form. Contractor shall submit Requests for Information using forms provided or approved by County.

.4 Unnecessary, Multiple Requests. Contractor shall carefully review, coordinate and consolidate (where appropriate to prevent piecemeal submission) Requests for Information (whether originating with Contractor or the Subcontractors) prior to submitting them in order to eliminate unnecessary or duplicative requests.

.5 Responses. Responses to Requests for Information shall be furnished with reasonable promptness so as to not unreasonably Delay progress of the Work; provided, however, that the timing of a response by the Architect, County or a County Consultant to a Request for Information shall not constitute grounds for a Contract Adjustment unless Contractor has complied with the requirements set forth in this Paragraph 3.2.5 and, if applicable, Paragraph 2.1.3, above.

.6 Back Charges by County. County shall have the right to deduct from payments due to Contractor sums expended by County for the services of the Architect, Inspectors of Record or County Consultants due to a failure by Contractor to comply with this Paragraph 3.2.5.

.7 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO SUBMIT A REQUEST FOR INFORMATION IN ACCORDANCE WITH AND UNDER CIRCUMSTANCES IN WHICH A REQUEST FOR INFORMATION WAS REQUIRED BY THIS PARAGRAPH 3.2.5 SHALL RESULT IN CONTRACTOR WAIVING ITS RIGHT TO A CONTRACT ADJUSTMENT ON ACCOUNT OF ANY LOSS OR DELAY THAT COULD HAVE BEEN AVOIDED IF SUCH REQUEST FOR INFORMATION HAD BEEN PROPERLY PREPARED AND TIMELY SUBMITTED.

3.2.6 Correction of Work. Contractor shall, at Contractor's Own Expense, correct or replace in accordance with the direction of County any portion of the Work that is performed by Contractor or a Subcontractor knowing that it involves, or that Contractor or Subcontractor in the exercise of reasonable care and diligence should have known involves, a portion of the Contract Documents that contains an error, omission, conflict, ambiguity, lack of coordination or noncompliance with Applicable Laws, without first notifying and obtaining the written approval of County and Architect.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 General Obligation. Contractor shall provide competent, fully qualified personnel to supervise, administer, manage and direct the Work, competently and efficiently, at all times devoting their best skill and attention to perform the Work in accordance with the Contract Documents.

3.3.2 Supervisory Staff. Contractor shall employ a competent project manager, superintendent, scheduler, forepersons and necessary assistants during performance of the Work. Contractor's superintendent and forepersons shall be present at the Site at all times that the Work is in progress and at any time that any employee of Contractor or a Subcontractor is present at the Site. Contractor's project manager and superintendent shall, unless excused from attendance by the County, attend all job meetings. Contractor's project manager and superintendent must be able to fluently read and write in English. Contractor's superintendent shall not perform the Work of any trade, pick up materials, or perform any Work not directly related to the supervision of the Work and shall be available twenty-four (24) hours a Day, seven (7) Days a week, to respond to emergencies.

3.3.3 County Supplementary Personnel. Without limitation upon any of the rights or remedies of the County under the Contract Documents or under Applicable Laws, in the event that Contractor fails to have personnel on Site to supervise the Work, the County shall have the right, but not the obligation, upon twenty-four (24) hours' telephonic or email notice by the County to Contractor, to provide such supervision on a temporary basis and to deduct from the sums owing to Contractor the actual costs of such temporary supervision. Contractor shall, notwithstanding the County's providing such temporary supervision, remain solely responsible for all actions and omissions of its personnel and of the Subcontractors.

3.3.4 Means, Methods, Procedures. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and coordinating all portions of the Work, unless the Contract Documents specify other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, Contractor shall nonetheless be fully and solely responsible for the adequacy and safe implementation of such means, methods, techniques, sequences or procedures. If Contractor believes that such specified means, methods, techniques, sequences or procedures may not be safe or adequate, Contractor shall give written notice to County and Architect and shall not proceed with that portion of the Work without further written instruction from County or Architect. In response to such notice, County may order Contractor to improve the character or increase the efficiency of the means, methods, techniques, sequences or procedures employed, and Contractor shall conform to such order; but the failure of County to order such improvement or increase of efficiency will neither relieve Contractor from its sole responsibility for safety at the Site nor relieve Contractor from its obligation to perform the Work in accordance with the Contract Documents and Applicable Laws.

3.4 LABOR, MATERIALS AND EQUIPMENT

3.4.1 Costs of Work. Contractor shall provide and pay for labor, materials, tools, equipment, machinery, water, heat, utilities, transportation, facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether incorporated or to be incorporated into the Work.

3.4.2 Coordination. Contractor shall provide supervision sufficient to ensure proper coordination for the timely and efficient performance and completion of the Work.

3.4.3 Field Conditions. Before commencing the Work or any activities on the Site, Contractor shall take field measurements and verify field conditions and carefully compare such field measurements and conditions with the information in the Contract Documents and other information obtained by or available to Contractor.

3.4.4 Layout. Contractor is solely responsible for (1) the accurate layout of all portions of the Work, (2) the accuracy of the Project lines and levels, (3) erection of the Work square, plumb, level, true to line and grade, in the exact plane, and to the correct elevation and (4) sloping of surfaces to drain as indicated by the Contract Documents, or, if not indicated, as needed to provide for adequate drainage.

3.4.5 Materials, Equipment

.1 Delivery, Storage, Inventory. Materials and equipment shall be: (1) furnished in ample quantities and at such times as to ensure uninterrupted progress of the Work; and (2) if located on the Site, properly stored and protected as reasonable and necessary, or as directed by County, to prevent Loss from any foreseeable cause, including, without limitation, theft. In the event that County gives direction as to the location for storage or protection of materials or equipment on the Site, Contractor shall nonetheless remain solely responsible for its safe and secure storage and protection. No part of any such stored materials and equipment shall be removed from its place of storage except for immediate installation in the Work. Contractor shall keep an accurate inventory of all such stored materials and/or equipment in a manner satisfactory to County.

.2 Purchases. Contractor shall place orders for materials and/or equipment as specified so that delivery of same may be made without Delay to the Work. Contractor shall, upon request from County, furnish to County documentary evidence showing that orders have been placed. County reserves the right in the event Contractor fails, within three (3) Days after receipt of written notice by County to Contractor to comply with the requirements of this Subparagraph 3.4.5.2, to comply with the requirements of this Subparagraph 3.4.5.2, to deduct the costs paid or payable by County associated with such purchases from payments otherwise owing to Contractor. Contractor shall, if requested by County, accept assignment of any such contracts entered into by County without a Contract Adjustment.

.3 Title. No material, supplies or equipment for the Work shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies and equipment installed or incorporated in the Work and agrees upon Final Completion to deliver the Work, including the premises, land, improvements and appurtenances on or to which the Work is placed, located or affixed, to County free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any of the Work shall have any right of lien upon the Site, or any Existing Improvement or appurtenance thereon, except that (1) nothing stated in this Subparagraph 3.4.5.3 shall be interpreted as a waiver by Contractor or any Subcontractor of its right under Applicable Laws to serve a stop payment notice for Work that is not paid for by County as required under the terms of the Contract Documents; and (2) Contractor may install metering devices or other equipment of utility companies or political subdivisions, title to which may be retained by such utility company or political subdivision, provided that in the event of installation of any such metering device or utility equipment, Contractor shall advise County as to the owner, and the precise location, thereof.

.4 Substitutions. No substitution of materials, equipment, articles, processes or other items of the Work required under the Contract Documents will be made without written approval of County, which approval may be granted or denied in the sole and absolute discretion of County. With respect to any such substitution made or requested by Contractor, neither the occurrence of a substitution made or requested by Contractor nor the approval or disapproval by County of a substitution that is made in accordance with this Subparagraph 3.4.5.4 shall give rise to any right of Contractor to a Contract Adjustment. Contractor shall, notwithstanding County's or Architect's approval, remain solely responsible for the sufficiency and suitability of all substitutions requested by Contractor and approved, or otherwise made, by Contractor.

.5 Parts List. Contractor will provide a printed parts list for all items which might be subject to replacement and for which parts lists are either expressly required by the Contract Documents or customarily provided according to usual commercial practices.

.6 Manuals. As part of its obligation for submission of Record Documents, four (4) hard copies and one (1) electronic version of operations and maintenance manuals shall be prepared and transmitted by Contractor to County prior to and as a condition of Final Completion. Final Payment will not be due until County has received all such manuals and all other manuals covering the Work that are either required to be provided by the terms of the Contract Documents or if not required are customarily provided according to usual commercial practices applicable to the portion of Work involved. Operating instructions will be included within the equipment manuals and will state all information necessary for County to operate, use, maintain and service the equipment fully and efficiently.

.7 Start Up. Contractor will be responsible for start-up of all systems and equipment purchased as part of the Work and has included sufficient amounts in its Bid to cover contingencies arising out of the start-up of such systems and equipment. Contractor will comply fully with each manufacturer's specifications and instructions. Systems and equipment specified to be furnished with manufacturer's supervision of start-up will be placed in operation only under such supervision.

3.5 CONTRACTOR'S WARRANTY

3.5.1 General Warranty. In addition to other warranties and guarantees required by the Contract Documents, Contractor shall, and hereby does, warrant and guarantee that: (1) the Work will conform to the requirements of Contract Documents, including, without limitation, any performance standards that are part thereof; (2) all Work for which there is not a specific requirement, criteria, specification or standard set forth in the Contract Documents will conform to the Standard of Performance; (3) all labor, equipment, materials and other items of Work will be when installed new and free of liens, claims and security interests; (4) without limitation to the other requirements of this warranty, all labor, installation and workmanship will be performed in a good and workmanlike manner; and (5) all labor, materials, equipment, services and work shall be free of defects for a period of one (1) year after Final Completion. If required by County, Contractor shall furnish satisfactory evidence as to the kind and quality of services, labor, installation, materials and equipment used. Manufactured items installed in the Work, unless otherwise specifically stated in the Contract Documents, are to be installed in strict accordance with manufacturer's current printed instructions.

3.5.2 Repair, Replacement. Without limitation upon the County's other rights or remedies under the Contract Documents or Applicable Laws, any and all Work that, for reasons other than (1) ordinary wear and tear or (2) abuse or neglect by persons or entities other than the Contractor or the Subcontractors, is not in conformance with the warranties or guarantees required by the Contract Documents or Applicable Laws shall be repaired or replaced, together with the repair or replacement of any other Work, Existing Improvements or the work of the Separate Contractors, the County's own forces or others, which may be removed, displaced or damaged in so doing. The Contractor shall notify the County in writing upon completion of such repair or replacement. In the event of failure by the Contractor to commence and pursue with diligence said replacement or repair within ten (10) Days after being notified by the County, the County is hereby authorized to proceed with such replacement and repair as the County deems necessary and expedient and to charge such costs to Contractor at Contractor's Own Expense.

3.5.3 Not a Limitation. The warranties stated in this Section 3.5 are in addition to any other warranties or guarantees that are required under any other provision of the Contract Documents or Applicable Laws. Nothing stated in this Section 3.5 shall be interpreted as a limitation upon the County's rights under any warranties or guarantees provided for under any other provision of the Contract Documents or under Applicable Laws that afford the County greater rights than the rights afforded to County under this Section 3.5.

3.5.4 Assignment. Contractor does hereby unconditionally and irrevocably assign to County all warranties and guarantees issued or made by any Subcontractor, of any Tier (including, without limitation, any manufacturer, supplier and distributor) in connection with the Work. Such assignment shall not relieve Contractor of, or otherwise limit, any of its obligations contained in the Contract Documents, including, without limitation, the general responsibility and liability of Contractor for a breach by a Subcontractor (including, without limitation, any manufacturer, supplier and distributor, of any Tier) of a warranty or guarantee given by such Subcontractor in connection with the Work.

3.5.5 Close-Out. Unless sooner requested by County, Contractor shall furnish to County, as part of the Close-Out Documents and as a condition to Final Payment, all written guarantees or warranties that are required by the terms of the Contract Documents. All such guarantees and warranties shall be: (1) in writing; (2) indexed and bound; (3) accompanied by such certifications and instruction materials as may be required by the Contract Documents; and (4) issued to County or assignable by their terms, and in fact assigned, to County.

3.6 TAXES

3.6.1 Payment by Contractor. Contractor shall pay, at Contractor's Own Expense, all local, state and federal taxes, including, without limitation, all sales, consumer, business license, use and similar taxes on materials, labor or other items furnished for the Work or portions thereof provided by Contractor or the Subcontractors, of all Tier, all taxes arising out of its operations under the Contract Documents and all benefits, insurance, taxes and contributions for social security and unemployment insurance which are measured by wages, salaries or other remuneration paid to Contractor's employees. If under federal excise tax law any transaction hereunder constitutes a sale on which a federal excise tax is imposed, and the sale is exempt from such excise tax because it is a sale to a state or local government, then County, upon request, will execute documents necessary to show: (1) that County is a political subdivision of the State for the purposes of such exemption; and (2) that the sale is for the exclusive use of County. No excise tax for

such materials shall be included in any price (including, without limitation, the Bid) submitted by Contractor for the Work or for Changes in the Work.

3.6.2 Tax Exempt Projects. If applicable to the Project, Contractor shall comply with Applicable Laws concerning tax-exempt construction projects.

3.6.3 Records of Taxes. Contractor and the Subcontractors shall keep sufficient records to verify the amount of sales and use taxes paid. Copies shall be submitted with each monthly Application for Payment. Failure to keep or submit such records, resulting in the inability of County to claim a refund for taxes for such materials, shall render Contractor liable to County for the amount of such tax refund.

3.7 PERMITS, FEES AND LEGAL NOTICES

3.7.1 Permits. Contractor shall obtain and pay for all permits and approvals that are not stated in the Contract Documents to be the responsibility of the County. Such permits and approvals that are the responsibility of the Contractor may include local building or land use permits, California Department of Fish and Game Streambed Alteration Agreements (Section 1600 et seq.), California Department of Fish and Game collection permits, U.S. Army Corps of Engineers 404 fill and dredge authorization, Clean Water Act Section 401 authorization (managed by the local California Regional Water Quality Control Boards) land owner agreements, or other regulatory permits or approvals required for the implementation of the Project. All permits, licenses and certificates obtained by Contractor shall be delivered to County prior and as a condition to Final Completion and Contractor's right to Final Payment.

3.7.2 Applicable Laws, Notices. Contractor shall comply with, and give notices required by, Applicable Laws bearing on performance of the Work.

3.7.3 Bonds, Undertakings. Contractor shall, without Contract Adjustment, procure and obtain all bonds required of the County or the Contractor by the municipality in which the Project is located or by any other public or private body with jurisdiction over the Project. In connection with such bonds, the Contractor shall prepare all applications, supply all necessary back-up material and furnish the surety with any required personal undertakings. The Contractor shall also obtain and pay, without Contract Adjustment, all charges for all approvals for street closings, parking meter removal and other similar matters as may be necessary or appropriate from time to time for the performance of the Work.

3.7.4 Notice of Violations. Contractor shall immediately notify County in writing of any instruction received from County, or any other Project Team member that, if implemented, would cause a violation of any Applicable Law.

3.7.5 Governmental Authority Approvals. Where the Contract Documents state, or Applicable Laws require, that materials, processes or procedures must be approved by a Governmental Authority, Contractor shall be responsible for satisfying the requirements and obtaining the approval of such Governmental Authority.

3.8 CONTRACTOR'S PERSONNEL

3.8.1 Key Persons. Contractor's employees acting as project manager, scheduler and superintendent constitute Key Persons. Individuals acting as Key Persons who are not already identified in Contractor's Post-Award Submittals shall be identified in writing to County prior to commencement of the Work.

3.8.2 Background Check. Contractor shall perform, prior to commencing Work on the Site, a thorough background check of each of the Key Persons and shall not, without prior written approval of County, employ any person to act as a Key Person if such background check, or other information known to Contractor, discloses a felony conviction or other matter which casts any reasonable doubt on the competency, reliability or honesty of such person.

3.8.3 Project Manager. The Key Person acting as project manager shall be deemed to have full authority to contractually bind Contractor, including, without limitation, the authority to bind Contractor to the terms of Contract Adjustments.

3.8.4 Transfer. Contractor's Key Personnel are deemed of essence to the Construction Contract. No Key Person shall, for so long as he/she is employed by Contractor, be transferred to any other project nor any of his/her responsibilities reassigned at any time during performance of the Work without the prior written approval of County, which approval may be granted or withheld in County's sole and absolute discretion.

3.8.5 Removal. County shall have the right, at any time, to direct the removal and replacement of any Key Person if his/her performance is determined by County, in its sole and absolute discretion, to be unsatisfactory.

3.8.6 Replacement. Any individual proposed by Contractor as a replacement for a Key Person must be approved in advance by County, such approval not to be unreasonably withheld, after submission by Contractor to County of complete information concerning such individual's experience and qualifications.

3.8.7 Communications. Important communications by Key Persons shall be confirmed in writing by Contractor. Other communications by Key Persons shall be confirmed on written request in each case.

3.8.8 Contact Information. Contractor shall provide to County, prior to the start of the Work, telephone numbers where Key Persons can be reached 24-hours a day, 7 Days a week.

3.8.9 Signatures. Prior to commencing the Work, Contractor shall submit to County a facsimile of the signatures of the Key Person acting as project manager, as well as any other representatives of Contractor with authority to sign on behalf of and contractually bind Contractor.

3.8.10 Exclusion from Site. Contractor shall at all times maintain good discipline and order at the Site among its employees and the employees of the Subcontractors. Any person in the employ of Contractor or any of the Subcontractors, of any Tier, whom County deems, in its sole and absolute discretion, incompetent, unfit, intemperate, troublesome or otherwise undesirable shall be excluded from the Site and shall not again be employed on the Site except with written approval of County.

3.9 CONTRACTOR'S CONSTRUCTION SCHEDULE

3.9.1 Preparation. Within twenty-one (21) Days after issuance by County of the Notice of Intent to Award, the Contractor shall prepare and submit a Construction Schedule for the Work, both in hard copy and electronically, for the County's approval. The Construction Schedule shall in all respects conform to and be consistent with the time requirements for the Project set forth in the Construction Contract.

3.9.2 Format. The Construction Schedule shall be in the form of a critical path progress schedule that shows, in graphic form, a plan for performance of the Work within the Contract Time. It shall be prepared, using Primavera P3, as a time-scaled bar chart showing: (1) continuous flow from left to right and activities and milestones that are critical to Substantial Completion and Final Completion of the Work; (2) identification of "float"; and (3) a clearly highlighted critical path. Durations and specific calendar days shall be clearly and legibly shown for the early and late start and finish of each activity. With the exception of County Review Periods and Governmental Authority Review Periods, any activity with more than fifteen (15) Days in duration will be segmented into fifteen (15) Day increments. No more than ten percent (10%) of the activities shall be shown as critical. Techniques or methods designed to suppress depiction of available float are strictly prohibited.

3.9.3 Detail. Activities shown in the Construction Schedule shall be in sufficient detail to demonstrate a practical plan to complete the design, engineering, fabrication and construction within the Contract Time and shall, at a minimum, include the following:

- .1** the start and finish date of each activity;
- .2** the anticipated percent of completion at the end of each month;
- .3** the weighted labor value expressed as a percentage of the total labor cost of the Work for each activity;

- .4 the final manpower curves by trade;
- .5 the anticipated purchase and delivery of major materials and equipment;
- .6 the County's occupancy requirements;
- .7 receipt and incorporation of materials, products or equipment to be furnished by County (if any);
- .8 County Review Periods and County Review Dates that are acceptable to and approved by County;
- .9 Governmental Authority Review Periods; and
- .10 the activities identified as being on the critical path to Substantial Completion and Final Completion of the Work.

3.9.4 **Updates.** Throughout the performance of the Work, weekly updates shall be delivered, in hard copy and, if required by County, in an electronic form satisfactory to County. In addition, Contractor shall regularly prepare and submit to County short term, three (3) week "look-ahead" schedules generated from the Construction Schedule approved by County. Except to the extent permitted by Contract Adjustment to the Contract Time approved by County in a duly executed Change Order or Unilateral Change Order, in no event shall the Contractor's updates or "look ahead" schedules alter the dates for Substantial Completion or Final Completion set forth in the Construction Schedule approved by County.

3.9.5 **Governing Schedule.** The governing schedule for the Work shall be the updated Construction Schedule approved by the County. Unless otherwise directed in a writing signed by County, no other schedule shall be used or relied upon by the Contractor or its Subcontractors in planning or performing the Work or in connection with any request for a Contract Adjustment to the Contract Time.

3.9.6 **Submittal Schedule.** Within twenty-one (21) Days after the receipt by the Contractor of the Notice of Intent to Award, the Contractor shall prepare and submit, in accordance with the Contract Documents, a Submittal Schedule for the County's approval. The Submittal Schedule shall be coordinated with the Construction Schedule and allow time for review of the Submittals as may be required by the Contract Documents, or if none is required, a reasonable time for such review. Contractor shall keep the Submittal Schedule current and updated in the same manner as required for updating of the Construction Schedule.

3.9.7 **Schedule Responsibility.** Contractor is and shall remain solely responsible, notwithstanding the County's review or approval thereof, for the accuracy, suitability and feasibility of all schedules it prepares for the Project, including, without limitation, the Construction Schedule, Submittal Schedule, "look ahead" schedules, recovery schedules and any updates thereof.

3.9.8 **Condition of Payment.** Compliance by Contractor with the requirements of this Section 3.9 and the other provisions of the Contract Documents pertaining to preparing, submitting, revising and updating the Construction Schedule and Submittal Schedule is a condition to County's obligation to make payment to Contractor. Recognizing that scheduling is a continuing, cumulative and recurring obligation, failure by County or to assert a right to withhold payment under this Paragraph 3.9.8 due to a noncompliance by Contractor with its schedule obligations shall not waive or diminish the County's right to withhold or disapprove of future payments on account of such prior, or any other past or future, noncompliance of the same or similar nature.

3.9.9 **Scheduling by County.** Without limitation to County's other rights under the Contract Documents, if Contractor fails after written notice by County to perform any part of its obligations relating to scheduling, County shall have the right, but not the obligation, to retain one or more schedule consultants to perform, in whole or in part, the Contractor's obligations or supplement the scheduling services provided by Contractor and to reimburse County for the costs of such consultant services by withholding such costs from payments to Contractor.

3.10 DOCUMENTS AT SITE, REPORTING, MEETINGS

3.10.1 Documents at Site

.1 Contract Documents, Submittals. Contractor shall at all times while performing Work at the Site maintain, in good order, at the Site: (1) one legible set of the permitted Contract Documents; (2) one legible copy of the current version of the other Contract Documents; (3) one legible and current version of approved Shop Drawings, Product Data, Samples and other Submittals; (4) one approved Storm Water Pollution Prevention Plan (SWPPP); and (5) one copy of all reports prepared pursuant to the Mitigation, Monitoring, and Reporting Program (MMRP) requirements of the California Environmental Quality Act.

.2 Record Documents. Contractor shall maintain Record Drawings and Specifications in a satisfactory record condition by posting, on a weekly basis (or, in the case of building or site mechanical, electrical, plumbing or fire sprinkler systems, as soon thereafter as is reasonable and practical), thoroughly and neatly, on the Drawings and Specifications all Changes to the Work and the location of the Work, including, without limitation, the location of portions of the Work shown diagrammatically, as occurs in the actual construction of the Work. The Record Drawings and Specifications and other Record Documents shall be prepared or converted, if requested by County, to electronic form (such as, AutoCAD, Adobe Acrobat or other software satisfactory to County). All Record Drawings and Specifications and other Record Documents shall be deemed the sole property of County and, at the earlier of Final Completion or termination of the Construction Contract, shall be turned over to County. At the time they are so turned over to County, they shall be manually signed by Contractor's superintendent certifying that, to the best of his/her knowledge, they are true and accurate and that the indications thereon represent the actual condition of the Work.

.3 Availability for Review. Copies or originals of all documents required to be maintained by Contractor at the Site or required to be submitted to County or the Architect shall be available at all times at the Site while Work is being performed for review by County, Inspector of Record, Architect and Governmental Authorities.

.4 Condition of Payment. Compliance by Contractor with the requirements of this Paragraph 3.10.1 shall be deemed a condition to Contractor's right to payment upon its Applications for Payment.

3.10.2 Daily Reports.

.1 Delivery. At the end of each Day that Contractor performs the Work on the Site, Contractor shall submit a daily report to County (on the form provided or approved by County) together with applicable delivery tickets for all labor, materials and equipment furnished that Day. If requested by County, daily reports shall be delivered electronically.

.2 Content. Daily Reports shall include the following information:

- (1) Labor - The names of the workers, and for each such worker his/her classification and hours worked.
- (2) Material - A list of the different materials used and for each different material the quantity used.
- (3) Equipment - The type of equipment, size, identification number, and hours of operation, including loading and transportation, if applicable.
- (4) Inspection and Testing Activities – A list of inspections performed by name of inspector and testing company and the type of inspection, items of the Work involved and a description of the outcome of such inspection or test.
- (5) Visitors, Guests, Dignitaries – A list of visitors and guests by name, title, company and purpose of visit.

(6) **Areas of the Work** – A statement of the areas of the Site on which the Work was performed and a detailed description of the stage, status and progress of the Work in each such area at the beginning and end of the Day.

(7) **Accidents, Delays, Defective Work** – A description in detail of any injuries to the workers, accidents or delays that occurred or Defective Work that was encountered.

(8) **Other Services and Expenditures** – A description of other services and expenditures in such detail as County may require.

.3 Payment. Timely and complete submission of daily reports by Contractor shall be a condition to Contractor's right to payment under the Construction Contract.

3.10.3 Progress Meetings. Contractor shall attend all progress meetings at the Site, at which meetings progress of the Work shall be reported in detail with reference to the then-current updated Construction Schedule approved by the County. Progress meetings shall be held weekly, or at such other time or frequency as County, in its sole and absolute discretion, deems necessary. A representative of each Subcontractor then actively performing Work, or immediately scheduled to become active, shall have a competent and knowledgeable representative present at such progress meeting to report on the condition of the Work of such Subcontractor and to receive relevant information. Meeting notes shall be taken by the County or Architect and distributed to all meeting attendees and all other affected parties.

3.10.4 Notice Requirements. Under no circumstances shall information contained in Contractor's daily job reports, monthly reports or job meeting minutes relieve Contractor of its obligations to comply with, serve as a substitute for, nor constitute a waiver by County of its right to insist upon, Contractor's compliance with the provisions of the Contract Documents relative to timely and complete notice to County of Changes, Delays, Claims or other matters for which written notice is required by the Contract Documents.

3.10.5 Availability for Review. Copies or originals of all Record Documents, daily reports, job meeting minutes and other documents required to be maintained or actually maintained by Contractor at the Site or required to be submitted to County or Architect shall be available at the Site for review by County, Architect, Inspectors of Record, County Consultants and Governmental Authorities.

3.11 SUBMITTALS

3.11.1 Not Contract Documents. Shop Drawings, Product Data, Samples and other Submittals are not Contract Documents. Their purpose is to demonstrate for those portions of the Work for which Submittals are required the way Contractor proposes to conform the Work to the designs and other information in the Contract Documents.

3.11.2 Coordination with Others. Contractor shall cooperate in the coordination of Contractor's Shop Drawings, Product Data, Samples and other Submittals with related documents submitted by the Separate Contractors.

3.11.3 Submission by Contractor.

.1 Submission. All Shop Drawings, Product Data, Samples and other Submittals required by the Contract Documents shall be submitted to Architect for its review and approval, with a copy to County and to such of County's Consultants or Separate Contractors as County may direct in writing. Informational submittals (i.e., Submittals upon which no responsive action is expected) shall be limited to those Submittals so identified in the Contract Documents. Submittals made by Contractor which are not required by the Contract Documents may be returned without action.

.2 Contractor Approval. The Contractor shall review, stamp "approved" and submit Contractor's Shop Drawings, Product Data, Samples and other Submittals to the Architect, in accordance with the latest Submittal Schedule approved by the County. The Contractor's approval and submission of Submittals constitutes a representation that the Contractor has determined or verified materials and field measurements and conditions related thereto, and that it has checked and coordinated the information contained within such Submittals with the requirements of the Contract Documents and with the Submittals for related Work. Submittals without evidence thereon of the

Contractor's approval shall be returned, without further consideration, for resubmission in accordance with these requirements.

.3 Transmittal. All Submittals shall be accompanied by an accurately completed transmittal in the form required by County. With respect to Submittals of documents, the transmittal shall give a list of the numbers of the sheets submitted. All sheets shall be marked with the name of the Project and the name of Contractor shall be numbered consecutively and referenced to the sheets or paragraphs of the Drawings and Specifications affected. A separate transmittal form shall be used for each specific item or class of material or equipment for which a Submittal is required. Transmission of Submittals of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency dictates review of the group or package as a whole. Any Submittal not accompanied by such transmittal form, or where all applicable items on the form are not completed, may be returned for re-submittal without review.

.4 Timing. Submittals shall be provided within the time frame specified in the Contract Documents, in accordance with the Construction Schedule and Submittal Schedule and at a time sufficiently early to allow review of the same by the Architect without causing Delay to construction progress. Contractor will be responsible to pay, at Contractor's Own Expense, additional services fees and costs incurred by County to the Architect, Inspectors of Record and County Consultants in order to expedite review of Submittals which are not submitted in a timely fashion.

.5 Content. Submittals shall consist of the appropriate combination of catalog sheets, material lists, manufacturer's brochures, technical bulletins, specifications, diagrams and product samples, necessary to describe a system, product or item. Submittals shall show in detail the size, sections and dimensions of all members, the arrangement and construction of all connections, joints and other pertinent details, and all holes, straps and other fittings for attaching the Work. When required by the Architect or the Contract Documents, engineering computations shall be submitted.

.6 Professional Certifications. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

.7 Multiple Submittals. Except where the preparation of a Submittal is dependent upon the approval of a prior Submittal, all Submittals pertaining to the same class or portion of the Work shall be submitted simultaneously.

.8 Notation of Revisions. Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or other Submittals, to revisions other than those requested and approved by Architect on previous Submittals.

.9 Duplicates. Contractor shall be responsible for delivering duplicates of Submittals to all other persons whose work or services are dependent thereon.

3.11.4 Review of Submittals. Review of Submittals by Architect, County or County Consultants is subject to the limitations of Paragraph 4.2.6, below. Contractor shall, notwithstanding any review or approval thereof by County, Architect or a County Consultant, be solely responsible for the content of all Submittals. Without limitation to the foregoing, deviations in Submittals from requirements of the Contract Documents shall remain the sole responsibility of Contractor unless Contractor has specifically informed Architect in writing of such deviation at the time of submission of the Submittal and Architect has given specific written approval thereof.

3.11.5 Contract Adjustments. Subject to Contractor's rights and obligations under Article 7, below, revisions indicated on Shop Drawings, Product Data, Samples or other Submittals shall not be considered as a basis for Contract Adjustments.

3.11.6 Compliance with Contract. Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or other Submittals until the respective Submittal has been returned by the Architect with an indication that it has been reviewed and that the Work addressed by the Submittal may proceed. Such Work shall be in accordance with such Submittals, unless such Submittal indicates that there are corrections to

be made. If corrections are indicated to be made then the Work shall be in accordance with the re-submitted and corrected Submittal that is reviewed and returned to the Contractor by the Architect.

3.12 USE OF SITE

3.12.1 Staging Area. Contractor will be assigned staging space on or adjacent to the Site, and all field offices, materials and equipment shall be kept within this area. Unless otherwise required by the Contract Documents, Contractor shall be responsible for restoring such areas and surrounding areas to the condition they were in prior to Contractor's commencement of the Work.

3.12.2 Existing Improvements. During the installation of the Work, Contractor shall ensure that Existing Improvements are adequately protected. Upon Final Completion of the Work, all Existing Improvements not required by the Contract Documents to be demolished as part of the Work that have been damaged by the actions or inactions of Contractor or its Subcontractors shall be restored to the condition they were in prior to Contractor's commencement of the Work.

3.12.3 Operations at Site. Contractor shall confine its activity, access and parking at the Site to areas permitted by Applicable Laws and County and shall not unreasonably encumber the Site with materials or equipment. Contractor acknowledges that it is experienced in performing construction within limited and confined areas and spaces such as those that are anticipated to exist on this Project and agrees to assume responsibility, without a Contract Adjustment, to take all special measures (including, without limitation, those related to protection, storage, staging and deliveries) as may be necessary to adapt its performance to the constraints of the Site.

3.12.4 Coordination. Contractor shall coordinate Contractor's operations with, and secure the approval of, County before using any portion of the Site.

3.12.5 Unauthorized Use. Personnel of Contractor and the Subcontractors shall not occupy, live upon or otherwise make use of the Site during any time that the Work is not being performed at the Site, except as otherwise approved by County.

3.12.6 Site Security. Contractor is responsible for the security of the Site and all of the Work, as well as the work of the Separate Contractors or County's own forces that occurs on the Site. Fences, barricades and other perimeter security shall be maintained in good condition and secured with locking devices. Damage to fences, barricades or other perimeter security, regardless of the cause, shall be repaired immediately at Contractor's Own Expense. Graffiti and unauthorized postings shall be removed or painted over so as to maintain a clean and neat appearance. Mobile equipment and operable machinery shall be kept locked or otherwise made inoperable whenever left unattended.

3.12.7 Persons on Site. Contractor shall not allow any person, other than the workers on the Project, authorized representatives of a union, or other individuals authorized by County, to come upon any portion of the Site where the Work is being performed. Only authorized personnel will be permitted on the Site. Contractor shall at all times maintain good discipline and order among its employees and the employees of the Subcontractors. Any person in the employ of Contractor or of any Subcontractors whom County may deem, in its sole and absolute discretion, incompetent, unfit, intemperate, troublesome or otherwise undesirable shall be excluded from the Site and shall not again be employed on the Site except with written approval of County and all Losses to Contractor or County associated therewith shall be borne by Contractor at Contractor's Own Expense.

3.12.8 County Uses and Activities. Contractor shall, prior to performing the Work at an operating or occupied County facility, become informed and take into specific account the uses by County and others of the Site and Existing Improvements, including, without limitation, business operations, public uses, employee uses, visitor uses, planned functions and ceremonies, and coordinate its planning, staging, scheduling, barricading and other performance of the Work so as to cause the minimum amount of interference or disturbance, whether before or after operating hours.

3.12.9 Dust, Fumes, Noise. Contractor shall take preventive measures to minimize, and eliminate wherever reasonably possible, generation of dust, fumes and noise.

3.12.10 Confinement of Operations. Contractor shall confine apparatus, the storage of materials and the operations of the workers to limits indicated by Contract Documents or as otherwise directed by County in writing.

3.12.11 Prohibited Substances. Contractor shall not permit (1) the possession or use of alcohol or controlled substances on the Site or (2) smoking in other than designated smoking areas approved by County.

3.12.12 Survey Markers. Contractor shall not disturb or cover any survey markers, monuments or other devices marking property boundaries or corners. If such markers are covered they shall be uncovered and if disturbed they shall be replaced by Contractor by means of the services of a licensed land surveyor. The costs of such uncovering and replacement shall be at Contractor's Own Expense.

3.12.13 Drainage, Erosion. Contractor is responsible for and shall make corrections to changes in patterns of surface water drainage resulting from, and related erosion control made necessary by, the performance of the Work.

3.12.14 Trenches. As required by California Labor Code §6705, if the Contract Price exceeds Twenty-Five Thousand Dollars (\$25,000) and involves the excavation of any trench or trenches five (5) feet or more in depth, Contractor shall, in advance of commencing excavation, submit to County a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the Shoring Systems Standards established by the Construction Safety Orders of the California Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer, employed by Contractor at Contractor's Own Expense. Nothing in this Paragraph 3.12.14 shall be deemed to allow the use of a system less effective than that required by such Construction Safety Orders. No excavation of such trench or trenches shall be commenced until such plan has been approved by County and Architect. Nothing in this Paragraph 3.12.14 shall be construed to impose any liability, including, without limitation, any tort liability, upon the County or upon any of its officers, agents, representatives or employees.

3.13 CUTTING AND PATCHING

Contractor shall be responsible for all cutting, fitting or patching required to complete the Work and to make its parts fit together properly both among themselves and with any Existing Improvements and the work of the Separate Contractors and of County's own forces. In all cases, cutting shall be performed under the supervision of competent mechanics skilled in the applicable trade and openings shall be cut as small as possible to prevent unnecessary damage. Contractor shall not damage or endanger a portion of the Work, Existing Improvements or fully or partially completed construction of County's own forces or of the Separate Contractors by cutting, patching, excavating or otherwise altering such construction. Contractor shall not cut or otherwise alter such Existing Improvements or construction by Separate Contractors or by County's own forces except with the written consent of such Separate Contractors or County, which consent shall not be unreasonably withheld, delayed or conditioned. When asked, Contractor shall not unreasonably withhold from the Separate Contractors or County the Contractor's consent to Separate Contractors' or County's own forces' cutting or other alteration of the Work as required to complete the work of the Separate Contractors or County's own forces.

3.14 UTILITIES AND SANITARY FACILITIES

3.14.1 Contractor Responsibility. Except as otherwise required by California Government Code §4215, Contractor shall contact all relevant utility providers and arrange for obtaining all available information, concerning location of subsurface utility lines. Prior to commencement of any digging, Contractor shall make its own investigation, including exploratory excavations, to determine the locations and type of Work which could result in damage to such utilities. In accordance with California Government Code §§4216 et seq., except in an emergency, Contractor shall contact the appropriate regional notification center at least two (2) the working days, but not more than fourteen (14) Days, prior to commencing any excavation, if the excavation will be conducted in an area which is known, or reasonably should be known, to contain sub-service installations, and shall obtain an inquiry identification number from the regional notification center. Contractor shall not assume, unless actual observed surface conditions at the Site indicate otherwise, that utilities are located in the same location as indicated on the as-built records or other information obtained by Contractor. Contractor shall conduct potholing in advance of digging in any areas where there are not apparent surface conditions at the Site indicating the actual location of underground utilities and be at all times vigilant in watching for any conditions encountered, above or below the surface of the ground, that might indicate that underground utilities are at locations other than those indicated by the as-built records or other information obtained by Contractor.

Contractor shall perform its digging operations in a slow and meticulous manner so as to avoid wherever reasonably possible damaging existing underground utilities. Contractor shall, at Contractor's Own Expense, make good any Loss to County or others as a result of Contractor's failure to perform any of its obligations under this Paragraph 3.14.1. Nothing stated in this Paragraph 3.14.1 shall be interpreted as requiring Contractor to do subsurface exploration or potholing for the purpose of locating subsurface utilities at the Site prior to the Bid Closing Deadline or as precluding the Contractor from receiving a Contract Adjustment for unknown subsurface utilities constituting Differing Site Conditions that are encountered in the course of performing the Site investigation or potholing required by this Paragraph 3.14.1.

3.14.2 County Responsibility. If and to the extent required by California Government Code §4215, County assumes the responsibility for removal, relocation, and protection of those existing main or trunkline utility facilities located at the Site at the time of commencement of the Work that are not identified in the Contract Documents. Provided that Contractor has exercised the Standard of Care in performing the Work in accordance with the Contract Documents, Contractor shall be entitled to a Contract Adjustment for, relocating, repairing or removing any utility facilities not indicated in the Contract Documents with reasonable accuracy, including, without limitation, equipment on the Site necessarily idled thereby. Delays caused by County's or a utility owner's failure to provide for the removal or relocation of such utility facilities shall constitute a Compensable Delay. Nothing herein shall be deemed to require County to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Site can be inferred from the presence of other visible facilities, such as buildings or meter junction boxes located on or adjacent to the Site.

3.14.3 Temporary Utilities. All utilities, including but not limited to electricity, water, gas and telephone, used in performance of the Work (including, without limitation, meters and temporary distribution systems from distribution points to points on Site where a utility is needed and "tap fees") shall be furnished and paid for by Contractor or, if furnished by County, shall be paid for by Contractor at Contractor's Own Expense. Upon Final Completion of the Work, Contractor shall remove all temporary distribution systems. If the Work involves an addition to an existing facility, Contractor may, with written permission of County, granted or withheld in County's sole and absolute discretion, use County's existing utilities by making prearranged payments to County for utilities used by Contractor. When it is necessary to interrupt any existing utility service to make connections, a minimum of two (2) working days' advance notice shall be given to County. Interruptions shall be of the shortest possible duration and shall be scheduled during a time of Day that minimizes its impact on the operations of the existing facility. Any Loss to County or Contractor associated with interruption of a utility service as a result of Contractor's breach of, or failure to fully comply with, its obligations under this Paragraph shall be paid for by Contractor at Contractor's Own Expense.

3.14.4 Sanitary Facilities. Contractor shall provide sanitary temporary toilet facilities, for the use of all the workers, in no fewer numbers than required by Applicable Laws, plus such additional facilities as may be directed by County. Such facilities shall be maintained in a sanitary condition at all times. Use of existing or permanent toilet facilities shall not be permitted except by written consent of County.

3.15 CLEANING UP

3.15.1 Contractor Responsibility. Contractor at all times shall keep the Site free from debris such as waste, rubbish and excess materials and equipment caused by the performance of the Work. At the end of each Day that Work is performed, Contractor shall not leave debris under, in or about the Site but shall promptly dispose of or remove same from the Site. Without limitation to the other clean up requirements of the Contract Documents, upon Final Completion, Contractor shall: (1) clean the interior and exterior of the buildings, including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections and any areas where debris has collected so surfaces are free from foreign material or discoloration; (2) clean and polish all glass, plumbing fixtures, finish hardware and similar finish surfaces and equipment; and (3) remove temporary fencing, barricades, planking, sanitary facilities and similar temporary facilities from the Site.

3.15.2 Cleanup by County. If Contractor fails upon 24 hours' notice by County to perform its obligation to clean up, County may arrange to do so, and the cost thereof shall be borne by Contractor at Contractor's Own Expense.

3.16 ACCESS TO THE WORK

3.16.1 **County.** County, Inspectors of Record, Architect and County Consultants, and their representatives, and such other persons as authorized by County, shall at all times have access to the Work, either in preparation or in progress. Contractor shall provide safe and proper facilities for such access so that they and their representatives may perform their functions safely.

3.16.2 **Separate Contractors.** County, using its own forces or those of Separate Contractors, may, at any time during the performance of the Work, enter the Site for the purpose of performing construction or for any other purpose. Contractor shall cooperate with County, County's own forces and Separate Contractors and not interfere with other work being done by them or on their behalf.

3.16.3 **Delivery Routes.** Contractor shall arrange for delivery of material over routes designated by County.

3.17 INTELLECTUAL PROPERTY RIGHTS

Contractor shall pay all royalties and license fees relating to use of Intellectual Property Rights pertaining to Work performed. Contractor shall defend suits or claims for infringement of Intellectual Property Rights and shall defend, indemnify and hold harmless the Indemnitees from Loss on account thereof in accordance with the terms of Section 3.18, below, unless the infringement is due to a particular design, process, product or product of a particular manufacturer that is required by the Contract Documents; provided, however, that if Contractor has information leading it to believe that the use of a particular design, process or product required by the Contract Documents would constitute an infringement of an Intellectual Property Right, then Contractor shall nonetheless be responsible to provide such defense, indemnification and hold harmless if such information is not promptly furnished in writing to County.

3.18 INDEMNIFICATION

3.18.1 **Contractor's Indemnity Obligation.** To the fullest extent permitted by Applicable Laws, Contractor agrees to indemnify, immediately defend at its own expense and hold harmless, County, Board of Supervisors, and each of their respective members, officers, employees, agents, insurers and volunteers ("Indemnitee(s)"), through legal counsel reasonably acceptable to County, from any and all Losses, whether real or alleged, regardless of whether caused in part by such Indemnitee or its agents, servants or independent contractors who are directly responsible to such Indemnitee, arising out of or relating to any of the following:

- .1 any act or omission of Contractor or a Subcontractor, of any Tier;
- .2 the activities of Contractor or a Subcontractor, of any Tier, on the Site or on other properties related to performance of the Work or the preparation for performance of the Work;
- .3 the payment or nonpayment of any Subcontractor, of any Tier, for the Work performed, except where such nonpayment is the result of a breach by County of its payment obligations under the Contract Documents;
- .4 the existence or dispersal of any Hazardous Substances or Mold on the Site as a result of the failure of Contractor or a Subcontractor, of any Tier, to comply with its obligations under the Contract Documents;
- .5 the violation by Contractor or a Subcontractor, of any Tier, of an obligation under Section 3.17, above, involving infringement of an Intellectual Property Right; or
- .6 the violation by Contractor or a Subcontractor, of any Tier, of any Applicable Law, including, without limitation, the violation of any requirement of the State of California General Permit for Storm Water Discharges Associated with Construction Activity and subsequent amendments or orders for construction activities as applicable thereto (including, without limitation, the requirements of a Storm Water Pollution Prevention Plan) or the violation of any applicable requirement of any local or regional Air Quality Management District (AQMD) (including, without limitation, a violation of any of the requirements set forth in the County MOU with AQMD dated January 6, 2004 Agenda Item 3.1 (for projects in the Coachella Valley) or AQMD Rule 403 (for projects west of the Coachella Valley));

PROVIDED, HOWEVER, that nothing contained herein shall be construed as obligating Contractor to indemnify an Indemnitee for Losses resulting from the sole negligence, active negligence or willful misconduct of such Indemnitee or its agents, servants or independent contractors who are directly responsible to such Indemnitee or from a defect in design furnished by such Indemnitee, where such sole negligence, active negligence, willful misconduct or design defect has been determined by agreement of Contractor and that Indemnitee or has been adjudged by the final and binding findings of a court or arbitrator of competent jurisdiction. In instances where the active negligence or willful misconduct of an Indemnitee or its agents, servants or independent contractors who are directly responsible to such Indemnitee or a defect in a design furnished by such an Indemnitee accounts for only a portion or percentage of the Loss involved, the obligation of Contractor will be for that portion or percentage of the Loss not due to such active negligence, willful misconduct or design defect.

3.18.2 Indemnification of Adjacent Property Owners. In the event Contractor enters into an agreement with the owners of any adjacent property to enter upon such property for the purpose of performing the Work or other activities incidental to the Work, Contractor shall fully indemnify, defend and hold harmless any person or entity which owns or has any interest in such adjacent property against any Loss resulting from the acts or omissions of the Contractor or its Subcontractors. The form and content of such indemnification agreement shall be approved by County prior to commencement of any Work on or around such property.

3.18.3 Insurance and Employment Benefits. The indemnification, defense and hold harmless obligations of Contractor under this Section 3.18, as well as any such obligations stated elsewhere in the Contract Documents: (1) shall not be limited by the amounts or types of insurance (or the deductibles or self-insured retention amounts of such insurance) which any Indemnitee, Contractor or any Subcontractor carries or is required to carry under the terms of the Contract Documents; (2) is independent of and in addition to the Indemnitees' rights under the insurance to be provided by an Indemnitee, Contractor or any Subcontractor; and (3) shall not be limited, in the event of a claim against an Indemnitee by an employee of Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, by a limitation on amount or type of damages, compensation or benefits payable by or for Contractor or Subcontractor under any worker's compensation act, disability benefit act or other employee benefit program.

3.18.4 Subcontractor Indemnity Agreements. Contractor agrees to obtain or cause to be obtained executed defense and indemnity agreements with provisions identical to those set forth in this Section 3.18 from each and every Subcontractor, of every Tier.

3.18.5 Implied Indemnity Rights. Notwithstanding anything stated in this Section 3.18 or elsewhere in the Contract Documents to the contrary, an Indemnitee's right to seek equitable indemnity and contribution from Contractor is in no way diminished, limited or precluded by any agreement by Contractor to provide express contractual indemnity to such Indemnitee. Contractor's obligations under this Section 3.18 shall be deemed to completely eliminate and preclude any right by Contractor to seek contractual or equitable indemnity or contribution from any Indemnitee for any Loss covered by the Contractor's express indemnification obligations under this Section 3.18.

3.18.6 Obligation to Defend. The Contractor's obligation to defend under this Section 3.18 includes, without limitation, the obligation to immediately reimburse an Indemnitee for any attorney's fees, court costs (statutory and non-statutory), arbitration and mediation expenses, professional, expert and consultant fees, investigative costs, postage costs, document copying costs, telecopy costs and any and all other costs and expenses associated with defense of such Indemnitee as and when incurred by any Indemnitee in defense of a claim by any third person or entity as a result of Contractor's failure or refusal to comply with its immediate defense obligation to such Indemnitee. Nothing stated in this Section 3.18 or elsewhere in the Contract Documents shall be interpreted as providing or implying that the obligation of Contractor to defend an Indemnitee against an alleged Loss that is within the scope of the Contractor's indemnification obligation under this Section 3.18 or under any other provision of the Contract Documents is to any extent released, excused, limited or relieved by a finding, determination, award or judgment by a court or arbitrator that the alleged Loss was due to circumstances not within the scope of such indemnification obligation.

3.19 LABOR, WAGES, PAYROLL RECORDS

3.19.1 Public Work. This Work is a "public work" as defined in Labor Code §1720 and must be performed in accordance with the requirements of Labor Code §§1720 to 1850 and Title 8 California Code of Regulations §§16000 to 17270, which govern the payment of prevailing wage rates on public works projects.

3.19.2 Prevailing Wage Rates. Pursuant to the provisions of Article 2 (commencing at §1770), Chapter 1, Part 7, Division 2 of the Labor Code of California, the Board of Supervisors has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime Work in the locality in which the Work is to be performed for each craft, classification or type of worker needed to execute the Work from the Director of the Department of Industrial Relations. These rates are on file with County and copies will be made available to any interested party on request. Contractor shall post a copy of such wage rates at the Site. The adoption of such wage rates is not a representation that labor can be obtained at these rates. It is the responsibility of Contractor to inform itself as to the local labor conditions. Holiday and overtime Work, when permitted by Applicable Laws, shall be paid for at a rate of at least one and one-half times the adopted rate of per diem wages, unless otherwise specified. Holidays shall be defined in the collective bargaining agreement applicable to each particular craft, classification or type of worker employed.

3.19.3 Unclassified Workers. Any worker employed to perform the Work not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director of the Department of Industrial Relations shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to the Work to be performed by him/her, and such minimum wage rate shall be retroactive to time of initial employment of such person on the Project in such classification.

3.19.4 Per Diem Wages. Contractor shall pay or shall cause to be paid each worker engaged in the Work not less than the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any of the Subcontractors and such workers. Pursuant to California Labor Code §1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time and subsistence pay.

3.19.5 Applicable Laws. Contractor represents and warrants that the Contractor's Bid and the Contract Price includes funds sufficient to allow Contractor to comply with all Applicable Laws governing the labor or services to be provided. Contractor shall defend and indemnify the Indemnitees in accordance with Section 3.18, above, for any violation of any Applicable Law, including but not limited to California Labor Code §2810, and agrees to pay all assessments, including wages and penalties, made against County in relation to such violations.

3.19.6 Posting at Site. Contractor shall post at appropriate conspicuous points on the Site the prevailing wage rates of the Department of Industrial Relations in accordance with 8 California Code of Regulations 16100(b).

3.19.7 Worker Hours. As provided in Article 3 (commencing at §1810), Chapter 1, Part 7, Division 2 of the California Labor Code, eight (8) hours of labor shall constitute a legal day's work. The standard work day of any worker employed at any time by Contractor or any of the Subcontractors performing the Work, or any part of the Work, shall, except as hereinafter provided, be limited and restricted by Contractor to eight (8) hours per day, between the hours of 6:00 A.M. and 6:00 P.M. (unless otherwise required by Applicable Laws), plus one-half hour unpaid lunch approximately midway through the shift, provided that Contractor or any of the Subcontractors may establish a four day/ten-hour schedule consistent with Applicable Laws pertaining to payment of prevailing wages and the provisions any applicable collective bargaining agreement. A regular-work week shall constitute forty (40) hours during any one week. Notwithstanding the provisions hereinabove set forth, the parties hereto may agree to changes in the work day or the work week as permitted by Applicable Laws, and Contractor and all Subcontractors must pay the appropriate prevailing wage rate for those hours and days worked.

3.19.8 Overtime. Overtime work performed by employees of Contractor or any of the Subcontractors shall be compensated according to the applicable general prevailing rate established by the Department of Industrial Relations for holiday and overtime work for each craft, classification or type of worker in the locality in which the Work is to be performed.

3.19.9 Payroll Records. It shall be the sole responsibility of Contractor to ensure compliance with the provisions of Applicable Laws and the Contract Documents relating to maintenance and submission of payroll records. Pursuant to the provisions of California Labor Code §1776, Contractor shall keep, and shall cause each Subcontractor performing any portion of the Work to keep, accurate certified payroll records, showing the name, address, social security number, worker classification and straight-time and overtime hours worked each Day and week, and the actual per diem wages paid to each journeyman, apprentice, worker or other employee employed by Contractor in connection with the Work. Certified payroll records must be in the payroll reporting format prescribed by the Division of Labor Standards Enforcement. If there is no work by Contractor or a Subcontractor in a given week, Contractor must keep

and submit a certified "Nonperformance" payroll record, indicating "no work" for that week. Contractor shall submit all certified payroll records to County in complete, unredacted form with an original signature on the Statement of Compliance, along with, and as a condition to, its Applications for Payment. Additionally, payroll records shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

.1 a certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative on request;

.2 a certified copy of all such payroll records shall be made available for inspection or furnished upon request to County, the Division of Labor Standards Enforcement and/or the Division of Apprenticeship Standards of the Department of Industrial Relations or such other person or entity as designated by County;

.3 a certified copy of all such payroll records shall be made available upon request by the public for inspection or the copying thereof, provided that (1) such request is made by the public through either County, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement of the Department of Industrial Relations, (2) such requested payroll records have not previously been provided pursuant to Subparagraph 3.19.9.2, above, then the requesting individual or entity shall, prior to being provided the records, reimburse the costs of preparation by Contractor, the Subcontractors and the entity through which the request was made, and (3) the public shall not be given access to records at the principal office of Contractor;

.4 Contractor and each Subcontractor shall within ten (10) Days after receipt of a written request file a certified copy of such payroll records with the person or entity that requested the records;

.5 Contractor shall provide, and shall cause each Subcontractor to provide, payroll records as defined in Title 8 California Code of Regulations §16000 to County within ten (10) Days after receipt of written request, at no cost to County;

.6 any copy of such payroll records made available for inspection by, and copies furnished to, the public shall be redacted in a manner so as to prevent disclosure of an individual's name, address, and social security number, except that any copy made available for inspection by, and copies furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (29 U.S.C. Section 175a) shall be marked or redacted only to prevent disclosure of an individual's name and social security number, and in either event, the name and address of Contractor or the Subcontractor performing the Work shall not be so obliterated; and

.7 any copy made available to an agency included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided nonr copies of certified payroll records;

.8 Contractor shall inform County concurrently with the submission of its initial Application for Payment, of the location of such payroll records, including the street address, city and county, and thereafter shall, within five (5) working days, provide a notice of any change of location and address of such payroll records.

3.19.10 Apprentices. Contractor acknowledges that, even if performance of the Work involves a dollar amount greater than or a number of working days greater than that specified in California Labor Code §1777.5, it shall be the sole responsibility of Contractor, for all apprentice occupations, to ensure compliance with California Labor Code §1777.5, including, without limitation, the following provisions:

.1 Apprentices of any crafts or trades may be employed and, when required by California Labor Code §1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the California Labor Code.

.2 Every such apprentice shall be paid the prevailing rate of per diem wages for apprentices in the trade to which he or she is registered and shall be employed only at the work of the craft or trade to which he or she is registered.

.3 Only apprentices, as defined in California Labor Code §3077, who are in training under apprenticeship standards and written apprentice agreements under Chapter 4 (commencing at §3070), Division 3 of the California Labor Code, are eligible to be employed at the apprentice wage rate on Public Works. The employment and training of each apprentice shall be in accordance with either: (1) the apprenticeship standards and apprentice agreements under which he or she is training, or (2) the rules and regulations of the California Apprenticeship Council.

.4 Contractor and any of the Subcontractors employing workers in any apprenticeable craft or trade in performing any of the Work shall apply to the applicable joint apprenticeship committee for a certificate approving Contractor or the Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

.5 Prior to commencing the Work, Contractor shall submit contract award information to an applicable apprenticeship program that can supply apprentices to the Site of the Work. The information submitted shall include an estimate of journeyman hours to be performed under the Construction Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to County if requested by County.

.6 The ratio of the Work performed by apprentices to journeymen employed in a particular craft or trade on the Work may be no higher than the ratio stipulated in the apprenticeship standards under which the apprenticeship program operates, where Contractor or the Subcontractor agrees to be bound by those standards, but, except as otherwise provided in this Paragraph, in no case shall the ratio be less than one (1) hour of apprentice work for every five (5) hours of journeyman work. Apprentices may comprise up to thirty percent (30%) of the work force of each particular craft, classification or type of worker employed, unless the applicable joint apprenticeship committee establishes a lower percentage. To the extent possible, fifty percent (50%) of the apprentice work force shall consist of first-year apprentices.

.7 The interpretation and enforcement of California Labor Code §1777.5 shall be in accordance with the rules and procedures of the California Apprenticeship Council.

.8 Contractor and all the Subcontractors shall comply with California Labor Code §1777.6, which forbids certain discriminatory practices in the employment of apprentices.

.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work, paying special attention to California Labor Code §§1777.5, 1777.6, and 1777.7 and Title 8, California Code of Regulations, §§200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California.

3.19.11 Pre-Construction Meetings, Interviews. Contractor shall attend any pre-construction meetings held by County to discuss labor requirements. Contractor and the Subcontractors shall allow County, County Consultants and the Department of Industrial Relations, and designated representatives of each, to conduct, at their discretion, interviews of workers at the Site during working hours.

3.19.12 Penalties for Violations.

.1 **Prevailing Wage Violations.** Pursuant to California Labor Code §1775, Contractor and any of the Subcontractors shall, as a penalty, pay an amount not to exceed Two Hundred Dollars (\$200) for each Day, or portion thereof, for each worker paid less than the prevailing rates, determined by the Director of the Department of Industrial Relations, for the trade or craft in which such worker is employed by Contractor or, except as provided by said §1775, by any of the Subcontractors, of any Tier, for performance of the Work. The amount of this penalty shall be determined by the Labor Commissioner and shall be based on consideration of both: (1) whether the failure of Contractor or the Subcontractor to pay the correct rate of per diem wages was a good faith mistake and, if so, whether the error was promptly and voluntarily corrected upon being brought to the attention of Contractor or the Subcontractor; and (2) whether Contractor or the Subcontractor has a prior record of failing to meet its prevailing wage obligations. The difference between the amount owed to each worker pursuant to such prevailing wage rates, and the amount paid to each worker for each Day or portion thereof for which each worker was paid less than the prevailing wage rate, shall be paid to each worker by Contractor.

.2 Working Hour Violations. Pursuant to Labor Code §1813, Contractor shall pay a penalty of Twenty-Five Dollars (\$25) per worker employed in the performance of the Work by Contractor or by any of the Subcontractors for each Day during which such worker is required or permitted to work more than eight (8) hours in any Day and forty (40) hours in any one calendar week in violation of the provisions of Article 3 (commencing at §1810), Chapter 1, Part 7, Division 2 of the California Labor Code.

.3 Payroll Record Violations. Pursuant to California Labor Code §1776, Contractor shall in the event of a failure to comply within ten (10) Days with any written notice requesting the records enumerated in subdivision (a) of said §1776, pay a penalty of One Hundred Dollars (\$100) for each Day, or portion thereof, for each worker, until Contractor has strictly complied with such request. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

.4 Apprenticeship Violations. Pursuant to California Labor Code §1777.7, if Contractor or the Subcontractor is determined by the Chief of the Division of Apprenticeship Standards (the "Chief") to have knowingly committed a first-time violation of California Labor Code §1777.5, Contractor or the Subcontractor shall pay, as a civil penalty, an amount not exceeding One Hundred Dollars (\$100) for each full Day of noncompliance, provided that the amount of this penalty may be reduced by the Chief if the penalty would be disproportionate to the severity of the violation. In lieu of this penalty, the Chief may, for a first-time violation and with the concurrence of the joint apprenticeship committee, order Contractor or the Subcontractor to provide apprentice employment equivalent to the work hours that would have been provided for apprentices during the period of noncompliance. If such violation by Contractor or the Subcontractor is a second or subsequent violation committed within a three (3) year period from a previous violation of §1777.5, Contractor or the Subcontractor shall pay, as a civil penalty, to County the sum of not more than Three Hundred Dollars (\$300) for each full Day of noncompliance. County shall withhold the amount of the civil penalty from contract progress payments then due or to become due. In addition, if Contractor or the Subcontractor is determined to have knowingly committed a serious violation of any provision of §1777.5, the Chief may deny to Contractor or the Subcontractor, and to its responsible officers, the right to bid on or be awarded a contract to perform work as a subcontractor on any subsequent project for County for a period of up to one (1) year for the first violation and for a period of up to three (3) years for a second or subsequent violation.

3.19.13 Subcontractor Provisions. Contractor shall include, and shall require the Subcontractors to include, contractual provisions in all contracts they enter into for the performance of the Work requiring compliance with the provisions of this Section 3.19 at no additional cost.

3.19.14 Condition of Payment. Compliance by Contractor with the requirements of this Section 3.19 and each of its Paragraphs shall be a condition to Contractor's right to payment under its Applications for Payment. Without limitation to the foregoing, payments to Contractor shall not be made when payroll records are delinquent or inadequate.

3.20 LABOR CODE §2810

3.20.1 Application. The provisions of this Section 3.20 apply only if the Contractor has not executed a collective bargaining agreement covering the workers who will be employed to perform the Work.

3.20.2 Declaration by Contractor. If a Declaration of Sufficiency of Funds has not been submitted by Contractor as a Post-Award Submittal, then it must be submitted prior to Award. In executing the Construction Contract, Contractor warrants and represents that all of the statements contained in its Declaration of Sufficiency of Funds remain true and correct as of the date of execution of the Construction Contract and may be relied upon by County in determining whether there appears to be sufficient funds in the Contractor's Bid to allow the Contractor to comply with all Applicable Laws governing the labor or services to be provided for the performance of the Work. The truth and accuracy of the statements contained in said Declaration and in this Paragraph 3.20.2 constitute a material part of the Contractor's consideration for, and a material inducement to the County's entering into, the Construction Contract.

3.20.3 Continuing Duty. To the extent that any of the information provided in the Declaration of Sufficiency of Funds submitted by Contractor relating to numbers of workers or independent contractors that will be employed or utilized for performance of the Work was or is based upon a best estimate, rather than actual figures or information, then the Contractor assumes the continuing duty to the County to ascertain the actual figures and information requested in the Declaration of Sufficiency of Funds and to provide such actual figures and information to the County in the form

of a revised and updated Declaration of Sufficiency of Funds once the actual figures and information become known.

3.21 URBAN RUNOFF AND STORM WATER COMPLIANCE

3.21.1 Contractor's Responsibility. If and to the extent storm water permitting, control, mitigation or discharge control is required by Applicable Laws, the Contractor shall: (1) prior to starting any Work at the Site, sign and implement the Storm Water Management Plans or Storm Water Pollution Prevention Plans as previously prepared by the County's Consultant for civil engineering or by others; (2) take all necessary steps to monitor, report, enforce and otherwise implement and comply with the requirements of the Storm Water Permit, Storm Water Management Plans and Storm Water Pollution Prevention Plans and all Applicable Laws pertaining to the elimination or mitigation of storm water pollutant discharge to separate storm sewer systems or other watercourses, including without limitation, applicable requirements of the State Water Resources Control Board, Santa Ana, San Diego, and/or Colorado Region Water Quality Control Boards and municipal storm water management programs; (3) adhere to and implement the Special Provisions for Urban Runoff and Water Pollution Control set forth in the Specifications; and (4) ensure that the Work is constructed in conformance with those post-construction best management practices (BMPs) identified within the project-specific Water Quality Management Plan (WQMP).

3.21.2 Inspections, Reports. Contractor shall immediately notify the person identified to Contractor as the County's "project manager" for the Project of all inspections by Government Authorities (including, but not limited to, any regional board staff) and, if practicable, arrange for participation by such Governmental Authorities in any other pertinent inspections conducted at the Site. Contractor shall provide to County copies of all reports and monitoring information related to the matters covered by this Section 3.21.

3.21.3 Violations. The Contractor recognizes and understands that failure to comply with the requirements of any applicable storm water-related permit issued by the State of California of the United States pursuant to the Clean Water Act (Title 33 U.S.C. §§ 1251 et seq) and/or the Porter Cologne Water Quality Control Act (California Water Code §§13000 et seq.) is a violation of Applicable Laws. Contractor shall be responsible for all Losses and for any liability (including, without limitation, fines, penalties and other administrative liabilities and costs) imposed by Applicable Laws as a result of the Contractor's failure to comply with Applicable Laws, including, without limitation, the requirements of this Section 3.21.

3.21.4 Condition of Payment. Compliance by the Contractor with the requirements of this Section 3.21 shall be a condition to the Contractor's right to payment under its Applications for Payment.

3.21.5 Costs of Compliance. The Contractor represents and warrants that it has included in its Bid all costs of compliance with the requirements of this Section 3.21.

3.22 SOLID WASTE MANAGEMENT

Contractor shall comply with all provisions of Applicable Laws (including, without limitation, the requirements of the California Public Resources Code, rules and regulations of the California Integrated Waste Management Board and provisions of any Site-specific plans adopted by County) that are applicable to the activities of contractors performing construction or related activities on the Site. Compliance by Contractor with the requirements of this Section 3.22 shall be a condition to Contractor's right to payment under its Applications for Payment.

3.23 CEQA COMPLIANCE

No Work that is subject to California Environmental Quality Act (CEQA) shall proceed by Contractor until Contract Documents satisfying the CEQA process are reviewed and approved by the County. Contractor shall comply with all applicable CEQA requirements. If there is a federal nexus (e.g. a source of federal funding) to the Project, compliance by Contractor with the National Environmental Policy Act (NEPA) will be required in addition to and in conjunction with compliance with requirements of CEQA. The Contractor shall comply with the conditions identified on the Plans and Specifications for compliance with the California Environmental Quality Act, including, without limitation, all requirements pertaining to Mitigation, Monitoring, and Reporting Program (MMRP).

3.24 AQMD COMPLIANCE

Contractor is responsible for full and complete compliance with, as applicable: (1) AQMD Rule 403.1, County Ordinance 742, the County MOU with AQMD dated January 6, 2004 Agenda Item 3.1 (for projects in the Coachella Valley); or (2) AQMD Rule 403 (for projects west of the Coachella Valley). Any fines imposed by AQMD on the County, as well as any other Loss to County, as a result of non-compliance by Contractor with the applicable provisions of the foregoing requirements are the responsibility of Contractor and upon request by County will be paid to County by Contractor or may be withheld by County from amounts due to Contractor under its Applications for Payment.

ARTICLE 4 CONSTRUCTION ADMINISTRATION

4.1 ARCHITECT

4.1.1 Scope of Authority. The Architect shall have the authority to act on behalf of County only as expressly provided in the Contract Documents and subject to such limitations on authority as set forth in Paragraph 4.1.2, below. As clarification of the foregoing, if the Contract Documents provide that the Architect has the right to approve of, consent to or direct that Contractor take or forbear from taking an action, such authority shall be limited to issuing such approval, consent or direction and shall not include, or be interpreted to include, authority to bind County with respect to any of the matters set forth in Paragraph 4.1.2, below. If Contractor's compliance with such approval, consent or direction of the Architect would involve or require authorization by County within the scope of the matters set forth in Paragraph 4.1.2, below, Contractor has the obligation, in addition to complying with the Architect's approval, consent or direction, to take steps in accordance with the Contract Documents to obtain such authorization of County as may be required and failing to do so shall not have any right to recourse or recovery from County on account of Contractor's action taken or Work performed in response to such approval, consent or direction by Architect.

4.1.2 Limitations on Authority. Without limitation to the other limitations on the Architect's authority expressed or implied under Paragraph 4.1.1, above, and notwithstanding anything else set forth in the Contract Documents to the contrary, Architect does not have authority to: (1) obligate or commit County to any payment of money; (2) obligate County to any adjustment to the Contract Price or Contract Time; (3) relieve Contractor of any of its obligations under the Contract Documents; (4) approve or order any Work involving Delay or Extra Work; or (5) perform any act, make any decision or give any direction or approval that is described in these General Conditions as an act, decision, direction or approval that is to be performed, made or given by any person or entity other than Architect.

4.1.3 Work Stoppage. Architect's authority includes, without limitation, the authority to stop the Work whenever such stoppage may be necessary, in Architect's opinion, for the proper execution of the Work. Any Work that is stopped or disapproved by order of Architect shall be resumed if and when County so directs in writing, with or without the concurrence of the Architect.

4.1.4 Replacement. County may, in its sole discretion, substitute another person or entity, or add persons or entities, to perform the functions of Architect or to exercise some or all of the authority of Architect provided for in the Contract Documents.

4.1.5 County Rights. All rights and authority conferred upon Architect under the Contract Documents constitute rights that County may, in its sole and absolute discretion, exercise in writing on its own behalf, irrespective of whether the County has ordered the removal, replacement or a change in the authority of the Architect.

4.2 ADMINISTRATION OF THE CONSTRUCTION CONTRACT

4.2.1 Observations of the Work. Architect will visit the Site as appropriate to the stage of the Work to observe the Work in progress. Observations shall be for the purpose of ascertaining the progress of the Work and that the character, scope, quality and detail of construction (including workmanship and materials) comply with the Contract Documents, the Architect's directives, approved Submittals and clarifications issued by Architect. Observations shall be separate from any inspections which may be provided by others.

4.2.2 Means, Methods. Construction means, methods, techniques, sequences, procedures and safety precautions and programs in connection with the Work are solely the responsibility of Contractor. Neither County nor

Architect: (1) has control over or charge of, nor are they responsible for, Contractors or any Subcontractor's construction means, methods, techniques, sequences, procedures, safety precautions or programs in connection with the Work, all of which are, as between Contractor and County, solely Contractor's responsibility; (2) is responsible for Contractor's failure to carry out the Work in accordance with the Contract Documents; or (3) has control over, charge of, or responsibility for acts or omissions of Contractor, the Subcontractors or their agents or employees, or of any other persons performing portions of the Work.

4.2.3 Communications by Contractor. County shall be provided by Contractor with copies of all communications from Contractor or the Subcontractors to Separate Contractors or the Architect. Contractor shall not rely on oral or other non-written communications.

4.2.4 Review of Applications for Payment. If requested by County, Architect will review and certify all Applications for Payment by Contractor, including Applications for Payment requesting Progress Payments and Final Payment. In such cases, if the Architect and County do not concur in respect to the amount to be paid to Contractor, County's determination of the amount due will prevail.

4.2.5 Rejection of the Work. Architect will have authority to reject Work that does not conform to the Contract Documents and to require additional inspection or testing, in accordance with Article 10, below, whether or not such Work is fabricated, installed or completed. Whenever Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, Architect will have authority to require additional inspection or testing of the Work in accordance with Article 10, below, whether or not such Work is fabricated, installed or completed. Neither Architect's authority to act under this Paragraph 4.2.5 nor a decision made in good faith either to exercise or not to exercise such authority, shall give rise to a duty or responsibility of Architect to Contractor, the Subcontractors, their agents or employees, or other persons performing any of the Work. County shall have the right, notwithstanding a recommendation by the Architect pursuant to this Paragraph 4.2.5 to reject a portion of the Work, to elect to accept the Work rejected by Architect and to direct in writing the manner in which the Work is to be performed and Contractor shall comply therewith.

4.2.6 Review of Submittals. Architect and such other County Consultants as Architect or County determines appropriate will review, approve or take other appropriate action upon the Contractor's Submittals. Such review, approval and other action taken in regard to a Submittal is for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents and is not conducted for the purpose of determining the technical accuracy and completeness of the Submittal, checking details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the sole responsibility of Contractor. Actions by Architect and County Consultants in connection with review of a Submittal by Contractor will be taken with such promptness as to cause no unreasonable Delay in the Work of Contractor or in the activities of the Separate Contractors or County, while allowing sufficient time in their judgments to permit adequate review. Whether or not County has identified a particular Submittal for review by Architect or a County Consultant, Contractor shall in all cases submit Submittals sufficiently in advance to allow time to permit adequate review by Architect and other County Consultants. Neither Architect's nor any County Consultant's review of a Submittal shall: (1) relieve Contractor of its obligations under Section 3.11, above; (2) constitute approval of safety precautions or, unless otherwise specifically stated in writing by the Architect or County Consultant at the time such Submittal is returned to Contractor; (3) be construed as an approval of any construction means, methods, techniques, sequences or procedures; and (4) if it involves review or approval of a specific item, be construed as indicating approval of an assembly of which such item is a component.

4.2.7 Changes. After consultation with the Architect, County will prepare the Change Orders, Unilateral Change Orders and Construction Change Directives for execution and take appropriate action thereon in accordance with Article 7, below.

4.3 CLAIMS

4.3.1 Submission of Claims. All Claims by Contractor shall be submitted in accordance with the procedures set forth in this Section 4.3.

4.3.2 Arising of Claim.

.1 Changes. A Claim by Contractor involving a Contract Adjustment due to a Compensable Change or Deleted Work arises upon issuance of a decision denying, in whole or in part, Contractor's Change Order Request. Such Claim shall be prepared and submitted in accordance with the requirements of this Section 4.3, including, without limitation, Paragraphs 4.3.3 through 4.3.5, below.

.2 Other Claims. Claims by Contractor other than those described in Subparagraph 4.3.2.1, above, arise at the time that County receives written notice by Contractor of Contractor's intent to file the Claim. Such notice of intent shall be given no later than five (5) Days after the Discovery Date relative to such circumstances (even if Contractor has not yet experienced a Loss or Delay due to such circumstances) and shall state the event or condition giving rise to the Claim and its probable effect, if any, upon the Contract Price and Contract Time. **FAILURE BY CONTRACTOR TO SUBMIT A NOTICE OF INTENT TO FILE CLAIM IN ACCORDANCE WITH THIS SUBPARAGRAPH 4.3.2.2 SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO FURTHER RECOURSE OR RECOVERY UPON SUCH CLAIM.**

4.3.3 Content of Claims. A Claim must include the following:

- .1** a statement that it is a Claim and a request for a decision on the Claim;
- .2** a detailed description of the act, error, omission, unforeseen condition, event or other circumstance giving rise to the Claim;
- .3** supporting documentation as follows: (1) if the Claim involves a Contract Adjustment due to Compensable Change or Deleted Work, documentation demonstrating that a complete Notice of Change and Change Order Request were timely and properly submitted as required by Article 7, below; (2) if the Claim involves an adjustment to the Contract Time, documentation demonstrating that a complete Notice of Delay and Request for Extension were timely and properly submitted as required by Article 7 and Article 8, below; and (3) if the Claim does not involve a Contract Adjustment on the basis of Compensable Change or Deleted Work, documentation demonstrating that a notice of intent to file the Claim was timely and properly submitted as required by Subparagraph 4.3.2.2, above;
- .4** a detailed justification for any remedy or relief sought by the Claim, including, without limitation, all of the following: (1) a detailed cost breakdown in the form required for submittal of Change Order Requests, which complies with the prohibition on "total cost" calculations set forth in Paragraph 7.7.15, below; and (2) job cost records substantiating the actual costs that have been incurred; and
- .5** a written certification, signed by a responsible managing officer or principal of Contractor's organization who has the authority to sign contracts on behalf of Contractor and who has personally investigated the matters alleged in the Claim, in the following form:

"I hereby certify under penalty of perjury that I am a managing officer or principal of (Contractor) and that I have reviewed the Claim presented herewith on Contractor's behalf and/or on behalf of (Subcontractor(s)) and that the following statements are, to the best of my knowledge after diligent inquiry into the circumstances of such Claim, true and correct:

(i) the facts alleged in or that form the basis for the Claim are true and accurate;

(ii) I do not know of any facts or circumstances, not alleged in the Claim, that by reason of their not being alleged render any fact or statement alleged in the Claim materially misleading;

(iii) I have, with respect to any request for money or damages alleged in or that forms the basis for the Claim, reviewed the job cost records (including those maintained by Contractor and by any Subcontractor, of any Tier, that is asserting all or any portion of the Claim) and confirmed with reasonable certainty that the losses or damages alleged to have been

suffered by Contractor and/or such Subcontractor were in fact suffered in the amounts and for the reasons alleged in the Claim;

(iv) I have, with respect to any request for extension of time or claim of delay, disruption, hindrance or interference alleged in or that forms the basis for the Claim, reviewed the job schedules (including those maintained by Contractor and by any Subcontractor, of any Tier, that is asserting all or any portion of the Claim) and confirmed that the delays or disruption alleged to have been suffered by Contractor and/or such Subcontractor were in fact experienced for the durations, in the manner, and with the consequent effects on the time and/or sequence of performance of the Work, as alleged in the Claim; and,

(v) Contractor has not received payment from County for, nor has Contractor previously released County from, any portion of the Claim.

Signature: _____

Name: _____

Title: _____

Company: _____

Date: _____

4.3.4 **Noncompliance.** Failure by Contractor to comply with Paragraph 4.3.3, above, shall give County the right, without obligation, to deny the Claim or return the Claim without any response.

4.3.5 **Submission of Claims.**

.1 **Time for Filing.** All Claims and supporting documentation and certifications required to be submitted by Contractor must be submitted to the County within thirty (30) Days after the Claim arises (as "arises" is defined in Paragraph 4.3.2, above). No Claims by Contractor are permitted after Final Payment.

.2 **Manner of Filing.** A Claim shall be submitted by registered or certified mail, return receipt requested.

.3 **Condition Precedent.** Contractor's strict compliance with the requirements of this Section 4.3 as to a Claim shall be considered a condition precedent to Contractor's right to initiate or seek determination of its rights in any legal proceedings with respect to such Claim.

4.3.6 **Response to Claims by Contractor.**

.1 **Claims Response.** County shall provide a reasonable review and issue a written Good Faith Determination within forty-five (45) Days of receipt of the Claim, unless County and Contractor have by mutual agreement extended the time period. The written Good Faith Determination shall identify which portion of the Claim is disputed by County and which portion is undisputed.

.2 **Meeting with Board.** If County should need to submit and gain approval of the Board of Supervisors prior to providing the Contractor the written statement identifying the undisputed and disputed portions of the Claim, and the governing body does not meet within the forty-five (45) days or within the mutually agreed time extension, County shall have three (3) days following the next duly publicly noticed meeting of the Board of Supervisors after the forty-five (45) day period, or agreed extension, to provide Contractor a written statement identifying the disputed portion and undisputed portion of the Claim.

.3 Payments on Undisputed Portion(s). Any payment due on an undisputed portion of the Claim shall be processed and made within sixty (60) days after County issues its written statement. Amounts not paid in a timely manner shall bear interest at 7 percent per annum.

.4 Failure of County to Respond. If County should fail to respond to a Claim from Contractor within the time periods set forth in this 4.3.6 or otherwise meet the time requirements, the Claim shall be deemed rejected in its entirety. A Claim that is denied by reasons of County's failure to have responded to the Claim, or its failure to otherwise meet the requirements of Public Contract Code §9204, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of the Contractor.

4.3.7 Meet and Confer.

.1 Dispute by Contractor. If Contractor disputes County's Good Faith Determination and written response of a Claim by Contractor, or if County fails to respond within the prescribed time set forth herein, the Contractor may demand, in writing sent by registered or certified mail return receipt requested, an informal conference to meet and confer for settlement of the issues still in dispute. Upon receipt of such demand, County shall schedule a meet and confer conference within thirty (30) Days.

.2 Conclusion of Meet and Confer. Within ten (10) business days following conclusion of the meet and confer conference, if the Claim or any portion thereof remains in dispute, County shall provide the Contractor with a written statement identifying the portion of the Claim still in dispute and the portion that is undisputed. Any payment due on the undisputed portion shall be processed and made within sixty (60) days after such written statement is issued. Amounts not paid in a timely manner shall bear interest at 7 percent per annum.

.3 Mediation. Any disputed portion of the Claim as identified by the Contractor in writing, shall be submitted to non-binding mediation with the County and Contractor sharing the associated costs equally. The County and Contractor shall mutually agree to a mediator within ten (10) business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. Mediation includes any non-binding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assist the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

.4 If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be subject to applicable procedures outside this section.

4.3.8 Subcontractor Claims.

.1 Subcontractor Claim. If a subcontractor or lower tier subcontractor has a claim against the County, the Contractor may present to the County a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a claim for work which was performed by the subcontractor or a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the County shall furnish reasonable documentation to support the claim.

.2 Contractor Response. Within forty five (45) days of receipt of the written request by the subcontractor, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the claim to the County and, if the Contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

4.3.9 Claims Based on Differing Site Conditions.

.1 Contractor Responsibility. Save and except as hereinafter provided in this Paragraph 4.3.9 for Contract Adjustments due to Differing Site Conditions, Contractor agrees at Contractor's Own Expense to assume the risk and costs of Extra Work and Delay due to concealed or unknown conditions, surface or subsurface, at the Site or in Existing Improvements.

.2 Differing Site Conditions. Differing Site Conditions are those conditions at the Site or in Existing Improvements and not otherwise reasonably ascertainable by Contractor in the performance of its obligations under the Contract Documents (including, without limitation, conditions not reasonably ascertainable by Contractor from documents or information described in Paragraph 3.2.1, above, that were provided or available to Contractor for its review prior to the Bid Closing Deadline) that constitute: (1) hazardous materials that constitute hazardous waste, as defined in California Health and Safety Code §25117, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of Applicable Laws; (2) subsurface or concealed conditions at the Site or concealed conditions in Existing Improvements which differ materially from those indicated by the Contract Documents or other information that was either reviewed by Contractor or that Contractor was given the opportunity to review prior to the Bid Closing Deadline; or (3) unknown physical conditions at the Site or concealed conditions in Existing Improvements of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.

.3 Notice of Change. If Contractor encounters conditions it believes constitute Differing Site Conditions, then Contractor shall, before such conditions are disturbed, give Notice of Change as required by Paragraph 7.6.1, below, stating, without limitation, a detailed description and precise location of the conditions encountered.

.4 Investigation by County. Upon receipt of notice from Contractor as required by Subparagraph 4.3.9.3, above, County shall promptly investigate Contractor's report of Differing Site Conditions.

.5 Change Order Request. If Contractor intends to seek a Contract Adjustment based upon Differing Site Conditions, it shall submit a complete and timely Change Order Request in accordance with Paragraph 7.6.2, below, setting forth its request for a Contract Adjustment.

.6 Contract Adjustments. If, following Contractor's compliance with its obligations under this Paragraph 4.3.9, County finds that Differing Site Conditions exist, then, unless the Contractor's right to Contract Adjustment has been waived as pursuant to Paragraph 3.2.3, above, a Contract Adjustment shall be made for the resulting Compensable Change and Compensable Delay, in such amount and duration as County determines by issuance of a Good Faith Determination are reasonable and permitted by these General Conditions.

.7 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO STRICTLY COMPLY WITH THE REQUIREMENTS OF THIS PARAGRAPH 4.3.9 PERTAINING TO CONTRACT ADJUSTMENT BASED ON A CLAIM FOR DIFFERING SITE CONDITIONS SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO FURTHER RECOURSE OR RECOVERY UPON SUCH CLAIM.

.8 Final Completion. No claim by Contractor for additional compensation for Differing Site Conditions shall be allowed if asserted after Final Payment.

4.3.10 Continuous Work. Contractor shall, notwithstanding the existence of a Claim by Contractor that is disputed by County, maintain continuous performance, without interruption, suspension or slowing, of the Work and its other obligations (1) pending issuance by County of a Good Faith Determination of the Claim and (2) thereafter in compliance with the terms of such Good Faith Determination.

4.4 NOTICE OF THIRD-PARTY CLAIMS

County shall provide notification to Contractor within a reasonable time after receipt of any third-party claim relating to the Construction Contract. County shall be entitled to recover from Contractor its reasonable costs of providing such notification.

4.5 WAIVERS OF RIGHTS BY CONTRACTOR

COUNTY AND CONTRACTOR ACKNOWLEDGE THAT IT IS IN THE INTERESTS OF BOTH PARTIES THAT CHANGES, DELAYS AND CLAIMS BE IDENTIFIED, QUANTIFIED, EVALUATED AND FINALLY RESOLVED PROMPTLY, CONTEMPORANEOUSLY WITH THE CIRCUMSTANCES FROM WHICH THEY ARISE, AND THAT THERE BE CERTAINTY WITH RESPECT TO THE FINALITY OF ANY RESOLUTION OF RELATED DISPUTES. ON

THOSE PREMISES, AND IN FURTHER RECOGNITION OF THE FACT THAT IT WOULD BE EXTREMELY DIFFICULT OR IMPOSSIBLE TO QUANTIFY, DEMONSTRATE OR PROVE THE HARM TO COUNTY IF ANY OF THE FOREGOING PREMISES IS NOT ACHIEVED DUE TO A FAILURE BY CONTRACTOR TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS CONCERNING TIMELY NOTICE OR SUBMISSIONS OF NOTICES AND CLAIMS RELATING TO CHANGES, DELAY AND CONTRACT ADJUSTMENTS, COUNTY AND CONTRACTOR AGREE THAT FAILURE BY CONTRACTOR TO CONFORM TO SUCH REQUIREMENTS OF THE CONTRACT DOCUMENTS SHALL IN AND OF ITSELF CONSTITUTE SUFFICIENT CAUSE AND GROUNDS, WITHOUT THE NECESSITY OF COUNTY DEMONSTRATING ANY ACTUAL HARM OR PREJUDICE, FOR IMPOSING UPON CONTRACTOR A FULL AND UNCONDITIONAL WAIVER BY CONTRACTOR OF ITS RIGHT TO A CONTRACT ADJUSTMENT AND OF ITS RIGHTS AND RECOURSE FOR RECOVERY OF ANY RELATED LOSS BY ANY LEGAL PROCESS OTHERWISE PROVIDED FOR UNDER APPLICABLE LAWS.

4.6 GOOD FAITH DETERMINATIONS

Wherever in the Contract Documents it is provided that the County may or shall make a determination or decision in the exercise of good faith (including, without limitation, provisions for a Good Faith Determination by County), any such determination or decision that the person exercising such right on behalf of County believes in good faith to be a proper exercise of County's rights and to have a reasonable basis in fact, whether or not such determination is in fact proper, reasonable or correct or adjudged to be so, shall be complied with by Contractor without Delay to Contractor's performance of the Work. However, unless the Contract Documents expressly provides otherwise, neither such good faith determination or decision nor Contractor's compliance therewith shall be interpreted as precluding the Contractor from exercising its rights to seek adjudication of its rights in the manner permitted by these General Conditions or Applicable Laws.

4.7 ESCROW BID DOCUMENTS

If the Bidding Documents obligate Contractor to submit Escrow Bid Documents, then submission by Contractor of its Escrow Bid Documents shall constitute a warranty and representation by Contractor that it has no other written documents or electronic files containing any information that Contractor was required to include, but failed to include, as part of its performing such obligation and Contractor agrees it shall have no right to submit for consideration by County, or offer into evidence in legal proceedings, in support of a request for Contract Adjustment or a Claim any such documentation or electronic files that Contractor so failed to include in its Escrow Bid Documents.

ARTICLE 5 SUBCONTRACTORS

5.1 SUBSTITUTION

5.1.1 Substitutions Allowed. There shall be no substitution of or addition to the Subcontractors except as permitted by Chapter 4 (commencing at §4100), Division 2, Part 1 of the California Public Contract Code (the "Act").

5.1.2 Contractor's Own Expense. Any increase in the cost or time of performance of the Work resulting from the replacement, substitution or addition of a Subcontractor shall be borne solely by Contractor at Contractor's Own Expense.

5.1.3 Substantiation of Compliance. At any time during performance of the Work it shall be the responsibility and burden of Contractor, if requested by County, to present clear and convincing evidence that Contractor is, and all times during the bidding and Award of the Construction Contract was, in full compliance with all of the applicable provisions of the Act. Failure by Contractor to present such evidence when requested shall be deemed a breach of this Section 5.1 and of the Act, thereby entitling County to exercise any or all of its rights and remedies under the Contract Document or Applicable Laws, including, without limitation, the right to cancel the Construction Contract or assess any penalties provided for by the Act.

5.1.4 Splitting Prohibited. Any attempt by Contractor to avoid compliance with the Act, such as, but not limited to, by splitting the work of subcontracts with Subcontractors into separate contracts or changes orders so as to not exceed the monetary threshold of the Act applicable to listing of Subcontractors, is strictly prohibited.

5.2 SUBCONTRACTUAL RELATIONS

5.2.1 Written Agreements. Contractor shall, by written agreement entered into between the Contractor and Subcontractors no later than twenty (20) Days after Award, require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to Contractor by terms of the Contract Documents and to assume toward Contractor all the obligations and responsibilities which Contractor, by the Contract Documents, assumes toward County and the Architect. Each subcontract agreement shall preserve and protect the rights of County and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against Contractor that Contractor, by the Contract Documents, has against County. Contractor shall require each first-Tier Subcontractor to enter into similar agreements with their sub-subcontractors. Copies of applicable portions of the Contract Documents shall be made available by Contractor to the first-Tier Subcontractors and each Subcontractor shall similarly make copies of such Contract Documents available to each Subcontractor of a lower-Tier with which it contracts. Without limitation to the foregoing, each contract that is entered into by a Subcontractor, of any Tier, shall, without limitation, require the Subcontractor:

- .1 to perform the Work in accordance with the terms of the Contract Documents;
- .2 to assume toward Contractor all the obligations and responsibilities which Contractor assumes toward County by the Contract Documents;
- .3 to preserve and protect the rights of County under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights;
- .4 to waive all rights (including, without limitation, rights of subrogation) that the Subcontractor or its insurers may have against County and others required by the Contract Documents to be named as additional insureds, for Losses covered by insurance carried by Contractor or County, except for such rights as the Subcontractor may have to the proceeds of such insurance held by County or such other additional insured;
- .5 to afford County and entities and agencies designated by County the same rights and remedies afforded to them under the Contract Documents with respect to access to, and the right to audit and copy at County's cost, all of the Subcontractor's books, records, contracts, correspondence, instructions, drawings, receipts, vouchers, purchase orders, memoranda and other records and documents relating to the Work and requiring the Subcontractor to preserve all such records and other items for a period of ten (10) years after Final Completion;
- .6 to recognize the rights of the County under Section 5.3, below, including, without limitation, the County's right to (1) accept assignment of the Subcontractor's agreement, (2) accept assignment of Contractor's rights as obligee under a performance bond furnished by a first-Tier Subcontractor, (3) to retain the Subcontractor pursuant to the terms of its agreement with Contractor to complete the unperformed obligations under its agreement, and, (4) if requested by the County, to require that the Subcontractor execute a written agreement on terms acceptable to the County confirming that the Subcontractor is bound to the County under the terms of its agreement with Contractor;
- .7 to submit applications for payment, requests for change orders and extensions of time and claims, and to comply with all other notice and submission requirements of the Contract Documents, sufficiently in advance to allow Contractor time to comply with its obligations under the Contract Documents;
- .8 to purchase and maintain insurance in accordance with the requirements of the Contract Documents;
- .9 to defend and indemnify the Indemnitees on the same terms as provided in Section 3.18, above;
- .10 to comply with the nondiscrimination (Article 16, below) and prevailing wage (Section 3.19, above) provisions of these General Conditions;

.11 limiting the Subcontractor's right to additional compensation or extension of time due to Differing Site Conditions and Design Discrepancies in accordance with the provisions of Section 3.2, above;

.12 to provide for a right of termination for convenience by Contractor that limits the Subcontractor's right to compensation to an allocable share of the subcontract price that corresponds to the percentage of the Work properly performed by the Subcontractor, with no additional sum payable for any other Losses, including, without limitation, prospective damages, lost profits or consequential damages, of any kind; and

.13 to provide that time is of the essence to each of the Subcontractor's obligations.

5.2.2 Copies. Contractor shall, upon request by County made at any time, furnish to County true, complete, and executed copies of all contracts with the Subcontractors and amendments, modifications and change orders thereto. Progress payments shall not be made for items of the Work for which County has not received such documents following request therefor by County.

5.2.3 No Brokering. Contractor shall not permit any portion of the Work to be contracted to a firm acting as a broker, factor or other entity not actually performing a substantial portion of the Work with its own forces; provided, however, that nothing herein shall be interpreted as precluding the right of a Subcontractor who has agreed to provide all of the materials and labor for a trade to subcontract the labor portion only to a sub-subcontractor.

5.2.4 Third-Party Rights. Contractor acknowledges that County is an intended third-party beneficiary to all contracts between Contractor and its first-Tier Subcontractors. Notwithstanding the foregoing or anything else to the contrary in the Contract Documents, there is no intent on the part of County or Contractor to create any rights (including, without limitation, third-party beneficiary rights) in favor of any Subcontractor, of any Tier, against County and nothing contained in the Contract Documents and no course of conduct, act or omission on the part of County shall be construed as creating a direct or indirect contractual right in favor of any Subcontractor, of any Tier, and against County.

5.2.5 All Subcontractor Tiers. It is the Contractor's obligation to see to it that all obligations of the Contractor are assumed by (or, "flow down") to the Subcontractors, of every Tier, by the inclusion of contractual provisions requiring each of the Subcontractors, of every Tier, to bind not only themselves but their lower-Tier Subcontractors to the obligations assumed by Contractor under the Contract Documents.

5.3 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.3.1 Contingent Assignment. Contractor hereby contingently assigns to County, or to such person or entity as County, in its sole and absolute discretion, designates, all of its interest in subcontracts entered into by Contractor with its first-Tier Subcontractors. If a first-Tier Subcontractor has provided a performance bond, then Contractor's rights under such performance bond are likewise hereby deemed contingently assigned to County or its designee and provision shall be made in the performance bond for surety's consent to such contingent assignment.

5.3.2 Acceptance by County. The contingent assignments provided for by this Section 5.3 will be effective only as to those subcontracts and performance bonds which County or its designee accepts in writing. Said acceptance is the sole condition upon which the effectiveness of such assignments are contingent. County or its designee may accept any such assignment at any time during the course of the Work and prior to Final Completion. Such contingent assignments are part of the consideration to County for entering into the Construction Contract with Contractor and may not be withdrawn prior to Final Completion.

5.3.3 County Obligation. County's or its designee's sole obligation in the event it accepts a contingent assignment of a subcontract under this Section 5.3 shall be to pay in accordance with the terms of such subcontract for Work performed after written notice of acceptance of such assignment. In the event County directs that such assignment be made to County's designee, then such designee only, and not County, shall be solely liable under such assignment for Work performed after written notice of acceptance of such assignment.

5.4 COMMUNICATIONS BY COUNTY

County shall have the right to communicate, orally or in writing, with the Subcontractors with respect to matters that are related to Contractor's performance of its obligations under the Contract Documents. Nothing herein shall be interpreted

as extending to County the right as part of such communications to direct the manner in which any Subcontractor performs the Work. Except as otherwise provided in the Construction Contract or these General Conditions, Contractor shall be provided with a copy of all such communications that are in writing. Such communications shall not create, or be interpreted as creating, any contractual obligation of County to any Subcontractor.

5.5 DOCUMENT AVAILABILITY

Contractor shall make available to each proposed Subcontractor with whom it enters into a contract for performance of any portion of the Work, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound so as to ensure that all matters disclosed thereby are taken into consideration and included in the terms of such contracts and shall identify to such Subcontractor the terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. The Subcontractors shall similarly be required to make copies of applicable portions of such documents available to their respective proposed sub-subcontractors or sub-subconsultants.

5.6 NO LIABILITY OF COUNTY

Nothing set forth in this Article 5, and no action taken by County with respect to review or approval of the Subcontractors or their contracts, shall impose any liability or responsibility upon County nor relieve Contractor of its responsibilities under the Contract Documents or Applicable Laws.

ARTICLE 6 COUNTY'S OWN FORCES AND SEPARATE CONTRACTORS

6.1 COUNTY'S RIGHT TO PERFORM CONSTRUCTION WITH OWN FORCES AND TO AWARD SEPARATE CONTRACTS

6.1.1 Right of County. County reserves the right to perform construction or operations related to the Project with County's own forces and to award other contracts to Separate Contractors in connection with other portions of the Project or other construction or operations on the Site.

6.1.2 Separate Contractors. Contractor shall ascertain to its own satisfaction the scope of the Project and the nature of any other contracts that have been or may be awarded by County to Separate Contractors in prosecution of the Project. Contractor shall look solely to such Separate Contractors, and County shall not be responsible, for any Losses for which Contractor is not provided a right or recovery by means of a right to Contract Adjustment for Compensable Change or Compensable Delay, that are suffered by Contractor or the Subcontractors, of any Tier, resulting directly or indirectly from the conduct of such work by the Separate Contractors.

6.1.3 Coordination. Nothing in the Contract Documents creates or will create any duty on the part of County to coordinate the Work of Contractor with the work of Separate Contractors. Contractor shall, when directed to do so by County, participate with the Separate Contractors and County in reviewing the Separate Contractors' construction schedules. Contractor and Separate Contractors will coordinate all work with the other so as to facilitate the general progress of the Project. Contractor agrees that any recovery of Losses for which Contractor is not provided a right or recovery by means of a right to Contract Adjustment for Compensable Change or Compensable Delay, that are suffered by Contractor due to a failure by a Separate Contractor to coordinate its work with the Work of Contractor will be sought directly against the Separate Contractors as set forth elsewhere in this Article 6.

6.1.4 Disputes. Contractor and County agree that Separate Contractors in direct contractual privity with County are third party beneficiaries of the Contract Documents, but only to the extent of claims and causes of action against Contractor arising out of or resulting from Contractor's performance or failure of performance under the Contract Documents or any act or omission of Contractor or the Subcontractors causing Loss to such Separate Contractors. Contractor consents to being sued by Separate Contractors for Losses caused by Contractor or any of the Subcontractors. Contractor hereby waives lack of privity of contract with such Separate Contractors as a defense to such actions.

6.1.5 Remedy. If Contractor as a result of the acts or omissions of one or more of the Separate Contractors suffers a Loss that is not compensated by means of a right given to Contractor under the Contract Documents to a

Contract Adjustment, then Contractor's sole remedy is to assert a claim or cause of action directly against the Separate Contractor(s) causing the Loss and Contractor hereby releases, acquits, holds harmless and forever discharges County of and from any and all liability for such Loss.

6.2 MUTUAL RESPONSIBILITY

6.2.1 Use of Site. Nothing contained in the Contract Documents shall be interpreted as granting Contractor exclusive use or occupancy of the Site. Contractor shall afford County's own forces and the Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities. Contractor shall not Delay the work of the Separate Contractors or County's own forces.

6.2.2 Adjoining Work. If part of Contractor's performance of the Work depends for proper execution or results upon construction or operations by County's own forces or Separate Contractors, Contractor shall, prior to proceeding with that portion of the Work, carefully inspect such construction and operations and promptly report in writing to the County apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Contractor will be responsible, at Contractor's Own Expense, for Losses to County resulting from any such discrepancies or defects not reported in accordance with this Paragraph 6.2.1 that were apparent or that should have been apparent to Contractor on careful inspection.

6.2.3 Damage. Contractor shall promptly remedy Loss caused by Contractor or its Subcontractors to completed construction or partially completed construction on the Site, or to property of County or the Separate Contractors.

6.2.4 Disputes. Contractor shall notify the County in writing within five (5) Days if it believes it has experienced or is experiencing any Delay or Loss due to the activities of County's own forces or the Separate Contractors or in the event of any dispute with County's own forces or a Separate Contractor.

6.2.5 Settlement of Disputes. If Contractor or any Subcontractor causes a Loss to a Separate Contractor, then Contractor will promptly settle the matter directly with the Separate Contractor and will defend, indemnify and hold County and the other Indemnitees harmless from any and all effects of such Loss in accordance with the terms of Section 3.18, above.

6.3 ALLOCATION OF CLEANUP COSTS

If a dispute arises among Contractor, the Separate Contractors and/or County as to the responsibility for maintaining the Site and surrounding area free from waste materials and rubbish, County may clean up such waste materials and rubbish and allocate the cost among those responsible as County determines in good faith to be just.

ARTICLE 7 CHANGES IN THE WORK

7.1 CHANGES

7.1.1 General. County is authorized to make Changes in the Work in accordance with the provisions of this Article 7.

7.1.2 Contract Adjustments. Contract Adjustments shall only be permitted as follows: (1) the Contract Price shall only be adjusted by means of a Change Order or Unilateral Change Order for Compensable Change, Deleted Work or Compensable Delay; and (2) the Contract Time shall be adjusted by means of a Change Order or Unilateral Change Order for Excusable Delay, Compensable Delay or Deleted Work. All Contract Adjustments to the Contract Price shall conform, without limitation, to the requirements of this Article 7. All Contract Adjustments to the Contract Time shall conform, without limitation, to the applicable requirements of this Article 7 and Article 8, below.

7.1.3 Exclusive Rights. The rights expressly set forth in the Contract Documents for Contract Adjustments constitute Contractor's exclusive rights for additional compensation or extensions of time and are intended to be in lieu of and wholly replace any other such rights and remedies that Contractor has under Applicable Laws for recovery or

relief on account of Loss or Delay in connection with performance of the Work, it being the intent of the County and Contractor that if circumstances arise for which the Contract Documents do not provide to Contractor an express right to a Contract Adjustment, then such omission of an express right shall conclusively be deemed to mean that no right to a Contract Adjustment was intended; and, consistent with that intent, no right to a Contract Adjustment on account of such circumstances shall by any means, legal or equitable, of interpretation, construction, inference, implication or application be considered, found or adjudged to exist.

7.1.4 Written Authorization. Any Change performed by Contractor pursuant to any direction other than a duly authorized and executed Change Order, Unilateral Change Order or Construction Change Directive shall be at Contractor's Own Expense.

7.1.5 Prompt Performance. Subject to the procedures set forth in this Article 7 and elsewhere in the Contract Documents, all Changes shall be performed promptly and without Delay.

7.2 SIGNATURES AND AUTHORIZATIONS

7.2.1 Parties. A Change Order shall be executed by County and Contractor. A Unilateral Change Order shall be executed by the County. Construction Change Directives shall be executed in accordance with Section 7.5, below.

7.2.2 Form. Change Orders, Unilateral Change Orders and Construction Change Directives shall be executed using forms furnished by County or, if requested by County, using forms furnished by Contractor that are approved by County.

7.2.3 Authorization.

.1 Compensable Changes.

(1) Director of Facilities Management. A Compensable Change shall be performed by Contractor only if authorized by a Change Order, Unilateral Change Order or Construction Change Directive signed by the Director of Facilities Management in accordance with the requirements of this Article 7; provided, however, that the Director of Facilities Management's authority to bind the County to a Contract Adjustment shall be subject to the limitations of Public Contract Code §20142.

(2) County's Project Manager. The person identified by County as its "project manager" for the Project shall have the right to exercise the Director of Facilities Management's authority under this Paragraph 7.2.3, but only if and to the extent that such authority is expressly given to such project manager in a writing signed by the Director of Facilities Management (and not by a designee of the Director of Facilities Management).

(3) Board of Supervisors. Except as otherwise provided in Subparagraph 7.2.3.1 (4), below, if a Contract Adjustment increasing the Contract Price would exceed the limitations of Public Contract Code §20142, then in addition to written authorization by the Director of Facilities Management, such Compensable Change shall be performed only if approved by a vote of the Board of Supervisors in accordance with the requirements of Applicable Laws.

(4) Disputed Changes. If a dispute arises between County and Contractor over (a) whether a particular portion of the Work constitutes a Compensable Change or (b) the amount of the Contract Adjustment to which Contractor is entitled on account of a Compensable Change, then, notwithstanding such dispute, the Contractor shall, if ordered to do so in a Construction Change Directive signed by the Director of Facilities Management, perform the disputed Work without Delay. Such direction by County shall not be interpreted as an agreement or admission by County that the disputed Change constitutes Extra Work or a Compensable Change for which Contractor is entitled to a Contract Adjustment. Compliance by Contractor with such direction shall not be interpreted as a waiver of Contractor's right to a Contract Adjustment if and to the extent that Contractor is entitled to a Contract Adjustment or Claim under the terms of the Contract Documents, including, without limitation, the right of Contractor to recover upon a Claim for the amount of any excess in the event that it is adjudged that the amount of the Contract Adjustment to which Contractor is entitled exceeds the limits of Public Contract Code §20142.

.2 **WRITING OF ESSENCE.** IT IS OF THE ESSENCE TO THE CONSTRUCTION CONTRACT BETWEEN CONTRACTOR AND COUNTY THAT ALL CHANGES MUST BE AUTHORIZED IN ADVANCE, IN WRITING, AS REQUIRED BY THIS ARTICLE 7. ACCORDINGLY, NO VERBAL DIRECTIONS, COURSE OF CONDUCT BETWEEN THE PARTIES, EXPRESS OR IMPLIED ACCEPTANCE OF CHANGES OR OF THE WORK, OR CLAIM THAT THE COUNTY HAS BEEN UNJUSTLY ENRICHED (WHETHER OR NOT THERE HAS BEEN SUCH ENRICHMENT) SHALL BE THE BASIS FOR A CONTRACT ADJUSTMENT IF CONTRACTOR HAS NOT OBTAINED ADVANCE WRITTEN AUTHORIZATION IN THE MANNER REQUIRED BY THIS ARTICLE 7.

7.3 **CHANGE ORDERS**

7.3.1 **Purpose.** The purpose of a Change Order is to establish the terms of the County's and Contractor's mutual agreement to a Contract Adjustment.

7.3.2 **Content.** A Change Order is a written instrument, prepared by the County, stating:

- .1 a Compensable Change or Deleted Work;
- .2 a Compensable Delay or Excusable Delay;
- .3 the amount of the Contract Adjustment, if any, to the Contract Price; and/or
- .4 the extent of the Contract Adjustment, if any, to the Contract Time.

7.4 **UNILATERAL CHANGE ORDERS**

7.4.1 **Purpose.** The purpose of a Unilateral Change Order is to establish the County's estimate of a disputed Contract Adjustment.

7.4.2 **Good Faith Determination.** The County's determination in a Unilateral Change Order of a Contract Adjustment shall be based upon a Good Faith Determination by County of the Contract Adjustment that is appropriate under the circumstances and consistent with the terms of the Contract Documents.

7.4.3 **Claim by Contractor.** If Contractor disputes any portion of the County's Good Faith Determination of a Contract Adjustment that is set forth in a Unilateral Change Order, Contractor shall file, within thirty (30) Days after issuance of the Unilateral Change Order by County, a Claim pursuant to Section 4.3, above. The amount of the Contract Adjustment requested in the Claim shall not exceed the difference between the amount (either in terms of dollar amount or number of Days) of the Contract Adjustment requested by Contractor and the amount (either in terms of dollar amount or number of Days) of the Contract Adjustment granted in the Unilateral Change Order. Contractor shall have no reserved right, and hereby waives any such right that may exist under Applicable Laws, to seek in such Claim a Contract Adjustment or recovery that is based upon any amount (either in terms of dollar amount or number of Days) that is in excess of such difference.

7.4.4 **WAIVER BY CONTRACTOR.**

FAILURE BY CONTRACTOR TO SUBMIT A CLAIM PURSUANT TO SECTION 4.3, ABOVE, WITHIN THIRTY (30) DAYS AFTER ISSUANCE OF A UNILATERAL CHANGE ORDER BY COUNTY SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO FURTHER RECOURSE OR RECOVERY BASED ON AN ASSERTION THAT THE AMOUNT OF THE CONTRACT ADJUSTMENT ON ACCOUNT OF THE CHANGE OR DELAY DESCRIBED IN SUCH UNILATERAL CHANGE ORDER SHOULD BE DIFFERENT THAN THE AMOUNT OF THE COUNTY'S GOOD FAITH DETERMINATION OF THE CONTRACT ADJUSTMENT AS SET FORTH IN SUCH UNILATERAL CHANGE ORDER.

7.5 CONSTRUCTION CHANGE DIRECTIVES

7.5.1 Purpose. The purpose of a Construction Change Directive is to: (1) direct the performance of a Change that does not involve a Contract Adjustment; (2) establish a mutually agreed basis for compensation to Contractor for a Compensable Change under circumstances where performance of the Compensable Change needs to proceed in advance of the County performing a full evaluation of the Contractor's rights relative to a Contract Adjustment; or (3) direct performance of Work or a Change with respect to which there exists a dispute or question regarding the terms of a Contract Adjustment.

7.5.2 No Contract Adjustment. A Construction Change Directive that directs the performance of Work or a Change that does not involve a Contract Adjustment to the Contract Price or Contract Time may be authorized by either the Director of Facilities Management or the County's project manager and shall be promptly performed by Contractor so as to not cause Delay to any other portion of the Work. A Construction Change Directive directing performance of a Change that does not contain any statement indicating that a Contract Adjustment is requested or required shall be conclusively presumed to be a Change that is not a Compensable Change and no Contract Adjustment increasing the Contract Price or Contract Time will be made on account thereof.

7.5.3 Agreed Contract Adjustment. A Construction Change Directive that contains a complete or partial agreement by the County and Contractor with respect to the Contractor's right to, or the amount of, a Contract Adjustment shall be authorized in accordance with, conform to the requirements of and be binding upon County and Contractor as provided for in, this Paragraph 7.5.3.

.1 Complete Agreement. Each Construction Change Directive involving a Compensable Change or Deleted Work with respect to which there is complete agreement on the terms of the Contract Adjustment shall comply with the following:

(1) Statement of Agreement. A statement shall be included that the County and Contractor are in agreement on all of the terms of the Contract Adjustment related to performance of such Compensable Change and set forth a full description of the terms of the Contract Adjustment, including, without limitation, its effect on the Contract Price and Contract Time.

(2) Legal Effect.

(a) Upon Contractor.

THE AGREED TERMS OF THE CONTRACT ADJUSTMENT WITH RESPECT TO WHICH THERE IS A STATEMENT OF FULL AGREEMENT ON THE TERMS OF THE CONTRACT ADJUSTMENT FOR A CHANGE IN THE WORK SHALL BE FINAL AND BINDING UPON CONTRACTOR. ANY RIGHT OR CLAIM BY CONTRACTOR FOR ANY ADDITIONAL COMPENSATION OR EXTENSION OF TIME RELATING DIRECTLY OR INDIRECTLY TO SUCH CHANGE SHALL BE CONCLUSIVELY DEEMED WAIVED BY CONTRACTOR, EVEN IF THE CIRCUMSTANCES GIVING RISE TO SUCH ADDITIONAL COMPENSATION OR EXTENSION OF TIME WERE NOT SUSPECTED BY OR KNOWN TO THE CONTRACTOR AT THE TIME OF EXECUTION OF THE CONSTRUCTION CHANGE DIRECTIVE AND IF SUSPECTED OR KNOWN WOULD HAVE BEEN CONSIDERED BY CONTRACTOR TO HAVE BEEN MATERIAL TO CONTRACTOR'S AGREEMENT TO THE CONTRACT ADJUSTMENT SET FORTH IN THE CONSTRUCTION CHANGE DIRECTIVE.

(b) Upon County. In recognition of the fact that Construction Change Directives may be issued under circumstances in which the County may not have had the access to pertinent information required for the County to fully evaluate the circumstances giving rise to the Change, it is agreed that neither the issuance nor execution of, nor any statement contained in, nor any course of conduct in connection with, a Construction Change Directive (including, without limitation, a Construction Change Directive that constitutes a full agreement by County and Contractor on the terms of a Contract Adjustment) shall be interpreted as a waiver, release or settlement of any of County's rights relating to the subject matter of the Construction Change Directive, or as creating or implying any right of Contractor to a Contract Adjustment, if it is found by County upon further investigation that circumstances existed, not known to County at the time of executing the Construction Change Directive, demonstrating that the Contractor was not in fact entitled to a Contract Adjustment or was entitled to a Contract Adjustment on different terms than those agreed to in the Construction Change Directive.

.2 Partial Agreement. Each Construction Change Directive involving a Compensable Change or Deleted Work with respect to which there is only agreement on a portion of the terms of a Contract Adjustment shall comply with the following:

(1) Agreed Terms. The Construction Change Directive shall state those terms of the Contract Adjustment as to which there is agreement.

(a) Legal Effect. Except to the extent of any additional open (i.e., non-agreed) terms stated or reserved in the Construction Change Directive, such agreement shall have the same legal effect set forth in Subparagraph 7.5.3.1 (2), above.

(b) Time and Materials. In the event that County and Contractor agree in the Construction Change Directive to the “time and materials” method of calculation set forth in Subparagraph 7.7.1.1 (4), below, but do not agree upon a maximum price, then the total cost to County for the Work covered by the Construction Change Directive shall under no circumstances exceed a price that is reasonable, competitive and fair to County given the amount and type of Work involved and the circumstances under which the Compensable Change is performed.

(2) Open Terms. The Construction Change Directive shall state those terms of the Contract Adjustment that are “open” or “disputed”; meaning those terms as to which the County and Contractor did not reach agreement.

(a) ROM Estimate. If such open terms involve the amount of the Contract Adjustment to the Contract Price or Contract Time on account of a Compensable Change, then the Construction Change Directive shall also include a Reasonable Order of Magnitude Estimate prepared by Contractor, or prepared by County and acknowledged in writing as accepted by Contractor, of the probable amount of the Contract Adjustment to the Contract Price and Contract Time associated with performance of the Compensable Change.

(b) Legal Effect. A Reasonable Order of Magnitude Estimate constitutes neither (i) a guarantee by Contractor that the amount of the Contract Adjustment to the Contract Price or Contract Time that may be associated with the Compensable Change or Deleted Work covered by such Construction Change Directive may not exceed the Reasonable Order of Magnitude Estimate nor (ii) authorization or agreement by County to a Contract Adjustment based on the amounts set forth in such Reasonable Order of Magnitude Estimate.

(c) Time and Materials. If County and Contractor state in the Construction Change Directive an agreement that the Contractor is entitled to a Contract Adjustment to the Contract Price on account of a Compensable Change, but do not state therein an agreement upon the method of calculation to be used for the Contract Adjustment from among the optional methods of calculation set forth in Paragraph 7.7.1, below, and if the County nonetheless directs Contractor to perform the Compensable Change pending future agreement on the amount of the Contract Adjustment, then it shall be conclusively presumed that County and Contractor have agreed that such Compensable Change shall be performed and compensated based upon the “time and materials” method of calculation set forth in Subparagraph 7.7.1.1 (4), below, and that the total Contract Adjustment for performance thereof shall under no circumstances exceed a price that is reasonable, competitive and fair to County given the amount and type of Work involved and the circumstances under which the Compensable Change is performed.

7.5.4 Disputed Contract Adjustment. Each Construction Change Directive involving a Contract Adjustment with respect to which there is a dispute or partial agreement shall, if Contractor is ordered to do so in a Construction Change Directive signed by the Director of Facilities Management, be performed by Contractor without Delay. Except as otherwise provided elsewhere in this Section 7.5, with respect to any open terms as to which the County and Contractor have not reached agreement both County and Contractor shall be deemed to have reserved their respective rights and defenses.

7.5.5 Other Notices. With respect to any Contract Adjustment or portion of a Contract Adjustment that is not fully resolved in a Construction Change Directive, neither issuance nor execution of such Construction Change Directive shall be interpreted as relieving Contractor of its obligation to comply with the requirements of these General Conditions relative to timely submission of notices required by the Contract Documents, including, without limitation, Notice of Change, Change Order Request, Notice of Delay or Request for Extension.

7.6 PROCEDURES

7.6.1 Notice of Change.

.1 Submission. Contractor shall submit a written Notice of Change to County if any instruction, request, drawing, specification, action, condition, omission, default or other circumstance occurs that constitutes a Compensable Change, Deleted Work, Compensable Delay or other matter that may involve or require a Contract Adjustment (additive or deductive). Such notice shall be provided prior to commencement of performance of the Work affected and no later than three (3) working days after the Discovery Date of such circumstance.

.2 Form. Notices of Change shall be provided using forms furnished by County or, if requested by County, using forms furnished by Contractor that are approved by County. Failure by County to request or approve a particular form shall not relieve Contractor of its obligation to provide a Notice of Change in a written form that complies with the requirements specified in Subparagraph 7.6.1.3, below.

.3 Content. Each Notice of Change in order to be considered complete shall include:

(1) a general statement of the circumstances giving rise to the Notice of Change (including, without limitation, identification of any related Construction Change Directive);

(2) a Reasonable Order of Magnitude Estimate by Contractor of any related Contract Adjustments (additive and deductive) to the Contract Price; and,

(3) if such circumstances involve a right to adjustment of the Contract Time due to Compensable Delay or Excusable Delay that has not been waived pursuant to Subparagraph 8.2.2.4, below, or Subparagraph 8.2.3.4, below, Contractor shall include, if not previously provided, a complete and timely Notice of Delay.

.4 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO PROVIDE A COMPLETE AND TIMELY NOTICE OF CHANGE UNDER CIRCUMSTANCES WHERE A NOTICE OF CHANGE INVOLVING A CHANGE IS REQUIRED BY THIS PARAGRAPH 7.6.1 SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO A CONTRACT ADJUSTMENT ON ACCOUNT OF SUCH CIRCUMSTANCES AND A WAIVER OF ANY RIGHT TO FURTHER RECOURSE OR RECOVERY BY REASON OF OR RELATED TO SUCH CHANGE.

.5 Deductive Adjustments. Failure by Contractor to submit a timely or proper Notice of Change under circumstances in which a Notice of Change is required shall in no way affect County's right to any deductive Contract Adjustment on account of such circumstances.

7.6.2 Change Order Request.

.1 Submission. With respect to any matter that may involve or require a Contract Adjustment (additive or deductive) of the Contract Price, Contractor shall, within fourteen (14) Days after receipt by the County of a Notice of Change pursuant to Paragraph 7.6.1, above, submit to the County a written Change Order Request.

.2 Form. Change Order Requests shall be provided using forms furnished by County or, if requested by County, using forms furnished by Contractor that are approved by County. Failure by County to request or approve a particular form shall not relieve Contractor of its obligation to provide a Change Order Request in a written form that complies with the requirements stated in Subparagraph 7.6.2.3, below.

.3 Content. Each Change Order Request in order to be considered complete shall include:

(1) a detailed description of the circumstances for the Compensable Change, Deleted Work or Compensable Delay;

(2) a complete, itemized cost breakdown (additive and deductive) of the Allowable Costs that form the basis for the Contractor's request for Contract Adjustment, including: (a) if the pricing is based on time and materials charges, all of Contractor's and each Subcontractor's Allowable Costs (including, without limitation, quantities, hours, unit prices, and rates) and Allowable Markups and (b) if the pricing is in the form of a lump sum price a detailed breakdown of the lump sum price into its component and individual items of Allowable Costs and Allowable Markup; and

(3) if such circumstances involve a right to a Contract Adjustment of the Contract Time due to Compensable Delay or Excusable Delay that has not been waived pursuant to Subparagraph 8.2.2.4, below, or Subparagraph 8.2.3.4, below, Contractor shall include, if not previously provided, a complete and timely Request for Extension.

.4 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO PROVIDE A COMPLETE AND TIMELY CHANGE ORDER REQUEST UNDER CIRCUMSTANCES WHERE A CHANGE ORDER REQUEST INVOLVING A CHANGE IS REQUIRED BY THIS PARAGRAPH 7.6.2 SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO A CONTRACT ADJUSTMENT ON ACCOUNT OF SUCH CIRCUMSTANCES AND A WAIVER OF ANY RIGHT TO FURTHER RECOURSE OR RECOVERY BY REASON OF OR RELATED TO SUCH CHANGE.

.5 Deductive Adjustments. Failure by Contractor to submit a timely or proper Change Order Request under circumstances in which a Change Order Request is required shall in no way affect County's right to any deductive Contract Adjustment on account of such circumstances.

7.6.3 Formal Notice of Essence. Contractor recognizes and acknowledges that timely submission of a formal Notice of Change and Change Order Request, whether or not the circumstances of the Change may be known to the County or available to County through other means, is not a mere formality but is of crucial importance to the ability of County to promptly identify, prioritize, evaluate and mitigate the potential effects of Changes. Any form of informal notice, whether verbal or written (including, without limitation, statements in Requests for Information, statements at regular job meetings or entries on monthly reports, daily logs or job meeting minutes), that does not strictly comply with the formal requirements of Paragraph 7.6.1, above, and Paragraph 7.6.2, above, shall therefore be insufficient.

7.7 PRICING

7.7.1 Basis of Calculation.

.1 Changes Not Involving Time. Contract Adjustments to the Contract Price on account of Compensable Changes or Deleted Work, other than Contract Adjustments to the Contract Price for Compensable Delay, shall be calculated according to one of the following methods:

(1) **Lump Sum.** By mutual acceptance of a lump sum proposal from Contractor based solely on Allowable Costs and Allowable Markups, that is properly itemized and supported by sufficient substantiating data to permit evaluation.

(2) **Unit Prices.** By the unit prices set forth in the Construction Contract or such other unit prices as are subsequently and mutually agreed to in writing between the County and Contractor, with no amount added thereto for Allowable Markups.

(3) **Estimating Guides.** For Compensable Changes with respect to which County elects to make a unilateral and final determination pursuant to Paragraph 7.7.11, below, by the sum of all the following:

(a) **Materials.** The reasonable value of materials and equipment documented as having been actually incorporated into the Work, which reasonable value may be less but shall never be more than Contractor's actual Allowable Costs therefor.

(b) **Labor.** An estimate of the reasonable costs of labor, installation and other services using the lower of the estimated prices for the locale of the Project (or if prices are not reported for the locale of the Project, the estimated prices that are reported for the region in which the Project is located) as reported in following recognized estimating guides: (i) R. S. Means Company, Inc. Building Construction Cost Data, Western Region - Latest Edition, P.O. Box 800 Kingston, MA 02364-800; or (ii) Lee Saylor, Inc. Current Construction Costs - Latest Edition, 9420 Topanga Canyon Boulevard, Woodland Hills, CA 91311.

(c) **Allowable Markup.** The amount that results when the applicable Allowable Markup is applied to the sum of the amounts derived from preceding Clauses (a) and (b) of this Subparagraph 7.7.1.1 (3).

(4) **Time and Materials.**

(a) **Compensable Changes.**

(i) **Contract Adjustment.** With respect to Compensable Changes, if none of the methods provided for in Subparagraphs 7.7.1.1 (1) through 7.7.1.1 (3), above, is applicable, then the additive amount increasing the Contract Price shall be calculated by taking (A) the total of the reasonable expenditures by Contractor and its Subcontractors, documented in the manner required by Paragraph 7.7.2, below, for Allowable Costs that are actually and directly incurred and paid in the performance of the Compensable Change, not to exceed for any Compensable Change a price that is reasonable, competitive and fair to County given the amount and type of Work involved and the circumstances under which the Compensable Change is performed, and (B) adding thereto the amount which results when the applicable Allowable Markups are applied to such total specified in preceding Clause (A) of this Subparagraph 7.7.1.1 (4) (a) (1).

(ii) **T & M/Guaranteed Maximums.** A Contract Adjustment that is calculated pursuant to this Subparagraph 7.7.1.1 (4) shall be subject to a not-to-exceed or guaranteed maximum price if such not-to-exceed or guaranteed maximum price has been mutually agreed upon between County and Contractor.

(iii) **Lump Sum Options.** If Contractor has reason to believe that a lump sum or unit price for a Subcontractor's performance of a portion of Extra Work authorized to be performed on a time and materials basis is available and Contractor has reason to believe such price is lower than the price that would be charged by the Subcontractor pursuant to the foregoing time and materials calculation, then Contractor has an obligation to inform County of that fact (along with the provision to the County of a complete itemized breakdown in accordance with Subparagraph 7.6.2.3(2), above) so as to afford County the opportunity, on a fully informed basis as to the component Allowable Costs and Allowable Markups that comprise such price, to avail itself of such favorable pricing.

(b) **Deleted Work.** With respect to Deleted Work (whether or not the Deleted Work involves a related Compensable Change as described in Paragraph 7.7.8, below), if none of the methods provided for in Subparagraphs 7.7.1.1 (1) through 7.7.1.1 (3), above, is applicable, then, in addition to the reduction, if any, that may be due to Owner pursuant to Subparagraph 8.2.6.2, below, (pertaining to Contract Adjustments shortening the Contract Time due to Deleted Work) and any additional reductions or credits to which County may be entitled under Paragraph 7.7.5, below, the Contract Price shall be reduced by the greater of either:

(i) the value assigned to the Deleted Work in the Schedule of Values attached to the Construction Contract, inclusive of all estimated markups by Contractor and any Subcontractor for overhead and profit set forth in the Schedule of Values (or, if insufficient detailed information on costs, overhead and profit for the Deleted Work is explicitly assigned in the Schedule of Values, as derived from the cost, bidding and/or estimating information that formed the basis for the establishment of the values set forth in such Schedule of Values); or

(ii) a reasonable estimate of the value of the Deleted Work (inclusive of all costs, overhead and profit) as of the date that the Construction Contract was executed by County and Contractor.

.2 Changes Involving Time. Contract Adjustments that are based on an extension of the Contract Time for Compensable Delay or a shortening of the Contract Time due to Deleted Work shall be calculated in the manner stated in the provisions of Section 3.3 of the Construction Contract and Article 8, below. Contract

Adjustments that are based on an acceleration in performance of the Work that is ordered by County in writing to overcome a Compensable Delay for which the Contractor is entitled to an extension of the Contract Time that has been properly requested and is not granted by County due to a County decision to accelerate rather than extend the Contract Time shall be calculated in the manner stated in the provisions of Article 8, below.

7.7.2 Time and Materials Documentation. Without limitation to any other provisions of the Contract Documents, Contractor's right to reimbursement of Allowable Costs incurred by Contractor or Subcontractors in the performance of a Compensable Change for which the Contract Adjustment is calculated pursuant to the time and materials method set forth in Subparagraph 7.7.1.1 (4), above, shall be conditioned on Contractor's compliance with the following conditions with respect to documentation of the Extra Work that is involved in the performance of the Compensable Change:

.1 Labor. At the close of each Day on which such Extra Work is performed, Contractor shall submit to County and, if requested, to the Inspector of Record, an Extra Work report, on forms provided by County, that sets forth with respect to each and all of the actual hours spent in performance of the Extra Work on the Day that the Extra Work was performed the following: the names of the workers, their classifications, hours worked and hourly rates. Such forms shall include a written certification by Contractor's project manager or superintendent at the time of submission that the information contained therein is complete and accurate.

.2 Materials, Equipment. At the close of each Day on which such Extra Work is performed, Contractor shall submit to County and, if requested, to the Inspector of Record, an Extra Work report, on forms provided by County, that sets forth with respect to each and all of the materials and equipment used or consumed in the performance of the Extra Work on the Day that the Extra Work was performed, the following: a list of the materials and equipment, prices or rates charged, in the case of equipment a description of the type of equipment, identification number, and hours of operation (including loading and transportation), and copies of delivery tickets, invoices or other documentation confirmatory of the foregoing.

.3 Other Expenditures. At the close of each Day on which such Extra Work is performed, Contractor shall submit to County and, if requested, to the Inspector of Record, an Extra Work report, on forms provided by County, that sets forth a list of other expenditures constituting Allowable Costs incurred in performance of the Extra Work on the Day that the Extra Work was performed, along with documentation verifying the amounts thereof in such detail as County may require.

.4 Subsequent Documentation. Documentation not available on any Day that a portion of the Extra Work is performed shall be submitted as soon as they are available but not later than twenty-one (21) Days after the earlier of the Day of delivery or incorporation of the particular item of Extra Work at the Site.

.5 Subcontractor Costs. Extra Work performed by Subcontractors on a time and materials basis shall be documented in the same manner as required of Contractor under this Paragraph 7.7.2. If Owner approves of a lump sum price for a Subcontractor's performance of Extra Work, then Contractor shall submit in lieu of the documentation otherwise required by this Subparagraph 7.7.2.5, such documentation as may be requested by Owner confirming the Extra Work performed on any given Day.

.6 Authentication. In addition to the foregoing, County may require that Contractor comply with other reasonable requirements pertaining to observation and verification of time and materials work and authentication of time and materials tickets and invoices by persons designated by County for such purpose.

.7 WAIVER BY CONTRACTOR.

THE FAILURE OF CONTRACTOR TO SUBMIT AUTHENTICATION OF COSTS IN THE MANNER REQUIRED BY THIS PARAGRAPH 7.7.2 SHALL, IF COUNTY ELECTS IN ITS REASONABLE DISCRETION TO TREAT IT AS SUCH, CONSTITUTE A WAIVER BY CONTRACTOR OF ANY RIGHT TO A CONTRACT ADJUSTMENT FOR THE ALLOWABLE COSTS INCURRED FOR PERFORMANCE OF THAT PORTION OF THE EXTRA WORK FOR WHICH CONTRACTOR HAS FAILED TO PROVIDE SUCH AUTHENTICATION.

7.7.3 Allowable Costs. The term "Allowable Costs" (1) means the costs that are listed in this Paragraph 7.7.3 and (2) excludes costs that do not constitute Allowable Costs under Paragraph 7.7.4, below:

.1 Labor. Straight-time wages and, if specifically authorized by County in writing, overtime wages for employees employed at the Site, including wages for employees of Subcontractors performing engineering or fabrication detailing at locations other than at the Site. The use of a labor classification which would increase the Allowable Costs for Extra Work will not be permitted unless Contractor establishes the necessity for the use of such labor classification. Overtime wages and salaries shall only constitute an Allowable Cost to the extent permitted by the Contract Documents and only as specifically authorized by County in writing setting forth the amount of overtime anticipated, which amount shall be deemed the maximum amount of overtime reimbursable as an Allowable Cost. As part of the Allowable Costs permitted by this Subparagraph 7.7.3.1, Contractor shall be entitled to be reimbursed wages paid to a "time and materials clerk" employed by Contractor to track and document Compensable Changes that are authorized or permitted to be performed on a time and materials basis pursuant to Subparagraph 7.7.1.1 (4), above, provided that the time expended by such employee is verified by contemporaneously maintained time sheets maintained by such clerk showing the actual time spent tracking and documenting the performance of Compensable Changes separately from other tasks or functions performed by such clerk.

.2 Benefits. To the extent based on wages reimbursable under Subparagraph 7.7.3.1, above, net actual employer costs of payroll taxes (FICA, Medicare, SUTA, FUTA), insurance (as adjusted for experience modifiers, premium discounts, dividends, rebates, expense constants, assigned risk pool costs, net cost reductions due to policies with deductibles for self-insured losses, assigned risk rebates, or the like), health and welfare, pension, vacation, apprenticeship funds and benefits required by lawful collective bargaining agreements.

.3 Materials. Costs of materials used or consumed in the Work. Such costs for Extra Work shall be at a price that is competitive to the price charged for similar materials delivered within the general vicinity of the Site by other subcontractors, suppliers, manufacturers and distributors. The cost for any such item that is not new shall mean "fair market value" based on the estimated price a reasonable purchaser would pay to purchase the used material at the time it was used or consumed for the Work, which fair market value must be declared by Contractor and approved by County prior to such use or consumption.

.4 Taxes. Sales taxes on the costs of the materials described in Subparagraph 7.7.3.3, above.

.5 Equipment Rental. Rental charges for necessary machinery and equipment, exclusive of hand tools, whether rented from Contractor or others. No charge shall be allowed or credit required for items which have a replacement value of One Hundred Dollars (\$100) or less. The allowable rental rates shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, loading, transportation, repairs and maintenance of any kind, depreciation, storage, insurance and all incidentals. If equipment used for Extra Work is used intermittently and, when not in use, could be returned to its rental source at less expense to County than holding it at the Site, it shall be returned, unless Contractor elects to keep it at the Site at no expense to County. Under no circumstances shall the aggregate rentals chargeable for any item of equipment exceed the following percentages of the fair market value of the item at the time of its first use for the Work, which fair market value must be declared by Contractor and approved by County prior to the first use of such item in or for the Work: (1) if the item is owned by the Contractor or any company affiliated with Contractor, the aggregate rentals shall not exceed 75% of such fair market value; and (2) if the item is not owned by the Contractor or any company affiliated with Contractor, the aggregate rentals shall not exceed 100% of such fair market value. All equipment shall be acceptable to County, in good working condition, and suitable for the purpose for which it is to be used. Manufacturer's ratings and manufacturer's approved modifications shall be used to classify equipment, and it shall be powered by a unit of at least the minimum rating recommended by the manufacturer. The cost of major repairs or overhauls of rented equipment or machinery shall be deemed a cost of business of the lessor of such equipment or machinery and shall not be reimbursable as an Allowable Cost.

.6 Subcontractors. Payments made by Contractor to Subcontractors; provided, however, that: (1) such payments are not otherwise precluded from reimbursement by the terms of the Contract Documents; (2) such payments are for Work performed in accordance with the requirements of the Contract Documents; (3) such payments are for amounts properly due and owing by Contractor under the terms of the governing contract between Contractor and such Subcontractor; and (4) in the case of payments for extra work performed by a Subcontractor pursuant to a change order executed between Contractor and a Subcontractor the change order was executed under circumstances in which the Subcontractor was entitled under the terms of its contract with Contractor to receive the amount of additional compensation agreed to in the change order.

.7 Royalties, Permits. Costs of royalties and permits.

.8 Bonds. Costs of bonds required to be furnished by Contractor (not Subcontractors) under the terms of the Contract Documents; provided, however, that such additional costs chargeable for Extra Work or credited for Deleted Work shall not exceed two percent (2%) of the costs described in Subparagraphs 7.7.3.1 through 7.7.3.7, above.

7.7.4 Costs Not Allowed. Allowable Costs shall not include any of the costs associated with any of the following (whether incurred by Contractor or a Subcontractor):

- .1** superintendent(s);
- .2** assistant superintendent(s);
- .3** project engineer(s);
- .4** project manager(s);
- .5** scheduler(s);
- .6** estimator(s);
- .7** drafting or detailing (except as otherwise permitted by Paragraph 7.7.3.1, above)
- .8** vehicles not dedicated solely to the performance of the Work;
- .9** small tools with a replacement value not exceeding One Hundred Dollars (\$100);
- .10** office expenses, including staff, materials and supplies;
- .11** on-Site and off-Site trailer and storage rental and expenses;
- .12** Site fencing not added solely due to the performance of Extra Work;
- .13** utilities, including gas, electric, sewer, water, telephone, telefax and copier equipment;
- .14** computer and data-processing personnel, equipment and software;
- .15** federal, state or local business, income and franchise taxes;
- .16** insurance (including, without limitation, general liability, automobile and worker's compensation);
- .17** without limitation to Contractor's right to liquidated damages under Section 3.3 of the Construction Contract, Losses, of any kind, incurred by Contractor or a Subcontractor, of any Tier, that arise from or relate to Delay (including Excusable Delay, Compensable Delay or Unexcused Delay) or acceleration to overcome the effects of such Delay; and
- .18** costs and expenses of any kind or item not specifically and expressly included in Paragraph 7.7.3, above.

7.7.5 Allowable Markups. Allowable Markups consist of the percentages set forth provided for by this Paragraph 7.7.5. Allowable Markups are deemed to cover, without limitation, the following: (1) direct and indirect overhead (including, without limitation, consumables, small tools and cleanup) and profit of the Contractor; (2) direct and indirect overhead (including, without limitation, consumables, small tools and cleanup) and profit of the Subcontractors, of every Tier; and (3) all costs that are not reimbursable to Contractor under Paragraph 7.7.4, above. Subject to the exclusions and limitations set forth in Paragraph 7.7.7, below, or elsewhere in the Contract Documents, Allowable Markups include and are limited to the following:

.1 Self-Performed Work

(1) **Compensable Change.** With respect to all or that portion of a Compensable Change involving Self-Performed Work, the Allowable Markup to Contractor shall be not more than five percent (5%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the Allowable Costs incurred by Contractor in the performance thereof, including, without limitation, Allowable Costs for materials or equipment purchased by Contractor from a first-Tier Subcontractor that is not an Installation Subcontractor.

(2) **Deleted Work.** With respect to all or that portion of Deleted Work involving Self-Performed Work, County shall be entitled to a credit equal to five percent (5%) of the amount of the credit for the savings to Contractor for the Self-Performed Work as calculated pursuant to Subparagraph 7.7.1.1 (4), (b), above.

.2 Installation Subcontractors (First-Tier)

(1) **Compensable Change.** With respect to all or that portion of a Compensable Change that is performed by a first-Tier Installation Subcontractor, the Allowable Markups to the first-Tier Installation Subcontractor and the Contractor shall be as follows:

(a) The Allowable Markup to the first-Tier Installation Subcontractor shall be not more than fifteen percent (15%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the Allowable Costs incurred by such first-Tier Installation Subcontractor in the performance of such Compensable Change.

(b) The Allowable Markup to Contractor shall be five percent (5%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the sum of (i) the Allowable Costs incurred by such first-Tier Subcontractor in the performance of such Compensable Change and (ii) the amount which results when the Allowable Markups thereon that are permitted pursuant to preceding Clause (a) of this Subparagraph 7.7.5.2 (1) are multiplied times such Allowable Costs.

(2) **Deleted Work.** With respect to all or that portion of Deleted Work that was to have been performed by a first-Tier Installation Subcontractor, the Contract Price shall be reduced as provided in Subparagraph 7.7.1.1 (4), (b), above. In addition, a credit shall be due from Contractor of five percent (5%) of the amount of the total credit due pursuant to Subparagraph 7.7.1.1 (4), (b), above.

.3 Installation Subcontractors (Second-Tier)

(1) **Compensable Change.** With respect to all or that portion of a Compensable Change that is performed by a second-Tier Installation Subcontractor, the Allowable Markups to such second-Tier Installation Subcontractor, to the first-Tier Installation Subcontractor that is above and in the same vertical contractual line of Tiers with such second-Tier Installation Subcontractor and to the Contractor, shall be as follows:

(a) The Allowable Markup to the second-Tier Installation Subcontractor shall be not more than five percent (5%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the Allowable Costs incurred by such second-Tier Installation Subcontractor in the performance of such Compensable Change.

(b) The Allowable Markup to the first-Tier Installation Subcontractor that is above and in the same vertical contractual line of Tiers with such second-Tier Installation Subcontractor shall be not more than fifteen percent (15%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the sum of (i) the Allowable Costs incurred by such second-Tier Installation Subcontractor in the performance of such Compensable Change and (ii) the amount which results when the Allowable Markups thereon pursuant to preceding Clause (a) of this Subparagraph 7.7.5.3 (1) are multiplied times such Allowable Costs.

(c) The Allowable Markup to Contractor shall be five percent (5%), which percentage shall for purposes of calculating the Contract Adjustment be multiplied times the sum of (i) the Allowable Costs incurred by the second-Tier Installation Subcontractor in the performance of such Compensable Change and (ii)

the amounts which result when the Allowable Markups thereon that are permitted pursuant to Clauses (a) and (b) of this Subparagraph 7.7.5.3 (1) are multiplied times such Allowable Costs.

(2) **Deleted Work.** With respect to all or that portion of Deleted Work that was to have been performed by a second-Tier Installation Subcontractor, the Contract Price shall be reduced as provided in Subparagraph 7.7.1.1 (4), (b), above. In addition, a credit shall be due from Contractor of five percent (5%) of the amount of the total credit due pursuant to Subparagraph 7.7.1.1 (4), (b), above.

.4 Other Subcontractors.

(1) **Compensable Changes:** With respect to any other Subcontractor, of any Tier, performing all or a portion of a Compensable Change who is not an Installation Subcontractor or who is an Installation Subcontractor below the second-Tier, the following shall apply:

(a) No markup shall be allowed to such other Subcontractor.

(b) The Subcontractor that is positioned in the Tier immediately above such other Subcontractor shall be entitled to an Allowable Markup of not more than five percent (5%) upon the Allowable Costs incurred by such other Subcontractor in the performance thereof.

(c) No other Allowable Markup by any Subcontractor of any Tier above such other Subcontractor shall be permitted.

(d) Contractor shall be entitled to an Allowable Markup of five percent (5%) of the sum of (i) the Allowable Costs of such other Subcontractor incurred in the performance of such Compensable Change and (ii) the amount which results when the Allowable Markup permitted by Clause (b) of this Subparagraph 7.7.5.4 (1) is multiplied times such Allowable Costs.

(2) **Deleted Work.** With respect to all or that portion of Deleted Work that was to have been performed by such other Subcontractor who is not an Installation Subcontractor or who is an Installation Subcontractor below the second-Tier, the Contract Price shall be reduced as provided in Subparagraph 7.7.1.1 (4), (b), above. In addition, a credit shall be due from Contractor of five percent (5%) of the amount of the total credit due pursuant to Subparagraph 7.7.1.1 (4), (b), above.

7.7.6 Review of Markups. It is Contractor's responsibility to review information submitted by Subcontractors to ensure that all markups comply with the requirements of the Contract Documents. Payment by the County of markups that exceed Allowable Markups shall not be considered as a waiver by County of the right to require repayment by Contractor of any markup charged that is in excess of Allowable Markups and such excess amounts shall be promptly paid by Contractor to County.

7.7.7 Exclusions and Limitations. Allowable Markups are not permitted:

.1 on agreed unit prices;

.2 on materials, products or equipment furnished by County;

.3 on liquidated damages payable to Contractor pursuant to Section 3.3 of the Construction Contract for Compensable Delay;

.4 to a Subcontractor who contracts to perform a Compensable Change that is in fact wholly performed by another Subcontractor (for purposes of this Paragraph 7.7.7, "wholly performed" means that all of the Compensable Change, other than supervision or minor labor or materials, are furnished by such other Subcontractor); or

.5 on any cost or compensation with respect to which the Contract Documents state that there shall be "no Allowable Markup", "no markup for overhead and profit" or words of similar meaning.

7.7.8 Net Calculations. If any one Change or collection of Changes in the same or related portions of the Work, or in multiple portions of Work covered by a single bulletin or instruction by County, involve both Compensable Change and Deleted Work, and if the added Allowable Costs resulting from the Compensable Change exceed the reduction calculated in accordance with Subparagraph 7.7.1.1 (4), (b), above, (excluding any Allowable Markup to the Contractor) then the calculation of Allowable Markups to Contractor shall be based on and limited to the resulting net increase in the Allowable Costs.

7.7.9 Unit Prices. Unless otherwise stated in the Contract Documents, unit prices stated in the Contract Documents or subsequently agreed upon by County and Contractor shall be deemed to include and encompass all costs of performance, overhead and profit, including, without limitation, all Allowable Costs and Allowable Markups. If the unit price stated in the Contract Documents is based on an estimated quantity established by County in the Construction Contract and the actual quantity of such unit-priced item varies by more than 25% above or below the estimated quantity, an equitable adjustment in the Contract Price shall be made upon demand of either County or Contractor. Such equitable adjustment shall be based solely upon any increase or decrease in Allowable Costs (without any Allowable Markups), due solely to the variation above 125% or below 75% of the estimated quantity.

7.7.10 Discounts. For purposes of determining Allowable Costs of a Compensable Change, all trade discounts, rebates, refunds, and returns from the sale of surplus materials and equipment shall accrue and be credited to County, and Contractor shall take all necessary steps to ensure that such discounts, rebates, refunds, and returns are secured.

7.7.11 Prompt Pricing. It is fundamental to the County's objective of controlling costs that performance of Compensable Changes on a time and materials basis of compensation and without a not-to-exceed price be curtailed. Contractor recognizes that prompt pricing by Contractor is critical to this objective. Accordingly, in addition to and without limitation on any of the County's other rights or remedies, including, without limitation, its right to enforce a waiver under Subparagraph 7.6.2.4, above, it is agreed that if Contractor fails to timely submit a complete Change Order Request in accordance with Paragraph 7.6.2, above, with respect to any circumstance, event or occurrence constituting a Compensable Change then: (1) any Delay to the performance of the Work associated with the performance, delayed performance or nonperformance of such Compensable Change shall be conclusively deemed to be an Unexcused Delay; and (2) the County shall have the option, exercised in its sole discretion, to unilaterally fix and determine the amount of the Contract Adjustment to the Contract Price for such Compensable Change based on the "estimating guide" method set forth in Subparagraph 7.7.1.1 (3), above, which determination shall be conclusively final and binding upon Contractor.

7.7.12 Final Payment. No Claim by Contractor for a Contract Adjustment shall be allowed if asserted after Final Payment.

7.7.13 Full Resolution. Except as otherwise stated in Paragraph 7.7.14, below, the signing of a Change Order by Contractor and the County shall be conclusively deemed to be a full resolution, settlement and accord and satisfaction with respect to any and all Loss and Delay, whether known or unknown at the time of execution of the Change Order, related to the subject matter of the Change Order, including, without limitation, all rights to recovery of costs, expenses or damages for delay, disruption, hindrance, interference, extended or extraordinary (direct and indirect) overhead, multiplicity of changes, loss of productivity, labor, wage or material cost escalations, inefficiency, legal expenses, consultant costs, interest, lost profits or revenue, bond and insurance costs, changes in taxes and other similar and related Losses. The foregoing provisions of this Paragraph 7.7.13 shall, whether or not they are expressly stated or referenced on the face of a Change Order, be deemed to be part of the terms of the Change Order and shall be deemed to supersede and govern over any other provision contained in any proposal, estimate or other documents attached to or referenced in such Change Order that conflicts with the provisions of this Paragraph 7.7.13. **ANY RIGHT OR CLAIM BY CONTRACTOR FOR ANY ADDITIONAL COMPENSATION OR EXTENSION OF TIME RELATING DIRECTLY OR INDIRECTLY TO A COMPENSABLE CHANGE DESCRIBED IN A FULLY EXECUTED CHANGE ORDER SHALL BE CONCLUSIVELY DEEMED WAIVED BY CONTRACTOR, EVEN IF THE CIRCUMSTANCES GIVING RISE TO SUCH ADDITIONAL COMPENSATION OR EXTENSION OF TIME WERE NOT SUSPECTED BY OR KNOWN TO THE CONTRACTOR AT THE TIME OF EXECUTION OF THE CONSTRUCTION CHANGE DIRECTIVE AND IF SUSPECTED OR KNOWN WOULD HAVE BEEN CONSIDERED BY CONTRACTOR TO HAVE BEEN MATERIAL TO CONTRACTOR'S AGREEMENT TO THE CONTRACT ADJUSTMENT SET FORTH IN THE CHANGE ORDER.**

7.7.14 Reserved Rights. Change Orders shall be executed by Contractor without any express reservation of rights by Contractor to reserve for the future the assertion of any right of recovery from the County for Loss or Delay arising out of or relating to the subject matter of the Change Order. Execution of a Change Order, Unilateral Change Order or Construction Change Directive shall not be interpreted as a waiver, release or settlement of any rights or claims that the County may have for any of the following: (1) Defective Work; (2) liquidated damages or actual Losses for Delay; or (3) recoupment by County (by way of withholding of funds, set off or recovery from Contractor) of amounts paid by County for costs or markups on costs that the County discovers, following payment of such amounts to Contractor, do not constitute proper charges to County, or that constitute charges that are not properly substantiated, under the terms of the Contract Documents.

7.7.15 No "Total Cost" Calculations. Contractor represents and warrants that it has the ability to generate and maintain complete and accurate cost accounting records that, if required, will reflect the actual costs of the Work incurred or avoided for multiple Compensable Changes and, on an event-by-event basis, the effect of multiple and concurrently occurring or caused Compensable Delays on the progress of the Work. Accordingly, Contractor agrees that all Change Order Requests and Claims shall be itemized in a manner that, with reasonable mathematical certainty and without reliance upon probabilities or inferences, segregates on a discrete, event-by-event basis the direct, actual Allowable Costs associated with each individual Compensable Change or Compensable Delay. Unless otherwise agreed to by County in writing in the exercise of its sole discretion, Change Order Requests and Claims shall not be based, in whole or in part, upon any methodology (such as "total cost" or "modified total cost" methodologies) that purports to establish Contractor's entitlement to additional compensation inferentially based, solely or principally, on the difference between Contractor's total costs for the Work or a portion of the Work and its original Bid.

7.7.16 Multiple Changes. The County reserves the absolute right to make whatever Changes, including, without limitation, Compensable Changes or Deleted Work, that it determines, in its sole discretion, are necessary or otherwise desirable. Under no circumstances shall the individual or cumulative number, value or scope of such Changes, or their individual and cumulative impact on the Work, become a basis for Contractor to assert any claim for breach of contract, abandonment, rescission, termination, cardinal change or reformation of the Construction Contract, nor shall such circumstances be the basis for Contractor, or any of the Subcontractors, of any Tier, to assert a right of recovery of any Loss if such right is not permitted by, or is in excess of that allowed under, the Contract Documents.

7.7.17 Continuous Performance. Subject to Contractor's rights under Section 15.4, below, no dispute or disagreement with respect to any Changes or Delay, including, without limitation, disputes over Contractor's right to or the terms of a Contract Adjustment, shall relieve or excuse Contractor from the obligation to proceed with and maintain continuous, expeditious and uninterrupted performance of the Work, including performance of any disputed Changes.

ARTICLE 8 CONTRACT TIME

8.1 COMMENCEMENT AND COMPLETION

8.1.1 Date of Commencement. The Date of Commencement shall not be postponed by the failure of Contractor or of persons or entities for whom Contractor is responsible to perform an obligation. Contractor shall not knowingly, except by agreement or instruction of the County in writing, commence operations on the Site or elsewhere prior to receipt of a Notice to Proceed. Contractor shall not commence any Work at the Site prior to its obtaining the insurance required by Article 11, below, and the Performance Bond and Payment Bond required by Article 12, below, and the Date of Commencement of the Work shall not be changed by the effective date of such insurance or bonds.

8.1.2 Substantial, Final Completion. Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion and Final Completion within the Contract Time, as adjusted for extensions of time duly permitted, authorized and noticed pursuant to Section 8.2, below.

8.1.3 Adjustments to Contract Time. Subject to the limitations set forth in this Article 8 and elsewhere in the Contract Documents, the Contract Time shall be extended for Compensable Delays and Excusable Delays and shall, where appropriate, be shortened for Deleted Work.

8.1.4 Early Completion. Nothing stated in these General Conditions or elsewhere in the Contract Documents shall be interpreted as creating any contractual right, express or implied, on the part of Contractor to finish

the Work earlier than the Contract Time. Contractor has included in its Contract Price the costs of all Contractor's and its Subcontractors' direct and indirect overhead, including but not limited to all staff, temporary facilities, temporary utilities and home office overhead for the entire duration of the Contract Time. These costs have been included in the Contract Price notwithstanding Contractor's anticipation of possibly completing the Work in fewer Days than established by the Contract Time. Under no circumstances (including, without limitation, circumstances in which the County has approved in writing of Contractor completing early) shall the County be liable to Contractor for any Losses, of any kind, due to the inability of Contractor to complete the Work earlier than the Contract Time, regardless of the cause, including, without limitation, Delays due to acts or omissions (intentional or negligent) of the County, Inspectors of Record, County Consultants, Separate Contractors or others. If the Contractor anticipates completing early, it must obtain in advance County's approval in writing of such early completion. Approval by County of such early completion may be granted or withheld in the County's sole and absolute discretion.

8.2 DELAYS AND EXTENSIONS OF TIME

8.2.1 Adjustments to Contract Time

.1 Extensions. Provided that Contractor has complied with the provisions of this Section 8.2 (including, without limitation, the requirements pertaining to timely delivery of a Notice of Delay and Request for Extension), if, as a result of Excusable Delay or Compensable Delay to the actual, as-built critical path of activities leading to achievement of Substantial Completion, Contractor is unable to achieve Substantial Completion within the Contract Time for Substantial Completion, then the Contract Time for Substantial Completion and Final Completion shall be extended, either by Change Order or Unilateral Change Order, for the length of the proven, resulting Delay to Contractor's ability to so complete the Work. The Contract Time shall not be adjusted for Unexcused Delays.

.2 Shortening. Contractor shall within ten (10) Days after receiving notice of Deleted Work prepare and deliver to County a Time Impact Analysis of the impact of the Deleted Work upon the critical path to determine if the Contract Time should be shortened thereby and if so the duration of the shortening. If the County and Contractor are unable to agree upon the duration of the shortening, then County shall make a Good Faith Determination of the reasonable amount of time that the Contract Time shall be shortened on account of such Deleted Work.

.3 Prescribed Calculations.

(1) Work Day Lost Calculations. Contractor may claim an Excusable Delay or a Compensable Delay for a full Day only if all Work on a critical path activity is stopped for more than six (6) hours of a normal eight (8) hour Work Day and for a half-Day only if all Work on a critical path activity is stopped for three (3) to six (6) hours of such a normal Work Day. No Excusable Delay or Compensable Delay may be claimed if all Work on a critical path activity is stopped for less than three (3) hours of such a normal work Day. Similarly, where Deleted Work results in the projected avoidance of the need to perform more than six (6), or between three (3) and six (6) hours of all Work on a critical path activity on such a normal work day, the Contract Time shall be contracted by a full Day or half Day, respectively.

(2) Dry Out Time Calculations. Contract Adjustments to the Contract Time that are based upon unusual precipitation that is an Act of God as defined in Paragraph 1.1.2, above, shall include, in addition to the number of Days of Excusable Delay to which Contractor is entitled due to a cessation of Work that occurs at the Site while the unusual precipitation is occurring, an additional extension for the Delay to the critical path of activities affecting Substantial Completion that is the result of Contractor being unable, after cessation of the unusual precipitation at the Site, to proceed with performance of Work due to wet or muddy conditions at the Site (hereinafter referred to as "dry out" time); provided, however, that the amount of dry out time for which Contractor is entitled to an extension of time in any given calendar month shall not exceed the number of Days that is the product derived by multiplying (a) the number of Days of Excusable Delay to which Contractor is entitled due to a cessation of Work that occurs at the Site while such unusual precipitation is occurring, by (b) a fraction, the (i) numerator of which is the number of Days of Excusable Delay due to measurable unusual precipitation occurring at the Site during such calendar month that constitutes an Act of God as defined in Paragraph 1.1.2, above, and (ii) the denominator of which is the total number of Days of measurable precipitation occurring at the Site during said calendar month (including both the number of Days comprising the normal, 10-year monthly average of measurable precipitation recorded by NOAA and the excess, or unusual precipitation that constitutes an Act of God as defined in Paragraph 1.1.2, above).

8.2.2 Notice of Delay.

.1 Submission. Contractor shall submit written Notice of Delay to County if any instruction, request, drawing, specification, action, condition, omission, default or other circumstance occurs that constitutes an Excusable Delay or Compensable Delay or other matter that may involve or require a Contract Adjustment extending the Contract Time. Such notice shall be provided prior to performance of the Work affected or involved and no later than seven (7) Days after the Discovery Date of such circumstance.

.2 Form. Notices of Delay shall be provided using forms furnished by County or, if requested by County, using forms furnished by Contractor that are approved by County. Failure by County to request or approve a particular form shall not relieve Contractor of its obligation to provide Notice of Delay in a written form that complies with the requirements of this Paragraph 8.2.2.

.3 Content. Each Notice of Delay in order to be considered complete shall include:

(1) a general statement of the circumstances giving rise to the Notice of Delay (including, without limitation, identification of any related Construction Change Directive);

(2) a Reasonable Order of Magnitude Estimate by Contractor of any related Contract Adjustments extending the Contract Time; and

(3) if such circumstances involve a right to a Contract Adjustment to the Contract Price for Compensable Change that has not been waived by Contractor, Contractor shall include, if not previously provided, a complete and timely Notice of Change.

.4 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO PROVIDE A COMPLETE AND TIMELY NOTICE OF DELAY UNDER CIRCUMSTANCES WHERE A NOTICE OF DELAY INVOLVING A DELAY IS REQUIRED BY THIS PARAGRAPH 8.2.2 SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO A CONTRACT ADJUSTMENT ON ACCOUNT OF SUCH CIRCUMSTANCES AND A WAIVER OF ANY RIGHT TO FURTHER RECOURSE OR RECOVERY BY REASON OF OR RELATED TO SUCH DELAY.

.5 No County Notice. Failure by Contractor to submit a timely or proper Notice of Delay under circumstances in which a Notice of Delay is required shall in no way affect County's right to a Contract Adjustment shortening the Contract Time on account of such circumstances.

8.2.3 Request for Extension.

.1 Submission. With respect to any matter that may involve or require an adjustment extending the Contract Time, Contractor shall, within fourteen (14) Days after receipt by County of a Notice of Delay pursuant to Paragraph 8.2.2, above, submit to County a written Request for Extension.

.2 Form. Requests for Extension shall be provided using forms furnished by County or, if requested by County, using forms furnished by Contractor that are approved by County. Failure by County to request or approve a particular form shall not relieve Contractor of its obligation to provide Requests for Extension in a written form that complies with the requirements of this Paragraph 8.2.3.

.3 Content. Each Request for Extension in order to be considered complete shall include:

(1) a detailed description of the circumstances giving rise to the request for Contract Adjustment to the Contract Time and a Time Impact Analysis (a Request for Extension that seeks an extension for more than one Delay shall be supported by a separate Time Impact Analysis for each separate Delay); and

(2) if such circumstances involve a right to a Contract Adjustment of the Contract Price on account of Compensable Change that has not been waived by Contractor, Contractor shall include, if not previously provided, a complete and timely Change Order Request.

.4 WAIVER BY CONTRACTOR.

FAILURE BY CONTRACTOR TO PROVIDE A COMPLETE AND TIMELY REQUEST FOR EXTENSION UNDER CIRCUMSTANCES WHERE A REQUEST FOR EXTENSION INVOLVING A DELAY IS REQUIRED BY THIS PARAGRAPH 8.2.3 SHALL, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4.6 OF THE GENERAL CONDITIONS, CONSTITUTE A WAIVER BY CONTRACTOR OF THE RIGHT TO A CONTRACT ADJUSTMENT ON ACCOUNT OF SUCH CIRCUMSTANCES AND A WAIVER OF ANY RIGHT TO FURTHER RECOURSE OR RECOVERY BY REASON OF OR RELATED TO SUCH DELAY.

.5 Adjustments Shortening Time. Failure by Contractor to submit a timely or proper Request for Extension under circumstances in which a Request for Extension is required shall in no way affect County's right to a Contract Adjustment shortening the Contract Time on account of such circumstances.

8.2.4 Response by County. After receipt of a timely and complete Request for Extension, County shall investigate the facts concerning the cause and extent of such Delay and, depending on whether the Request for Extension is justified, will notify Contractor of its approval or disapproval of all or a portion of Contractor's request. Extensions of time approved by County shall apply only to that portion of the Work affected by the Delay, and shall not apply to other portions of Work not so affected.

8.2.5 Formal Notice of Essence. Contractor recognizes and acknowledges that timely submission of a formal Notice of Delay and a formal Request for Extension, whether or not the circumstances of a Delay may be known to County or available to County through other means, are not mere formalities but are of crucial importance to the ability of County to promptly identify, prioritize, evaluate and mitigate the potential effects of Delay. Any forms of informal notice, whether verbal or written (including, without limitation, statements at regular job meetings or entries in monthly reports, daily logs, job meeting minutes, updated Construction Schedules or look-ahead schedules), that do not strictly comply with the formal requirements of Paragraph 8.2.2, above, and Paragraph 8.2.3, above, shall accordingly be deemed insufficient to satisfy the notice requirements of this Article 8.

8.2.6 Compensation for Delay.

.1 Compensable Delay. Contract Adjustments to the Contract Price for a Compensable Delay that involve an extension of the Contract Time shall be based, without duplication to any other Contract Adjustments to the Contract Price, on the terms of Section 3.3 of the Construction Contract. Contractor agrees to accept such right of Contract Adjustment in lieu of any other right that may exist under Applicable Laws for recovery of Losses due to Compensable Delay, whether incurred by Contractor or its Subcontractors, of any Tier.

.2 Deleted Work. The Contract Time and Contract Price shall be reduced by Contract Adjustment for Deleted Work (including, without limitation, Deleted Work associated with a termination by County of a portion of the Construction Contract or a deletion of portion of Work for the convenience of the County or due to an Event of Contractor Default) that results in a shortening of the Contract Time.

(1) Contract Time. The Contract Adjustment shortening the Contract Time for Substantial Completion shall be the number of Days that Contractor at the time of contracting would have reasonably expected to expend in performance of the Deleted Work and that, based on the Contractor's original Construction Schedule prepared on or about the time of contracting, were reasonably expected by Contractor to be critical to Substantial Completion of the Work within the Contract Time for Substantial Completion.

(2) Contract Price. The Contract Adjustment reducing the Contract Price shall be the product of (1) the number of Days that the Contract Time for Substantial Completion is shortened pursuant to preceding Clause (1) of this Subparagraph 8.2.6.2 multiplied times (2) the amount of liquidated damages set forth in Paragraph 3.3.2 of the Construction Contract, without any additional credit to County for Allowable Markups.

8.2.7 Acceleration of the Work.

.1 Due to Unexcused Delay. If County makes a Good Faith Determination based on County's observations of progress in performance of the Work by Contractor that Contractor will not achieve Substantial Completion of the Work within the Contract Time as adjusted pursuant to Paragraph 8.2.1, above, then Contractor shall, following receipt of a written request by County to accelerate, immediately respond in writing setting forth a detailed plan for accelerating the Work. All measures necessary, including working overtime, additional shifts, Saturdays, Sundays and holidays, to accelerate performance to ensure that the Work is performed within the Contract Time shall be taken by Contractor and the cost thereof shall be paid for by Contractor at Contractor's Own Expense. County may also take all other necessary measures to ensure no further Delays affect achievement of Substantial Completion and Final Completion of the Work within the Contract Time and the Contractor shall reimburse County, or County may withhold from payment due to Contractor, for Losses incurred by County in taking such measures.

.2 Due to Excusable Delay. Contractor shall have the right, exercised in its sole discretion, to accelerate performance of the Work to overcome time lost due to Excusable Delay. Such acceleration, if performed other than at the written direction of County, shall be deemed a voluntary acceleration and the cost of such accelerated performance shall be paid for by Contractor at Contractor's Own Expense. If County directs in writing that the Work be accelerated to overcome an Excusable Delay that is not concurrent with an Unexcused Delay, then Contractor shall be entitled to a Contract Adjustment to the Contract Price for such acceleration on and subject to the same terms as provided for in Subparagraph 8.2.7.3, below, in the case of an acceleration to overcome a Compensable Delay.

.3 Due to Compensable Delay. County shall have the right, exercised in its sole and absolute discretion, in lieu of granting a Contract Adjustment to the Contract Time for Compensable Delay, to direct in writing the acceleration of the Work by Contractor in order to recapture time lost due to such Compensable Delay. County and Contractor shall endeavor prior to commencement of such acceleration to mutually agree upon the amount of compensation to be paid therefor. County shall have the right, in the absence of such an agreement, to direct in writing that Contractor accelerate. Contractor shall comply with such directive. Contractor's right to a Contract Adjustment to the Contract Price on account of such acceleration shall be limited to (1) the premium time portion of any overtime paid for labor provided by Contractor or any Subcontractor, plus (2) additional supervision costs for additional shifts of supervision provided at the Site by Contractor only (not by Subcontractors), plus (3) Allowable Markup thereon as provided in Paragraph 7.7.5, above. Except as directed by County in the manner stated in this Subparagraph 8.2.7.3, no statements, conduct or actions by County will be construed as creating an obligation on the part of County to agree to a Contract Adjustment to the Contract Price on account of any cost of overtime or other costs associated with an acceleration of the Work to recapture time lost due to Compensable Delay.

8.2.8 Concurrent Delays. For purposes of the calculations provided for in this Paragraph 8.2.8, the words "concurrent delay", "concurrently delay" or "occur concurrently" mean the portion of two or more Delays affecting the critical path to Substantial Completion that are overlapping or co-existent. Contractor's right to a Contract Adjustment of the Contract Time (pursuant to Subparagraphs 8.2.8.1, 8.2.8.2 and 8.2.8.3, below) and Contract Price (pursuant to Subparagraphs 8.2.8.4, 8.2.8.5 and 8.2.8.6, below) shall, in the case of concurrent delays, be calculated in accordance with the following:

.1 If an Excusable Delay and a Compensable Delay occur concurrently, the maximum extension of the Contract Time shall be the number of Days from the commencement of the first Delay to the cessation of the Delay which ends last.

.2 If an Unexcused Delay occurs concurrently with either an Excusable Delay or a Compensable Delay, the maximum extension of the Contract Time shall be the number of Days, if any, by which such Excusable Delay or Compensable Delay exceeds the number of Days of such Unexcused Delay.

.3 If an Unexcused Delay occurs concurrently with both an Excusable Delay and a Compensable Delay, the maximum extension of the Contract Time shall be the number of Days, if any, by which such Excusable Delay and Compensable Delay, as determined pursuant to Subparagraph 8.2.8.1, above, exceeds the number of Days of such Unexcused Delay.

.4 If an Unexcused Delay occurs concurrently with a Compensable Delay, the maximum period of time for which Contractor shall be entitled to a Contract Adjustment to the Contract Price in accordance with Section 3.3 of the Construction Contract shall be the number of Days, if any, by which such Compensable Delay exceeds the number of Days of such Unexcused Delay.

.5 If a Compensable Delay occurs concurrently with an Excusable Delay, the maximum period of time for which Contractor shall be entitled to a Contract Adjustment to the Contract Price in accordance with Section 3.3 of the Construction Contract shall be the number of Days, if any, by which such Compensable Delay exceeds the number of Days of such Excusable Delay.

.6 If an Unexcused Delay occurs concurrently with both an Excusable Delay and a Compensable Delay, the maximum period of time for which Contractor shall be entitled to a Contract Adjustment to the Contract Price in accordance with Section 3.3 of the Construction Contract shall be the number of Days, if any, by which such Compensable Delay exceeds the number of Days of such Unexcused Delay.

8.2.9 Delay Claims. Claims by Contractor relating to disputed Contract Adjustments due to Delay shall be made in accordance with applicable provisions of Section 4.3, above.

8.2.10 Exercise of County Rights. Notwithstanding any other provision of the Contract Documents to the contrary, County's exercise in accordance with the Contract Documents of any of its rights or remedies permitted by Applicable Laws or the Contract Documents in response to a failure by Contractor or any Subcontractor to comply with the Contract Documents shall not, under any circumstances, entitle Contractor to a Contract Adjustment.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 PAYMENT BY COUNTY

9.1.1 Time for Payment. County shall make payment of undisputed sums due to the Contractor upon Applications for Payment requesting Progress Payment not later than thirty (30) Days after receipt of an Application for Payment requesting Progress Payment that has been properly and timely prepared and submitted by Contractor, and approved by County, in accordance with the requirements of the Contract Documents.

9.1.2 Not Acceptance. No approval, inspection or use of, or payment for, the Work by County or by any person or entity acting on County's behalf shall constitute acceptance of Work that is not in accordance with the Contract Documents or a waiver of any of County's rights under the Contract Documents.

9.1.3 Interest. If County fails to make payment of an undisputed sum due as a Progress Payment to the Contractor as required by this Article 9, County shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of California Code of Civil Procedure §685.010. The number of Days available to the County to make payment without incurring such interest shall be reduced by the number of Days by which the County exceeds the seven (7) Day response time applicable to the County set forth in Section 9.5, below. The foregoing is the County's sole obligation with respect to payment of interest earned or accrued on an amount claimed due prior to the commencement by Contractor of legal proceedings for recovery of such amount.

9.1.4 Disputed Payments. Subject to Contractor's rights under Section 9.8, below, no good faith dispute or disagreement between County and Contractor with respect to the amount of any payment claimed due by Contractor shall relieve or excuse Contractor from the obligation to proceed with and maintain continuous, expeditious and uninterrupted performance of the Work.

9.2 APPLICATIONS FOR PAYMENTS

9.2.1 Submission by Contractor. Applications for Payment requesting Progress Payment shall be properly prepared and submitted by Contractor to County once a month on the twenty-fifth (25th) Day of the month. If the twenty-fifth (25th) Day of the month is a weekend or Holiday, the Application for Payment shall be submitted on the next working day.

9.2.2 Period of Application. The period covered by each such Application for Payment requesting Progress Payment shall be not more than thirty (30) Days ending on the twenty-fifth (25th) Day of the month in which such Application for Payment is submitted.

9.2.3 Schedule of Values. Each Application for Payment shall be accompanied by a Schedule of Values prepared and submitted in accordance with the requirements of the Contract Documents, including, without limitation, the provisions of Section 9.3, below.

9.2.4 Changes in Work. Applications for Payment may include requests for payment on account of Compensable Changes in the Work which have been properly authorized by Change Order or Unilateral Change Order.

9.2.5 Progress Payments. Applications for Payment requesting Progress Payments shall be based on amounts calculated in accordance with the provisions of Section 9.4, below.

9.2.6 Percentage Completion. Applications for Payment requesting Progress Payments shall indicate the Contractor's estimate of the percentage of completion of each line item listed in the Schedule of Values as of the end of the period covered by the Application for Payment.

9.2.7 Projected Work. Unless approved by County in writing in advance of an Application for Payment being submitted, which approval may be granted or denied in the sole and absolute discretion of County, Applications for Payment shall only include amounts for Work performed to the twenty-fifth (25th) Day of the month in which the Application for Payment was submitted and shall not include request for payment of amounts for Work projected to be performed, stored or delivered beyond that date.

9.2.8 Disagreements. In the event of a disagreement between County and Contractor over the accuracy or reasonableness of the Contractor's statement of percentage of progress achieved that is contained in the Application for Payment, the County shall make a Good Faith Determination of the percentage, which percentage shall then be inserted by Contractor in the Application for Payment and the Application for Payment submitted, or resubmitted, incorporating such revision.

9.2.9 Substantial Completion. For the sole purpose of the percentage calculation set forth in Paragraph 9.2.6, above, and for no other purpose, the Work shall be deemed one hundred percent complete upon Substantial Completion and the amount released to Contractor shall, subject to County's right to withhold pursuant to Section 9.6, below, be a sum sufficient to increase the total of Progress Payments to Contractor to ninety-five percent (95%) of the Contract Price.

9.2.10 Certification by Contractor. Each Application for Payment that is submitted by Contractor shall be signed by Contractor with a certification by Contractor to County that: (1) the data comprising the Application for Payment is accurate and the Work has progressed to the point indicated; (2) to the best of Contractor's knowledge, information and belief, the Work is in accordance with the Contract Documents; (3) Contractor is entitled to payment in the amount certified; and (4) all sums previously applied for by Contractor on account of the Work performed by the Subcontractors and that have been paid by County have been paid to the Subcontractors performing such Work, without any retention, withholding or back charge by Contractor.

9.2.11 Stored Materials. County may, in the exercise of its sole and absolute discretion, approve or disapprove for inclusion in Contractor's Application for Payment the cost of materials to be incorporated, but not yet incorporated, in the Work and delivered and suitably stored either at the Site or at some other appropriate location acceptable to the County. As part of any request for such approval, Contractor shall furnish evidence satisfactory to County: (1) of the cost of such materials; (2) that such materials are under the exclusive control of Contractor, or if not, that title to the materials is in the County, free of any lien or encumbrance; and (3) with respect to materials stored off-Site, that the materials are safely and suitably stored in a bonded warehouse with appropriate insurance coverage satisfactory to County. No payment or approval by County pursuant to this Paragraph 9.2.11 shall (a) be construed as an inspection or acceptance of the materials; (b) relieve Contractor of its continuing and sole responsibility for the care and protection of, and sole responsibility for any Loss to, such materials, from any cause whatsoever; or (c) operate as a waiver of rights by County.

9.2.12 Title. Contractor warrants that title to all the Work covered by an Application for Payment will pass to County no later than the time of payment. Contractor further warrants that upon submittal of an Application for Payment all Work for which approval for payment has been previously issued by County shall, to the best of Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of

Contractor, the Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials or equipment for the Work.

9.3 SCHEDULE OF VALUES

9.3.1 Initial Submission. Within twenty-one (21) Days after issuance by County of the Notice of Intent to Award, Contractor shall submit to County a Schedule of Values, prepared in a form and incorporating a level of detail satisfactory to County, that allocates the Contract Price to various portions of the Work, including, without limitation, each portion of the Work to be performed by a Subcontractor, self-performed Work, discrete categories of direct (i.e., on-Site) overhead costs (sometimes referred to as “general conditions costs”), Contractor home office and indirect overhead and profit and amounts reserved for contingencies.

9.3.2 Balanced Allocation. The Schedule of Values shall be balanced, reflecting in each line item Contractor's estimated or actual cost commitments for the category of Work included in the line item and a proportionate share of Contractor's overhead and profit. Techniques, such as “front-end loading”, designed to create an imbalanced cash flow are strictly prohibited.

9.3.3 Line Estimates. Line item values stated in the Schedule of Values that are based on Contractor's estimates, rather than actual subcontract prices, shall be identified as such and replaced with actual subcontract prices when they become available as the subcontracting process progresses.

9.3.4 Updating. The Schedule of Values shall be updated by Contractor each month as necessary to reflect the Contractor's actual progress in subcontracting the Work. An updated Schedule of Values shall be attached to each Application for Payment.

9.3.5 Substantiation. Contractor shall provide such data as County may reasonably require to substantiate that the Schedule of Values has been prepared in conformance with the requirements of the Contract Documents. Failure to provide such substantiation shall result in the Schedule of Values being deemed incomplete and unapproved by County for use by Contractor in submitting its Applications for Payment.

9.3.6 Corrections. If corrections are required in order to make the Schedule of Values comply with the requirements of the Contract Documents, such corrections shall be made as a condition of the Contractor's Application for Payment being considered properly prepared, submitted and complete.

9.3.7 Changes to Work. Costs involved in the performance of Work covered by Change Orders, Unilateral Change Orders or Construction Change Directives shall be, at the option of County, either separately scheduled or incorporated as adjustments to the respective trade lines of Work to which they apply. Except as otherwise expressly required by Article 7, above, the Schedule of Values shall not be utilized by Contractor as a basis for calculating Contract Adjustments.

9.3.8 Applications for Payment. The Schedule of Values prepared by Contractor in accordance with the requirements of the Contract Documents shall be used as a basis for County's review and approval or disapproval of Applications for Payment.

9.4 PROGRESS PAYMENT CONDITIONS

9.4.1 Progress Payment Amount. Subject to the other provisions of the Contract Documents, the amount of each Progress Payment requested in an Application for Payment shall be computed as follows:

.1 take that portion of the Contract Price properly allocable to Work (other than materials, products or equipment furnished by County) permanently incorporated at the Site as part of the Work, based on the product derived by multiplying (1) the percentage completion of each such portion of the Work times (2) the portion of the total Contract Price allocated to that portion of the Work in the Schedule of Values, less a retention of five percent (5%) thereof;

.2 add that portion of the Contract Price that is allocable to materials and equipment (other than materials, products or equipment furnished by County) approved by County pursuant to Paragraph 9.2.11, above, and suitably stored at the Site or at a location off-Site, less a retention of five percent (5%) thereof;

.3 subtract the aggregate of previous payments made by the County; and

.4 subtract amounts, if any, that County has determined will be withheld pursuant to an exercise of the County's right to withhold pursuant to Section 9.6, below.

9.4.2 Other Conditions and Documentation. Contractor shall submit its Applications for Payment requesting Progress Payments to County using such forms as required by County. Without limitation to any other conditions to payment set forth elsewhere in the Contract Documents, the following shall be conditions precedent to a proper submission, and to County's approval, of each Application for Payment:

.1 submission of a Schedule of Values that complies with Section 9.3, above;

.2 submission of Contractor's certification required by Paragraph 9.2.10, above;

.3 submission of: (1) forms of conditional releases of stop payment notice and bond rights upon progress payment, complying with California Civil Code §8132, for all Work performed during the time period covered by the current Application for Payment, signed by Contractor and the Subcontractors, of every Tier; and (2) forms of unconditional releases of stop payment notice and bond rights upon progress payment, complying with California Civil Code §8134, for all Work performed during the time period covered by the previous Application for Payment, signed by Contractor and the Subcontractors, of every Tier;

.4 compliance by Contractor with its obligation for daily maintenance of Record Drawings and Specifications as required by Paragraph 3.10.1, above;

.5 compliance by Contractor with its obligation for submission of daily reports as required by Paragraph 3.10.2, above;

.6 compliance by Contractor with its obligations for submission of scheduling information and updating of the Construction Schedule as required by Section 3.9, above, and other provisions of the Contract Documents pertaining to preparation or updating of schedules and scheduling information;

.7 proper payment of prevailing wages as defined in California Labor Code §1720, et seq.;

.8 timely submission of adequate and complete certified payroll records for any time period that Work was performed and for which payment is being requested;

.9 submission of certifications by Contractor and the Subcontractors as required by Applicable Laws certifying that all employee benefit contributions due and owing have been paid in full;

.10 submission of sales tax information as required by Paragraph 3.6.3, above; and

.11 compliance by Contractor with all of its other obligations for submission of documentation or performance of conditions which, by the terms of the Contract Documents, constitute conditions to Contractor's right to receive payment for Work performed.

9.5 COUNTY APPROVAL/REJECTION OF APPLICATIONS FOR PAYMENT

9.5.1 Review by County. Subject to County's rights under Paragraph 9.5.4, below, County shall promptly review Applications for Payment submitted by Contractor and provide its approval or disapproval, in whole or part, within (1) seven (7) Days after receipt of an Application for Payment requesting Progress Payment, and (2) within fourteen (14) Days after receipt of an Application for Payment requesting Final Payment.

9.5.2 Disapproval by County. Disapproval by County disapproving of an Application for Payment shall be accompanied by an explanation of the reasons for such disapproval. Failure by County to specify in its disapproval a particular grounds for disapproval of an Application for Payment shall not waive the County's right to assert such grounds as a basis for any future disapproval, or nullification of its prior approval, of that or any other Application for Payment.

9.5.3 Re-submittal by Contractor. An Application for Payment that is disapproved by County shall be corrected and re-submitted by Contractor after receipt by Contractor of the notice of disapproval. A re-submitted Application for Payment shall be reviewed and responded to by County in the same manner as provided in Paragraphs 9.5.1 and 9.5.2, above. If re-submitted, the re-submitted Application for Payment shall be reviewed and responded to by County in the same manner as provided in Paragraph 9.5.1 and Paragraph 9.5.2, above. If not re-submitted, only the amount, if any, that is approved for payment shall be paid until such time as a proper Application for Payment that includes the disapproved amount has been submitted in another Application for Payment and, upon such re-submittal, approved for payment.

9.5.4 Approval Nullification. County reserves the right to nullify any prior approval of an Application for Payment that is later found to not be in compliance with the requirements of the Contract Documents, whether or not such noncompliance was previously actually observed or apparent on the face of the Application for Payment, and based on such nullification County may take either of the following actions, as applicable: (1) if the Application for Payment has not yet been paid by County, disapprove of that portion of the Application for Payment that is not in compliance and withhold payment of that sum until the noncompliance is fully rectified; or (2) if the Application for Payment has been paid by County, nullify the County's prior approval and withhold payment of such disputed amounts in response to future Applications for Payment; provided, however, that in either case the amount of the County's nullification shall be limited to that portion of the amount requested in the Application for Payment that is in dispute and the amount of its withholding from the current or any future Application for Payment shall be limited to the amount nullified plus any additional withholding permitted under Section 9.6, below.

9.5.5 No Waiver by County. Neither approval by County or Architect of, failure by County to exercise its right of nullification with respect to, nor payment by County upon, an Application for Payment or any portion thereof shall be interpreted as or constitute a waiver or release of any of County's rights to require Contractor's full compliance with the Contract Documents.

9.5.6 No Representation. Neither approval by County or Architect of, failure by County to exercise its right of nullification with respect to, nor payment by County upon, an Application for Payment or any portion thereof shall be interpreted as a representation that County or Architect has: (1) made exhaustive or continuous on-Site inspections to check the quality or quantity of the Work, (2) reviewed Contractor's construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from the Subcontractors and other data requested by County or Architect to substantiate Contractor's right to payment, or (4) made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Price.

9.6 WITHHOLDING OF PAYMENT

9.6.1 Grounds for Withholding. County may decline to approve an Application for Payment and withhold payment requested under any unpaid Application for Payment, in whole or in part, to such extent that County makes a Good Faith Determination that withholding is necessary, in the sole discretion of County, because of any of the following circumstances:

.1 Third-Party Claims. Third-party claims or stop payment notices filed or reasonable evidence (including, without limitation, failure by Contractor to submit conditional releases of stop payment notice and bond rights required by the Contract Documents) indicating the possible filing of such claims or stop payment notices.

.2 Defective Work. Defective Work not remedied.

.3 Nonpayment. Failure of Contractor to make proper payments to a Subcontractor for services, labor, materials or equipment or other Work.

.4 Inability to Complete. Reasonable doubt that the Work can be completed for the then unpaid balance of the Contract Price or within the Contract Time.

.5 Violation of Applicable Laws. Failure of Contractor or a Subcontractor to comply with Applicable Laws.

.6 Penalty. Any penalty asserted against County by virtue of Contractor's failure to comply with Applicable Laws.

.7 Lack of Progress. Failure by Contractor to maintain progress in accordance with the Construction Schedule.

.8 Setoff. Any reason specified elsewhere in the Contract Documents as grounds for a withholding, offset or setoff or that would legally entitle County to a setoff or recoupment.

.9 Consultant Services. Additional professional, consultant or inspection services required due to Contractor's failure to comply with the Contract Documents.

.10 Liquidated Damages. Liquidated damages payable to County pursuant to Section 3.2 of the Construction Contract or that there is a reasonable basis to believe will be payable to County based upon the Contractor's project date for Substantial Completion based on its update Construction Schedule or based upon other evidence available to County of the probable date that the Work will be Substantially Completed.

.11 Damage. Loss caused to County, a Separate Contractor or any other person or entity under contract to County, by Contractor or a Subcontractor.

.12 Cleanup. Cleanup performed by County and chargeable to Contractor pursuant to the terms of the Contract Documents.

.13 Employee Benefits. Failure of Contractor to pay contributions due and owing to employee benefits funds pursuant to any applicable collective bargaining agreement or trust agreement.

.14 Required Documents. Failure of Contractor to submit on a timely basis, proper and complete documentation required by the Contract Documents, including, without limitation, schedule updates, 'look ahead' schedules, pricing information, certifications and other required reports or documentation.

.15 Labor Compliance. Failure of Contractor or any Subcontractor to properly pay prevailing wages as defined in California Labor Code §§1720 et seq.

.16 Nullification. Nullification by County pursuant to Paragraph 9.5.4, above, of its prior approval of an Application for Payment.

.17 Releases. Failure by Contractor to submit any conditional release of stop payment notice and bond rights that is required pursuant to Subparagraph 9.4.2.3, above or Subparagraph 9.10.4.4, below.

.18 Other Breach. A breach by Contractor of any obligation or provision of the Contract Documents.

9.6.2 Application of Withholding. Sums properly withheld pursuant to Paragraph 9.6.1, above, may be used by County without a prior judicial determination of County's actual rights with respect to the grounds on which such withholding is based. Contractor agrees and hereby designates County as its agent for such purposes, and agrees that such payments shall be considered as payments made under the Construction Contract by County to Contractor. County shall submit to Contractor an accounting of such funds disbursed on behalf of Contractor. As an alternative to such payment, County may, in its sole and absolute discretion, elect to exercise its right to adjust the Contract Price as provided in Section 13.4, below.

9.6.3 Final Payment. In accordance with California Public Contract Code §7107, the amount to be withheld from Contractor's Final Payment pursuant to a withholding asserted pursuant to Paragraph 9.6.1, above, shall be limited to one hundred fifty percent (150%) of the disputed amount.

9.6.4 Release of Withholding. When the reasons for withholding of payment as set forth in Paragraph 9.6.1, above, are removed, approval by County will be promptly issued to Contractor for amounts previously withheld and payment of amounts withheld will be made by County within thirty (30) Days thereafter.

9.6.5 Additional Rights. The County's right of withholding set forth in this Section 9.6 is in addition to, and not a limitation upon, any other rights of withhold that County may have under the Contract Documents or Applicable Laws.

9.7 PAYMENTS BY CONTRACTOR

9.7.1 Payments to Subcontractors. Contractor shall not include in its Applications for Payment sums on account of any Subcontractor's portion of the Work that it does not intend to pay to such Subcontractor. Upon receipt of payment from County, Contractor shall pay the Subcontractors performing the Work, out of the amount paid to Contractor on account of such Subcontractors' portions of the Work, the amount to which said Subcontractors are entitled in accordance with the terms of their contracts with Contractor and Applicable Laws, including, without limitation, California Public Contract Code §7107. Contractor shall remain responsible, notwithstanding a withholding by County pursuant to the terms of these General Conditions, to promptly satisfy from its own funds sums due to all the Subcontractors who have performed the Work that is included in Contractor's Application for Payment. Contractor shall, by appropriate agreement, require each Subcontractor to make payments to its sub-subcontractors and suppliers in similar manner. County shall have no obligation to pay or be responsible in any way for payment to the Subcontractors, of any Tier.

9.7.2 Payments in Trust. Any funds that Contractor receives in payment for services or Work performed by a Subcontractor shall constitute assets of a trust, which trust funds shall be used for the exclusive benefit of the Subcontractor for the purpose of discharging Contractor's financial obligations on account of labor, services, materials or equipment furnished to the Project by the Subcontractor, provided that such labor, services, materials or equipment were performed in accordance with the Contract Documents, were included in an Application for Payment to County, and were paid by the County to Contractor. Contractor shall be the trustee of the trust and shall be required to deal with the trust assets for the benefit of the Subcontractor. Contractor shall not be a beneficiary of the trust. Nothing herein shall be construed as an intent to require that Contractor maintain trust funds in separate bank accounts, specifically designate any third party as a beneficiary of the trust created herein, or otherwise give rise to any cause of action against the County by any third party beneficiary of the trust created herein.

9.7.3 Payment Information. County will, on request, furnish to any of the Subcontractors, if practicable, information for such Subcontractor's review regarding percentages of completion or amounts applied for by Contractor and action taken thereon by County on account of portions of the Work done by such Subcontractor.

9.7.4 Joint Payment. County shall have the right, if deemed necessary in its sole discretion, to issue joint checks made payable to Contractor and any of the Subcontractors, of any Tier. The joint check payees shall be solely responsible for the allocation and disbursement of funds included as part of any such joint payment. Endorsement on such check by a payee shall be conclusively presumed to constitute receipt of payment by such payee. In no event shall any joint check payment be construed to create: (1) any contract between County and any of the Subcontractors, of any Tier; (2) any obligation from County to any of the Subcontractors; or (3) any third-party rights against County or Architect.

9.7.5 Direct Negotiation of Stop Payment Notices. County shall have the right to directly discuss, negotiate, settle or pay, without notice to or participation by Contractor, any stop payment notice claims asserted by the Subcontractors, of any Tier, and to deduct such sums paid from sums due to Contractor.

9.7.6 Release of Stop Payment Notices. With the exception of that portion, and only that portion, of a stop payment notice or other claim that arises as a result of a failure by the County to make payment to Contractor under circumstances constituting a breach of the Construction Contract by County, if any stop payment notice or other claim, whether invalid or valid, is filed with, served upon or made or asserted against the County or the Site by any

Subcontractor, of any Tier, or their agent or employee, for money claimed due, then Contractor shall within five (5) Days after written notice by the County procure, furnish and record appropriate releases or other instruments which under Applicable Laws will fully release, extinguish and remove such stop payment notice or claim, as well as any notices of pending action or other notices recorded against the Site in connection with the enforcement thereof. All costs of such actions by Contractor shall be paid for by Contractor at Contractor's Own Expense. Unless and until fully released as aforesaid, the County shall have the right to retain from any payment then due, or thereafter to become due, to Contractor an amount equal to one hundred and fifty percent (150%) of the amount necessary to satisfy, discharge and defend against any such stop payment notice or claim and any action or proceeding thereon, including, without limitation, an amount for anticipated attorney's fees and costs. If the amount to be paid, or the amount retained, is insufficient to satisfy, discharge and defend against any such stop payment notice or claim and any action or proceeding thereon, then Contractor shall be liable for the difference and upon demand shall immediately deposit the same with the County. The provisions of this Paragraph 9.7.6 are in addition to such other rights as the County may have against Contractor under the Contract Documents or Applicable Laws.

9.7.7 No County Obligation. Neither County nor Architect shall have any obligation to pay or to see to the payment of money to any of the Subcontractors except as may otherwise be required by Applicable Laws.

9.8 FAILURE OF PAYMENT

If, through no fault of Contractor or failure by Contractor to comply with its obligations under the Contract Documents either: (1) approval or disapproval by County of an Application for Payment properly prepared and submitted by Contractor and requesting payment that is otherwise undisputed by County is not issued within the time period required therefor by the terms of this Article 9; or (2) the County does not (a) upon an Application for Payment properly prepared and submitted by Contractor pay to Contractor, within the time period required for payment by County, an undisputed amount approved by County as earned, which approval has not been, and is not thereafter, nullified by County, or (b) pay to Contractor an amount that has been awarded by arbitration or judgment of a court of competent jurisdiction, then Contractor may, following delivery to County of a written "10-day stop work order", stop the Work until, as applicable, an approval or disapproval by County, or payment by County, is received by Contractor. Promptly upon receipt of such approval or disapproval, or payment, as applicable, Contractor shall resume the Work. Any resulting Delay associated with the shut down and start up of the Work as a result of Contractor's proper exercise of its right to stop work under this Section 9.8 shall constitute a Compensable Delay.

9.9 SUBSTITUTION OF SECURITIES FOR RETENTION

9.9.1 Public Contract Code. Pursuant to the requirements of California Public Contract Code §22300, upon the Contractor's request, the County will make payment to the Contractor of any funds withheld from payments to ensure performance under the Contract Documents if the Contractor deposits with the County, or in escrow with a California or federally chartered bank in California acceptable to the County ("Escrow Agent"), securities eligible for the investment of State Funds under Government Code §16430, or bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the County, upon the following conditions:

.1 The Contractor shall be the beneficial owner of any securities substituted for monies withheld for the purpose of receiving any interest on such securities.

.2 All expenses relating to the substitution of securities under said §22300 and under this Section 9.9, including, but not limited to the County's overhead and administrative expenses and expenses of Escrow Agent, shall be the responsibility of the Contractor.

.3 Securities or certificates of deposit substituted for monies withheld shall be of a value of at least equivalent to the amounts of the retention to be paid to the Contractor pursuant to the Contract Documents.

.4 If the Contractor shall choose to deposit securities in lieu of monies withheld with an Escrow Agent, the Contractor, the County and Escrow Agent shall, as a prerequisite to such deposit, enter into an escrow agreement. Such escrow agreement shall be substantially in the form "Escrow Agreement for Security Deposits in Lieu of Retention" set forth in California Public Contract Code §22300(f).

.5 The Contractor shall obtain the written consent of Surety to such agreement.

.6 Securities, if any, shall be returned to the Contractor only upon satisfactory Final Completion of the Work.

9.9.2 **Substitute Security.** To minimize the expense caused by such substitution of securities, the Contractor shall, prior to or at the time the Contractor requests to substitute security, deposit sufficient security to cover the entire amount to be withheld. Should the current market value of such substituted security at any time fall below the amount for which it was substituted, or any other amount which the County withholds pursuant to the Contract Documents, the Contractor shall immediately and at the Contractor's Own Expense deposit additional security qualifying under said §22300 until the current market value of the total security deposited is no less than the amount subject to withholding under the Contract Documents. Securities shall be valued as often as conditions of the securities market warrant, but in no case less frequently than once per month.

9.9.3 **Deposit of Retentions.** Alternatively, subject to the conditions set forth in Paragraph 9.9.1, above, upon request of the Contractor, the County shall make payment of retentions directly to Escrow Agent at the expense of the Contractor, provided that the Contractor, the County and Escrow Agent shall, as a prerequisite to such payment, enter into an escrow agreement in the same form as prescribed in Subparagraph 9.9.1.4, above. At the Contractor's Own Expense, the Contractor may direct the investment of the payments into securities and interest bearing accounts and the Contractor shall receive the interest earned on the investments. Escrow Agent shall hold such direct payments by the County under the same terms provided herein for securities deposited by the Contractor. Upon satisfactory Final Completion of the Work, the Contractor shall receive from Escrow Agent all securities, interest and payments received by Escrow Agent from the County, less escrow fees and charges of the Escrow Account, according to the terms of said §22300 and the Contract Documents.

9.10 FINAL PAYMENT

9.10.1 **Payment by County.** Subject to the County's right of withholding as set forth in Section 9.6, above, or elsewhere in the Contract Documents, Final Payment shall be made by County not more than sixty (60) Days after completion of the Work as defined in Clauses (1), (2), (3) or (4) of California Public Contract Code § 7107(c), whichever definition is earliest satisfied.

9.10.2 **Application for Final Payment.** Upon issuance by County of the Notice of Final Completion pursuant to Paragraph 9.13.5, below, Contractor shall submit to County its Application for Payment requesting Final Payment.

9.10.3 **Review by County.** County will review and approve or disapprove of the Application for Payment requesting Final Payment as provided in Section 9.5, above.

9.10.4 **Conditions to Final Payment.** Without limitation to any other conditions to payment set forth elsewhere in the Contract Documents, the following shall be conditions to a proper submission, and to County's approval, of Contractor's Application for Payment requesting Final Payment:

.1 submission of Contractor certification as required by Paragraph 9.2.10, above;

.2 submission of consent of Surety, if any, to Final Payment;

.3 submission of a certificate evidencing that the insurance required by the Contract Documents is in force;

.4 submission of conditional releases and waivers of stop payment notice and bond rights upon final payment in the form required by California Civil Code §8136 executed by Contractor and by all the Subcontractors, of every Tier;

.5 submission of all Close-Out Documents (including, without limitation, complete, accurate Record Drawings and Specifications certified by Contractor as required by Paragraph 3.10.1, above);

.6 timely submission of adequate and complete certified payroll records for any time period that Work was performed, which have not been submitted by Contractor in connection with its previous Applications for Payment;

.7 proper payment of prevailing wages as defined in California Labor Code §§1720, et seq.;

.8 submission of certifications by Contractor and each Subcontractor, as required by any applicable collective bargaining agreement or trust agreement or Applicable Laws, certifying that all employee benefit contributions due and owing have been paid in full; and

.9 submission of any other documents or information required by the Contract Documents as a condition of Final Payment or Final Completion.

9.10.5 Disputed Amounts. Pursuant to California Public Contract Code § 7107, County may deduct and withhold from Final Payment an amount of up to one hundred fifty percent (150%) of any disputed amounts, including, without limitation, amounts to protect County against any Loss caused or threatened as a result of Contractor's failing to fully satisfy the conditions of Final Completion and Final Payment.

9.10.6 No Waiver by County. The making of Final Payment by County shall not constitute a waiver by County of any rights or claims, including, without limitation, any right or claim for reimbursement of Allowable Costs or Allowable Markup paid to Contractor that is determined by County, either before or after Final Payment, to have been not due to Contractor.

9.10.7 WAIVER BY CONTRACTOR.

ACCEPTANCE OF FINAL PAYMENT BY CONTRACTOR OR A SUBCONTRACTOR SHALL CONSTITUTE A WAIVER OF ALL RIGHTS BY THAT PAYEE AGAINST COUNTY FOR RECOVERY OF ANY LOSS, EXCEPTING ONLY THOSE CLAIMS THAT HAVE BEEN SUBMITTED BY CONTRACTOR IN THE MANNER REQUIRED BY SECTION 4.3, ABOVE, PRIOR TO, OR AT THE TIME OF CONTRACTOR'S SUBMISSION TO COUNTY OF, ITS APPLICATION FOR PAYMENT REQUESTING FINAL PAYMENT.

9.11 SUBSTANTIAL COMPLETION

9.11.1 Contract Time. Contractor shall achieve Substantial Completion of the Work, or such portion of the Work as may be designated at any time by County for separate delivery, in accordance with the requirements of the Contract Time and other provisions of the Contract Documents.

9.11.2 Request for Inspection. Contractor shall notify the County when Contractor believes that the Work, or portion thereof designated by the County in the Contract Documents or otherwise for separate delivery, is Substantially Complete.

9.11.3 Substantial Completion Inspection. When Contractor gives notice to County that it has achieved Substantial Completion of the Work, or a County designated portion thereof, unless the County determines that the Work or County designated portion thereof is not sufficiently complete to warrant an inspection to determine Substantial Completion, County, Inspector of Record, Architect and such others as may be designated by County will inspect the Work, or such County designated portion thereof.

9.11.4 Substantial Completion Punch List. At the conclusion of such inspection, County shall prepare and give to Contractor (or, Owner may request that Contractor prepare and provide to County) a Substantial Completion Punch List of items, if any, to be completed or corrected for Substantial Completion. If Contractor disputes any of the items included, it shall so note its objection on the Substantial Completion Punch List. Contractor shall proceed within forty-eight (48) hours after preparation of the Substantial Completion Punch List to commence correction or completion of the items on the Substantial Completion Punch List, including, without limitation, any disputed items, and all such items of Work shall be completed promptly by Contractor before the Work will be considered as Substantially Complete. Failure by County, Architect, Inspector of Record or Contractor to include an item on the Substantial Completion Punch List does not alter the responsibility of Contractor to perform the Work in accordance with the Contract Documents. Items of Work necessary for Substantial Completion that, for any reason, have been omitted from the Substantial

Completion Punch List shall be added to the Substantial Completion Punch List and Contractor shall, at the request of County, Architect or Inspector of Record made at any time prior to Final Payment commence correction or completion of such items within forty-eight (48) hours and all such items of Work shall be completed by Contractor promptly and before the Work will be considered as Substantially Complete.

9.11.5 Re-Inspection. Contractor shall notify County when the items of Work shown on the Substantial Completion Punch List are completed. County, Inspector of Record, Architect and such others as County deems necessary or appropriate will then make a further inspection to determine whether such Work is Substantially Complete. If such inspection, or any subsequent re-inspection required pursuant hereto, discloses any item, whether or not included on the Substantial Completion Punch List, which must be completed or corrected before Substantial Completion, Contractor shall, as a condition of Substantial Completion, complete or correct such item, which shall then be re-inspected to confirm that such Work is Substantially Complete. Contractor shall reimburse County, or County may at its option withhold from Contractor's payments, amounts incurred by County to the Inspector of Record, Architect, County Consultants or others whose services, for reasons within the control or responsibility of Contractor or the Subcontractors, are necessary for more than two (2) such re-inspections to determine Substantial Completion.

9.11.6 Notice of Substantial Completion. When County determines that the Work, or such designated portion thereof, is Substantially Complete, County will prepare a Notice of Substantial Completion on the County's form, which shall state the date of Substantial Completion. If the Notice of Substantial Completion is for the entire Work, then the County will attach to it the Final Completion Punch List prepared in accordance with Paragraph 9.13.2, below. Regardless of the date the Notice of Substantial Completion is issued, Substantial Completion shall be deemed to have occurred on the date stated in the Notice of Substantial Completion.

9.12 PARTIAL OCCUPANCY OR USE

County reserves the right to beneficially occupy all or any portion of the Work at any time before Substantial Completion of the entire Work. Beneficial occupancy means that County has assumed physical occupancy and use of all or such portion of the Work. Commencement of improvements or other work by Separate Contractors in order to ready the Work for use or occupancy by County shall be unconditionally permitted in all cases prior to Substantial Completion and shall not constitute a taking of beneficial occupancy by County. Exercise by County in accordance with the provisions of this Section 9.12 of its right to take beneficial occupancy shall not constitute grounds for a Contract Adjustment. The County's right of beneficial occupancy of all or a portion of the Work prior to Substantial Completion shall be subject to the following conditions:

9.12.1 County and such others as County deems necessary will make an inspection of the portion of the Work to be beneficially occupied and prepare a list of items to be completed or corrected in the same manner as required by and subject to the same conditions as set forth in Section 9.11, above.

9.12.2 Beneficial occupancy by County shall not be construed as Acceptance of that portion of the Work which is to be occupied.

9.12.3 Except as otherwise provided in this Section 9.12, beneficial occupancy by County shall not constitute a waiver of rights of the County against Contractor. Notwithstanding anything stated in this Section 9.12 or elsewhere in the Contract Documents to the contrary, beneficial occupancy by County shall not constitute a waiver of rights of County relating to Defective Work in the area beneficially occupied or in any other portion of the Work.

9.12.4 Prior to the County's taking beneficial occupancy, Contractor shall submit to County an itemized list of each piece of equipment located in or serving the area to be occupied stating the date operation of such piece of equipment commenced, together with operating instructions, manuals and other information required by the Contract Documents. Contractor shall provide, in the areas beneficially occupied, on a continual basis, utility services, elevator service, and heating and cooling systems in operable condition commencing at the time of beneficial occupancy and until Final Completion of the entire Work. County shall be responsible, from and after taking occupancy, for utility consumption, regular operation and regular maintenance of such systems or equipment.

9.12.5 County shall pay all normal operating and maintenance costs resulting from its use of equipment in areas beneficially occupied.

9.12.6 County shall pay all utility costs that arise out of its beneficial occupancy.

9.12.7 Contractor shall not be responsible for providing security in areas beneficially occupied.

9.12.8 County shall use its best efforts to prevent its beneficial occupancy from interfering with the conduct of Contractor's remaining Work.

9.12.9 Contractor shall not be required to repair damage caused solely by County's beneficial occupancy.

9.12.10 Contractor shall continue to maintain all insurance required by the Contract Documents in full force and effect.

9.13 FINAL COMPLETION

9.13.1 **Contract Time.** Contractor shall expeditiously and diligently perform the Work after Substantial Completion, including, without limitation, all items of Work on the Final Completion Punch List that accompanies the Notice of Substantial Completion, so as to achieve Final Completion within the requirements of the Contract Time for Final Completion.

9.13.2 **Final Completion Punch List.** Contractor shall prepare and submit to County at the time that Contractor requests inspection for Substantial Completion of the entire Work pursuant to Paragraph 9.11.2, above, a draft proposed Final Completion Punch List of items of Work that will be required to be completed or corrected for Final Completion. Items identified in the course of any inspection for Substantial Completion that are required to Finally Complete the Work following Substantial Completion shall be added to the proposed Final Completion Punch List and the revised Final Completion Punch List attached to the Notice of Substantial Completion. If Contractor disputes any of the items included, it shall so note its objection on the Final Completion Punch List. When Contractor considers the Final Completion Punch List to be complete, it shall promptly sign and deliver the Final Completion Punch List to the County. Failure by County, Architect, Inspector of Record or Contractor to include an item on the Final Completion Punch List does not alter the responsibility of Contractor to perform the Work in accordance with the Contract Documents. Items of Work necessary for Final Completion that, for any reason, have been omitted from the Final Completion Punch List shall be added to the Final Completion Punch List upon request by the County made at any time prior to Final Payment and completion of such items shall be made promptly and before the Work will be considered Finally Complete.

9.13.3 **Performance of Punch List.** Contractor shall proceed promptly and in accordance with the Contract Time to correct and complete the items on the Final Completion Punch List, including, without limitation, any disputed items, and all such items of Work shall be completed by Contractor before the Work will be considered as Finally Complete.

9.13.4 **Request for Final Inspection.** Contractor shall notify County when Contractor believes that the Work is Finally Complete. County, Inspector of Record, Architect and such others as County deems necessary or appropriate will then make a further inspection to determine whether such Work is Finally Complete. If such inspection, or any subsequent re-inspection required pursuant hereto, discloses any item, whether or not included on the Final Completion Punch List, which must be completed or corrected before Final Completion, Contractor shall, as a condition of Final Completion, complete or correct such item, which shall then be re-inspected to confirm that such Work is Finally Completed. Contractor shall reimburse County, or County may at its option withhold from Contractor's payments, amounts incurred by County to the Inspector of Record, Architect, County Consultants or others whose services, for reasons within the control or responsibility of Contractor or the Subcontractors, are necessary for more than two (2) inspections to determine Final Completion.

9.13.5 **Notice of Final Completion.** When County determines that the Work is Finally Complete, County will prepare a Notice of Final Completion on the County's form, which shall state the date of Final Completion. Regardless of the date the Notice of Final Completion is issued, Final Completion shall be deemed to have occurred on the date stated in the Notice of Final Completion.

9.13.6 **Acceptance by County.** Acceptance may be exercised by County, in its sole and absolute discretion, either after Final Completion or, without waiving or releasing Contractor from any of its obligations under the Contract Documents, at any time after Substantial Completion and prior to Final Completion.

9.13.7 **Notice of Completion.** In addition to issuance of the Notice of Substantial Completion and Notice of Final Completion, County shall have the right, exercised in its sole and absolute discretion, to record a Notice of Completion pursuant to California Civil Code §9204.

9.13.8 **No Waiver by County.** No inspections conducted pursuant to this Article 9 nor any approvals or certificates issued by County, Architect or Inspector of Record shall be deemed to be a waiver or limitation on County's right to insist on Final Completion and full performance of all other conditions to Final Payment under the Contract Documents prior to issuance of Final Payment to Contractor.

ARTICLE 10 INSPECTIONS, SAFETY AND HAZARDOUS SUBSTANCES

10.1 INSPECTIONS

10.1.1 **General.** One or more Inspectors of Record, including special inspectors as required, may be employed by County and assigned to the Work. The fees of Inspectors of Record shall be directly paid for by County. IF INSPECTORS OR RECORD ARE ASSIGNED TO THE WORK, THEN NO WORK SHALL BE CARRIED ON EXCEPT UNDER THE INSPECTION, AND WITH THE KNOWLEDGE, OF THE APPROPRIATE INSPECTOR(S) OF RECORD, and Contractor shall be responsible, at Contractor's Own Expense, to remove and replace any Work performed without such inspection by the appropriate Inspector of Record.

10.1.2 **Coordination.** Contractor shall schedule, arrange, and coordinate its activities with the activities of the County, Inspectors of Record, Architect, County Consultants and others designated by County to inspect or observe the Work. When, in order to comply with the intent of the Contract Documents, inspection or observation must be made at the plant or mill of the manufacturer or fabricator of material or equipment, Contractor shall notify the County, as well as any other persons identified by County as assigned by it to inspect or observe the Work, a sufficient length of time in advance to allow for arrangements to be made for such inspection or observation.

10.1.3 **Uncovering of Work.** County or an Inspector of Record shall have the right to request that any portion of the Work be uncovered by Contractor for inspection. Except as otherwise provided in Paragraph 10.1.1, above, if such Work is found to be in accordance with the Contract Documents, then all of the additional costs incurred in uncovering, replacing and re-covering the Work shall constitute grounds for Contractor, upon proper notice and request pursuant to Article 7, above, to receive a Contract Adjustment for Compensable Change and if such uncovering, replacing and re-covering of the Work causes a Delay, such Delay shall constitute grounds for Contractor, upon proper and timely notice and request pursuant to Article 8, above, to receive a Contract Adjustment for Compensable Delay. If such Work is not in accordance with the Contract Documents, then such costs of uncovering, replacing and re-covering shall be paid for by Contractor at Contractor's Own Expense and any resulting Delay shall be consider an Unexcused Delay.

10.1.4 **Off-Hours Inspections.** Contractor shall request approval by County before arranging any inspections either: (1) before 7:00 am or after 3:00 pm on Monday through Friday, or (2) on any Saturday, Sunday, holiday or any other time when Work is not usually in progress. Such request shall be delivered to County at least two (2) working days in advance of the inspection being performed. Approval or disapproval of such request is in the sole and absolute discretion of County. Except where such off-hours inspections are due to a breach by County of an obligation under the Contract Documents, the additional cost (over and above that which would be required for inspections during regular business hours) to County of the inspection shall be paid for by Contractor at Contractor's Own Expense.

10.1.5 **Access to the Work.** Contractor shall make available for use by County, Inspectors of Record, Architect, County Consultants and others assigned to inspect or observe the Work, any equipment (wheelbarrow, shovel, ladder, man-lift, etc.) that is available or in use on Site, and is required to assist in such inspections or observations.

10.1.6 Right to Stop Work. County shall have the right, but not the obligation, to order Contractor to stop performance of Work. Inspectors of Record shall, only if and to the extent permitted by Applicable Laws or if they are given written authority to do so by County, have the authority, but not the obligation, to stop the Work whenever provisions of Contract Documents are not being complied with, or the conduct of the Work poses a probable risk of harm to persons or property.

10.1.7 No County Duty. No authority of the County, Inspectors of Record, Architect, County Consultants or others designated by County to inspect the Work that is conferred by the Contract Documents nor any decision made by any of them in good faith either to exercise or not exercise such authority, nor any recommendation by any of them, shall give rise to a duty or responsibility on the part of any of them to Contractor or to the Subcontractors, of any Tier.

10.1.8 Contractor Responsibility. Inspections or observations by the County, Inspectors of Record, County Consultants or others shall not in any way relieve Contractor from its sole responsibility for full compliance with all of the terms and conditions of the Contract Documents, nor be construed to lessen, to any degree, Contractor's responsibility for providing efficient and capable superintendence as required herein or for incorporating into the Work only those items of the Work that conform to the Contract Documents.

10.1.9 Reimbursement to County. Without limitation to any other provisions of the Contract Documents, Contractor shall reimburse the County at Contractor's Own Expense, or County shall have the right, at its option, to withhold from payments due to Contractor, costs of inspections, observations or testing and other Losses that are incurred for any of the following reasons: (1) Contractor has failed to execute the Work in accordance with the Contract Documents; (2) materials or equipment have been substituted by Contractor, without prior approval by the County and Architect; (3) Defective Work; or (4) to conduct load testing of certain portions of the structure that have not fully met the requirements of the Contract Documents.

10.2 SAFETY PRECAUTIONS AND PROGRAMS

10.2.1 General Safety Obligation. Contractor shall, notwithstanding the activities of others (such as, but not limited to, the County, Architect, Inspectors of Record, County Consultants or others designated by County to prepare safety recommendations or inspect or observe the Work), be solely responsible, on a twenty-four (24) hours a Day, seven (7) Days a week basis, for initiating, maintaining and supervising all safety precautions and programs on the Site in connection with the preparation, performance, observation or inspection of the Work, including all necessary precautions to protect and safeguard all persons and property from loss, injury, death or damage resulting, directly or indirectly, from the activities of Contractor or the Subcontractors, including, without limitation, all of the following:

- .1** persons in and around the Site, as well as their personal property and vehicles;
- .2** the Work, materials and equipment to be incorporated therein under care, custody or control of Contractor or the Subcontractors, of any Tier, whether in storage on or off the Site, including, without limitation, the provision of temperature control, covering and enclosures necessary to prevent Loss due to adverse weather conditions;
- .3** other property at the Site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, curbs, roadways, structures (including, without limitation, protection from settlement or loss of lateral support) and utilities not designated for removal, relocation or replacement in the course of construction; and
- .4** construction and operations by the County, Architect and Inspectors of Record.

10.2.2 Contractor's Safety Program. Prior to starting the Work, Contractor shall prepare and submit to County a Safety Program, which shall comply with the requirements of the Contract Documents and shall include, at a minimum, guidelines, requirements and procedures for the following: safety management policy; emergency response plan; illness and injury prevention procedures; safety meetings; accident investigation; basic accident causes; safety inspection checklist; fire prevention and control; report forms; and employee safety manual and procedures for achieving compliance with safety requirements of insurers. A copy of the Safety Program shall be maintained on Site at all times and provided to the County upon request. Contractor is solely responsible for monitoring activities at the Site for compliance with the Safety Program and for the enforcement thereof.

10.2.3 Safety Orders. Contractor shall comply with all Applicable Laws, including, without limitation, all safety laws, standards, orders, rules, regulations and building codes, to prevent accidents or injury to persons on, about or adjacent to the Site and to provide a safe and healthful place of employment. Contractor shall, at Contractor's Own Expense, correct any violations of Applicable Laws occurring or threatened by conditions on the Site.

10.2.4 Safety Representative. Contractor shall designate a responsible member of its organization on the Site, who meets the qualification and competency requirements of Applicable Laws and whose sole duty shall be giving safety instructions, prevention of accidents and overall job site safety (including, without limitation, posting of information and other notices regarding safety that are required under occupational safety and health laws and compliance with reporting and other occupational safety requirements pertaining to the protection of the life, safety and health of the workers). The name of the person so designated shall be reported to the County by Contractor prior to the commencement of any Work on the Site.

10.2.5 Protection. Contractor shall take reasonable precautions to protect the Work and all building materials, equipment, temporary field offices, storage sheds, and other public and private real and personal property that might be affected, directly or indirectly, by Contractor's activities associated with performance of the Work, and shall make good, at Contractor's Own Expense, all Loss due to failure to provide such reasonable precautions.

10.2.6 Safeguards, Disabled Access. Contractor shall erect and maintain, as required by existing conditions and performance of the Work, all necessary safeguards for safety and protection, including, without limitation, safety devices, belts, nets, barriers, safety rails, canopies, danger signs, fire protection, no smoking prohibitions, warnings against hazards, safety regulations postings and notifications to owners and users of adjacent sites and utilities, and shall, as required by Applicable Laws, make provision for access for, and provide assistive devices to, persons with disabilities, including, without limitation, providing safe pathways of travel around areas where construction is being performed so that occupants, visitors, the public and others on the Site with disabilities are afforded reasonably direct and barrier-free access to areas of the Site and Existing Improvements.

10.2.7 Fire, Explosives, Hazardous Substances. Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards. Explosives may be used or stored only when authorized in writing by the County. Explosives shall be handled, used and stored in accordance with Applicable Laws. When use or storage of explosives or other Hazardous Substances or methods of construction involving use of dangerous materials or equipment are necessary for execution of the Work, Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

10.2.8 First Aid. Contractor shall maintain emergency first aid treatment for all workers and other persons on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C.A. §§651 et seq.) and all other Applicable Laws.

10.2.9 Unsafe Conditions. Contractor shall immediately correct any condition that exists on the Site, or that County, in its reasonable judgment, determines to exist on the Site, that is unsafe or potentially unsafe to persons or property.

10.2.10 Responsibility for Loss. Contractor shall promptly remedy Loss to any property or person caused in whole or in part by the failure of Contractor, the Subcontractors, of any Tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable to fully comply with the requirements of this [Article 10](#), except Loss attributable solely to the negligent acts or omissions of the County, Inspectors of Record, Architect, County Consultants or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable, in whole or in part, to the negligence, willful misconduct or violation of Applicable Laws by Contractor or a Subcontractor, of any Tier, or the failure by Contractor to comply with the Contract Documents. The foregoing obligations of Contractor are in addition to and not a limitation upon Contractor's indemnity obligations under [Section 3.18](#), above.

10.2.11 Loading, Storage. Contractor shall be responsible for coordinating the storage and staging of materials and equipment on-Site and off-Site and shall not load or store or permit any part of the Work or the Site to be loaded or stored so as to endanger the safety of persons or risk loss or damage to property.

10.2.12 Emergency.

.1 Contractor Responsibility. In an emergency involving safety or protection of persons or property, Contractor shall act immediately, either at County's direction or as otherwise necessary under the circumstances, to prevent any Loss. In such cases, Contractor shall immediately notify County, which notice may be oral, followed within twenty-four (24) hours after occurrence of the incident by written confirmation of the occurrence of such emergency and Contractor's action in response thereto.

.2 County Action. If, in the sole discretion of County, the condition is immediately threatening life or property, County may, with or without notice to Contractor, take whatever immediate action is necessary to correct the life-threatening condition, and the costs thereof, including, without limitation, any fees or costs of Architect, Inspectors of Record, County Consultants or others to whom County may be liable, shall be borne by Contractor at the Contractor's Own Expense.

10.2.13 No County Responsibility. Nothing set forth in this Section 10.2 or elsewhere in the Contract Documents shall be interpreted as an assumption of any responsibility on the part of County or other persons or entities other than the Contractor and the Subcontractors, to report such conditions to Contractor nor as relieving Contractor of any of its responsibilities under the Contract Documents.

10.2.14 Separate Contractors. With respect to work of a Separate Contractor being performed within an area of the Site that is under the responsibility or control of the Contractor, Contractor shall: (1) provide copies of the Safety Program to the Separate Contractors and advise the Separate Contractors of the areas of the Site to which the Safety Program applies and where compliance with the Safety Program is expected; (2) protect the Separate Contractors' work and workers from Loss due to the actions or inactions of Contractor and the Subcontractors; and (3) notify the Separate Contractor and County of any observed violation by the Separate Contractor of the Safety Program or of any violations by the Separate Contractor of Applicable Laws governing safety on the Site. Nothing herein shall be interpreted as relieving the Separate Contractors from their obligations to comply with the Contractor's Safety Program, as excusing any failure by a Separate Contractor from performing its obligations under its contracts with County or Applicable Laws or as obligating Contractor to directly supervise or enforce the obligations of the Separate Contractors to comply with the requirements of the Safety Program or Applicable Laws relating to safety.

10.3 HAZARDOUS SUBSTANCES, MOLD

10.3.1 Hazardous Substances.

.1 On Site Conditions.

(1) Existing Conditions. In the event Contractor or its Subcontractors encounter materials existing or otherwise present at the Site that are reasonably believed to be Hazardous Substances that have not been rendered harmless, Contractor and Subcontractors shall, except in cases where the removal, encapsulation or abatement of such Hazardous Substances is indicated by the Contract Documents to be part of the Work to be performed by Contractor, immediately stop Work in the area affected and report the condition to County in writing. Contractor and Subcontractors shall continue Work in unaffected areas reasonably believed safe. County shall then promptly arrange for the sampling, testing and profiling of such suspected Hazardous Substances to confirm the nature, quantity or concentration thereof. In the event that such suspected Hazardous Substances are determined not to be Hazardous Substances or to be Hazardous Substances but not of sufficient nature, quantity or concentration to trigger handling and manifesting of the same as a hazardous waste upon disturbance and removal, then Contractor and its Subcontractors shall, without any Contract Adjustment, be obligated to resume the portion of the Work that was suspended and shall proceed to handle and dispose of such materials pursuant to the Contract Documents, taking all reasonable precautions that are applicable under the circumstances. If, alternatively, the suspected Hazardous Substances are determined to be Hazardous Substances of sufficient nature, quantity or concentration to trigger handling and manifesting of the same as hazardous waste upon disturbance and removal, the parties shall determine what, if any, action to take with respect to such Hazardous Substances, whether to resume Work with respect to such Hazardous Substances, taking all reasonable precautions that are applicable under the circumstances, and what, if any, Contract Adjustment is appropriate and mutually agreed in order to account for any increased cost of, or Delay in connection with, handling or disposal of Hazardous Substances not already contemplated and provided for in the Contract Documents.

(2) Contractor Release. Contractor and its Subcontractors shall not cause the discharge, release, emission, spill, storage, treatment or disposal of any Hazardous Substance on or adjacent to the Site, except as required and permitted by the Contract Documents and Applicable Laws in connection with Contractor's performance of an obligation to remove Hazardous Substances as part of the Work agreed to be performed under the Contract Documents or as otherwise required under the provisions of this Subparagraph 10.3.1.1. Should Contractor or its Subcontractors discharge, release, emit, spill, treat, store or dispose of any Hazardous Substance on the Site in violation of the foregoing obligation or otherwise in violation of Applicable Laws, Contractor shall at Contractor's Own Expense and without limitation to County's other rights or remedies for default immediately (a) inform County in writing of such event, (b) advise County with respect to any release reporting or notification requirement that may apply as a result of such event, (c) assist County in complying with any such reporting or notification requirement as determined by County, and (d) perform any investigation, remediation, removal or other response that is necessary or desirable in order to abate or clean up the condition resulting from such event to the full satisfaction of County and any applicable Governmental Authority. Such Hazardous Substances shall be removed and properly disposed of as soon as they can be accepted at an appropriate disposal facility, and in no event later than sixty (60) Days after such waste is generated, unless a longer time is approved by County.

.2 Remediation by Contractor.

(1) Application. The provisions of this Paragraph 10.3.1.2 shall apply only if the Work to be performed by Contractor includes within its scope the removal, abatement, moving, handling, containment, disposal or transport of Hazardous Substances

(2) Advance Submissions to County. Before Contractor or any of its Subcontractors moves, removes, or transports Hazardous Substances to a facility for the receipt, treatment, storage or disposal of the Hazardous Substances ("Hazardous Substances Facility"), Contractor shall cause the person or entity who will be moving, removing or transporting the Hazardous Substances to provide to County the following: (a) verification of the Hazardous Substance Facility's or other transporter's licensed status to haul such materials; (b) verification of the Hazardous Substance Facility's licensed status, including a current permit to receive the specific materials to be transported there; (c) certification that the Hazardous Substance Facility is not under enforcement action by the U.S. Environmental Protection Agency ("EPA") or applicable State Governmental Authority or listed on any applicable EPA or applicable State Government Authority list of violating facilities; (d) verification of the Hazardous Substances Facility's EPA Identification Number (if applicable); and (e) original executed letter(s) of indemnity from the Hazardous Substances Facility bearing the Hazardous Substance Facility's letterhead. Contractor further warrants that the selected Hazardous Substance Facility is appropriately licensed and permitted to store, treat and dispose of Hazardous Substances waste in connection with the Work.

(3) Contractor Responsibility. Contractor warrants that it is aware of and understands the hazards which are presented to persons, property and the environment in performance of the transportation, storage and disposal of the Hazardous Substances described in the Contract Documents. Contractor and its Subcontractors and agents shall be responsible for the following: (a) processing the application for, and receiving on behalf of the County or appropriate entity, an EPA or state-equivalent generator identification number (if required); (b) preparing manifests and other shipping documents; (c) making all necessary arrangements (after consultation with County) for any off-Site transportation, treatment, storage and disposal of such Hazardous Substances in accordance with Applicable Laws; (d) ensuring the proper and lawful transportation and disposal of such Hazardous Substances, even if such services are performed by other entities under contract with Contractor or its Subcontractors; and (e) taking any necessary actions to ensure such proper transport and disposal in the event of any contingency, such as the rejection of the Hazardous Substances as nonconforming by any waste disposal facility. Contractor shall promptly provide to County copies of all manifests and other shipping documents confirming the receipt and proper disposal of all Hazardous Substances at the Hazardous Substances Facility, even if such services are performed by other entities under contract with Contractor or its Subcontractors.

(4) Reporting Requirements. Contractor shall comply with any Hazardous Substances release reporting requirements to Governmental Authorities directly applicable to Contractor. Notice of such reporting must be provided in advance to County or concurrently in the event of an emergency.

(5) Samples. Contractor and its Subcontractors shall retain all media samples for the longer of (a) the longest holding period specified in any federal, state or local laboratory analytical procedures or

guidance for the analyses performed; or (b) three months for soil samples and thirty (30) Days for water samples. Further storage or transfer of samples will be made at County's expense upon County's written request of Contractor. Contractor shall require by contract that each and every Subcontractor and agent of Contractor or a Subcontractor who performs testing of samples in connection with the Work properly disposes of such samples in accordance with Applicable Laws after completion of testing and notice to County. Regarding any such samples which may remain on-Site, provided County has approved of such on-Site storage in advance, County agrees to pay all costs associated with the storage, transport, and disposal of such samples.

(6) Verification. Upon Final Completion of the Work, Contractor shall confirm to County in writing that: (a) all Hazardous Substances specified for removal in the Contract Documents have been removed; and (b) all Hazardous Substances wastes removed from the Site as part of the Work have been disposed of in accordance with this Subparagraph 10.3.1.2 and Applicable Laws in a Hazardous Substances Facility.

10.3.2 Mold. Contractor is responsible to immediately notify County in writing if any conditions in the construction materials incorporated or to be incorporated into the Work or present in Existing Improvements are encountered at the Site that Contractor or any Subcontractor knows or, in the exercise of due care of a Contractor and not that of a consultant with special or technical expertise in the subject of Mold, should know indicate the presence of Mold or if untreated are likely to result in the growth of Mold. Contractor shall thereafter take such precautions as are reasonably required to prevent the exposure of persons to such conditions until they have been evaluated. Except as otherwise authorized by the Contract Documents or as are usual and customary according to prevailing standards of the construction industry in the vicinity of the Project, Contractor shall not allow water or moisture to come into contact with materials in Existing Improvements or with materials located at the Site that are incorporated or to be incorporated into the Work and if such contact occurs, the areas affected shall be inspected by Contractor, using appropriate consultants experienced in testing and evaluating Mold, for the presence of Mold and evaluated for the potential of future growth of Mold. All portions thereof that are found to indicate the presence of Mold, or that are found to be in a condition that has the potential for becoming a source of Mold, shall be removed and replaced. Costs incurred by Contractor due to its failure to perform its obligation under this Paragraph 10.3.2 shall be borne by Contractor at Contractor's Own Expense.

10.3.3 Release of County. Contractor assumes the risk that its employees or the employees of its Subcontractors, and other persons that they cause or permit to be present on the Site, may be exposed to known or unknown Hazardous Substances or Mold. Under no circumstances shall County be liable for, and Contractor hereby fully and unconditionally releases County and the other Indemnitees from, and agrees to defend and indemnify County and the other Indemnitees on the terms set forth in Section 3.18, above, against, any and all known and unknown Losses resulting from or relating to the exposure of any employee of Contractor or its Subcontractors, or other person that they cause or permit to be present on the Site, to: (1) Hazardous Substances or Mold encountered in connection with or as a result of the performance of the Work, or (2) Hazardous Substances or Mold not necessarily encountered in connection with the performance of the Work, but to which any of them may nevertheless be exposed as a result of their being present on the Site.

10.3.4 Communications with Governmental Authorities. Contractor shall provide to County copies of all written communications with Governmental Authorities or others relating to Hazardous Substances or Mold (other than privileged communications); provided, however, that non-disclosure of privileged communications shall not limit Contractor's obligation to otherwise comply with the terms of the Contract Documents, including, without limitation, this Section 10.3.

10.3.5 Subcontractors. Contractor shall include provisions in all contracts it enters into with Subcontractors for the Work requiring them to assume toward Contractor and County the same obligations that Contractor assumes toward County under this Section 10.3. Contractor shall require the Subcontractors to ensure that such provisions are included in all contracts they enter into with all lower-Tier Subcontractors.

ARTICLE 11 INSURANCE

11.1 INSURANCE

11.1.1 Contractor's Insurance Requirements. Without limiting or diminishing any of the Contractor's obligations to defend, indemnify or hold the County harmless as set forth elsewhere in the Contract Documents, Contractor shall procure and maintain or cause to be maintained throughout the performance of the Work and for the duration of any guarantee or warranty provided under the Contract Documents, at Contractor's Own Expense, the following insurance coverages:

.1 Workers' Compensation. If the Contractor has "employees", as defined by the State of California, the Contractor shall provide a policy of statutory Workers' Compensation Insurance (Coverage A) as prescribed by the laws of the State of California. Such policy shall include Employers' Liability (Coverage B) including Occupational Disease with limits not less than \$1,000,000 per person per accident. Such policy shall be endorsed to waive subrogation in favor of the County and, if applicable, to provide a Borrowed Servant/Alternate Employer Endorsement. Pursuant to §3700 of the California Labor Code, Contractor shall file with the County before commencing the Work the following signed certification:

"I am aware of the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and I shall comply with such provisions before commencing the performance of the Work of this Construction Contract."

.2 Commercial General Liability. Contractor shall provide a policy of Commercial General Liability insurance coverage, including but not limited to, premises liability, contractual liability, products and completed operations liability, personal and advertising injury, and cross liability coverage, covering claims which may arise from or out of Contractor's performance of its obligations hereunder. Such policy shall name the County, its agencies, districts, special districts and departments, and their respective directors, officers, elected or appointed officials, agents, employees and representatives, including, without limitation, the members of the Board of Supervisors, and all other Indemnitees, as "additional insureds" and contain a waiver of subrogation in favor of the County and all other such additional insureds. Such policy's limit of liability shall not be less than \$1,000,000 per occurrence combined single limit. If such policy contains a general aggregate limit, it shall apply separately to the Construction Contract or be no less than two (2) times the occurrence limit.

.3 Vehicle Liability. If vehicles or mobile equipment are used in the performance of the Work or other obligations under the Contract Documents, then Contractor shall provide a policy of liability insurance coverage for all owned, non-owned or hired vehicles so used in an amount not less than \$1,000,000 per occurrence combined single limit. If such policy contains a general aggregate limit, it shall apply separately to the Construction Contract or be no less than two (2) times the occurrence limit. Such policy shall name the County, its agencies, districts, special districts and departments, and their respective directors, officers, elected or appointed officials, agents, employees and representatives, including, without limitation, the members of the Board of Supervisors, and all other Indemnitees, as "additional insureds" and contain a waiver of subrogation in favor of the County and all other such additional insureds.

.4 Property (Physical Damage). Contractor shall provide a policy of all-risk property insurance coverage for the full replacement value of all Contractor's equipment, improvements/alterations, temporary structures, and systems, including without limitation, items owned by others in the Contractor's care, custody or control, used on the Site or other County-owned property, or used in any way connected with the performance of the Work.

.5 Builder's All Risk (Course of Construction) Insurance. The Bid Form utilized by Contractor to prepare its Bid states whether the Contractor shall include Builder's All Risk (Course of Construction) Insurance for the Project. If the Bid Form states that such insurance shall be included by the Bidder in its Bid, then Contractor shall provide a policy of Builder's All Risk (Course of Construction) insurance coverage including (if the Work is located in an earthquake or flood zone or if required on financed or bond financing arrangements) coverage for earthquake and flood, covering the County, Contractor and every Subcontractor, of every Tier, for the entire Project, including property to be used in the construction of the Work while such property is at off-Site storage locations or while in transit or temporary

off-Site storage. Such policy shall include, but not be limited to, coverage for fire, collapse, faulty workmanship, debris removal, expediting expense, fire department service charges, valuable papers and records, trees, grass, shrubbery and plants. If scaffolding, falsework and temporary buildings are insured separately by the Contractor or others, evidence of such separate coverage shall be provided to County prior to the start of the Work. Such policy shall be written on a completed value form. Such policy shall also provide coverage for temporary structures (on-Site offices, etc.), fixtures, machinery and equipment being installed as part of the Work. Contractor shall be responsible for any and all deductibles under such policy. Upon request by County, Contractor shall declare all terms, conditions, coverages and limits of such policy. NOTWITHSTANDING THE FOREGOING, COUNTY RETAINS THE RIGHT EXERCISED AT ANY TIME PRIOR TO AWARD TO ELECT TO USE ITS OWN BUILDER'S ALL RISK (COURSE OF CONSTRUCTION) INSURANCE and in the event County so elects to deduct the price for such insurance that is stated in Contractor's Bid, or if not so stated the amount included by Contractor for such insurance in the preparation of the Contractor's Bid, from the Contract Price by means of a Contract Adjustment pursuant to Change Order or Unilateral Change Order. If the County so provides the All Risk (Course of Construction) insurance for the Project, then Contractor shall assume the cost of any and all applicable policy deductibles (currently, \$50,000 per occurrence) and shall insure its own machinery, equipment, tools, etc. from any loss of any nature whatsoever.

11.1.2 Other Mandatory Insurance Requirements. The Contractor shall comply with the following requirements, which shall be deemed applicable to all carriers and insurance policies provided pursuant to Paragraph 11.1.1, above:

.1 Insurer Rating. Any and all insurance carrier(s) providing insurance coverage under any and all policy(ies) of insurance provided by Contractor pursuant to Paragraph 11.1.1, above, shall be admitted to the State of California and have an A M BEST rating of not less than A: VIII (A:8) (unless such requirements are waived in writing by the County Risk Manager, and if the County's Risk Manager waives such requirement for a particular insurer such waiver is only valid for that specific insurer and only for one policy term);

.2 Self Insured Retentions. Contractor shall advise County in writing the dollar amount of any "self insured retention" maintained by the Contractor that exceeds \$500,000 per occurrence. Each such self insured retention must have the prior written consent of the County Risk Manager before the commencement of any Work or operations or activities relating to the Work. If Contractor is notified that a self insured retention is unacceptable to the County, then at the election of the County, exercised in the County's sole and absolute discretion, by means of the written approval of the County's Risk Manager, the insurance carriers affected shall either: (1) reduce or eliminate such self-insured retention as respects the Construction Contract; or (2) procure a bond, satisfactory to County and approved by County in writing, which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses.

.3 Evidence of Insurance. Contractor shall cause Contractor's insurance carrier(s) to furnish to the County either: (1) properly executed original certificate(s) of insurance and certified original copy(ies) of endorsement(s) effecting the coverage(s) required by this Section 11.1, or (2) if requested to do so orally or in writing by the County Risk Manager, provide original, certified copy(ies) of policy(ies) including all endorsement(s) and all attachment(s) thereto, showing such insurance is in full force and effect. Such certificate(s) and all policies of insurance provided by Contractor pursuant to this Section 11.1 shall contain the covenant of the insurance carrier(s) that thirty (30) Days' written notice shall be given to the County prior to any material modification, cancellation, expiration or reduction in coverage of such insurance. Each certificate of insurance and endorsement shall be signed by an individual expressly authorized by the insurance carrier to do so on the carrier's behalf. Contractor shall, if requested, provide written proof of such authorization. ***Contractor shall not commence any Work or any activities or operations related to the performance of the Work unless and until Contractor has complied with all of the requirements of this Section 11.1.***

.4 Modification, Cancellation, Changes in Limits. A material modification, cancellation, expiration, or reduction in coverage, shall constitute an Event of Contractor Default for which County shall have right, without limitation to its other rights or remedies provided for in the Contract Documents or under Applicable Laws, to terminate this Construction Contract. Such Event of Contractor Default may only be deemed cured if the County receives, prior to the effective date of such material modification, cancellation, expiration or reduction in coverage, properly executed original certificate(s) of insurance and original, certified copy(ies) of policy(ies) and endorsement(s), including all attachment(s) thereto, evidencing that the coverage(s) required by this Section 11.1 is(are) and will

continue, without any gap in coverage, in full force and effect in accordance with all of the requirements of this Section 11.1

.5 Primary Coverage. It is understood and agreed to by County and Contractor that the Contractor's insurance coverage(s) provided under this Section 11.1 shall be construed as primary insurance, and the County's insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory.

.6 Additional Coverages. County reserves the right to modify, adjust, add to and/or increase the types, amounts and terms of any insurance required under this Section 11.1 if the County Risk Manager determines, in the exercise of his/her sole and absolute discretion, that the type, amount or terms of the insurance required by this Section 11.1 has(have) become inadequate or that additional risk or exposure exists (such as, without limitation, the use of aircraft, watercraft, cranes, etc.) due to: (1) a Change in the Work; (2) the period of time of Contractor's actual performance of the Work continuing for longer than five (5) years from the Date of Commencement, whether due to Contract Adjustment or for any for any other reason; or (3) other circumstances not reasonably foreseeable to County.

.7 Subcontractors. Contractor shall include provisions in its subcontracts requiring each Subcontractor to assume an obligation toward Contractor to furnish insurance that complies with all of the requirements of this Section 11.1 as apply to Contractor's insurance provided to Owner and requiring such Subcontractors to furthermore include provisions in their contracts with lower-Tier Subcontractors likewise requiring such lower Tier Subcontractors assume the same obligations for providing such insurance and for passing through all such obligations to all lower Tier Subcontractors.

.8 Self-Insurance. If approved by County, in the exercise of its sole and absolute discretion, the insurance requirements contained in this Section 11.1 may be met with a program(s) of self-insurance provided that such program has been submitted to County and approved in writing by County prior to commencement of the Work or of any activity or operation related to the performance of the Work.

.9 Notice of Claim. Contractor agrees to notify County of any claim by a third party or any incident or event that may give rise to a claim arising from the performance of the Work.

ARTICLE 12 BONDS

12.1 PERFORMANCE BOND AND PAYMENT BOND

12.1.1 Performance and Payment Bonds. Within ten (10) Days after the issuance of the Notice of Intent to Award and prior to commencing Work, Contractor shall deliver to County a good and sufficient labor and materials payment bond ("Payment Bond") and a good and sufficient performance bond ("Performance Bond"), each in the amount of one hundred percent (100%) of the Contract Price.

12.1.2 Changes. The penal amounts of the Performance Bond and Payment Bond shall be increased on account of Change Orders and Unilateral Change Orders increasing the Contract Price. If requested by County, Contractor shall deliver to County evidence of such increases.

12.1.3 Replacement. Should any bond required hereunder or any Surety on such bond become or be determined by County to be insufficient, it shall be replaced within ten (10) Days by a bond that fully complies with the requirements of this Section 12.1.

12.1.4 Duration. The Payment Bond shall remain in effect until Acceptance of the Work and all Claims of Contractor and the Subcontractors, of any Tier, have been fully and finally resolved. The Performance Bond shall remain in effect and assure faithful performance of all Contractor's obligations under the Contract Documents, including, without limitation, all warranty obligations.

12.1.5 Condition of Payment. No payments to Contractor for Work performed shall be made or due until there has been full compliance with the requirements of this Section 12.1.

12.1.6 **Surety Rating.** Any Surety company issuing the Payment Bond or Performance Bond shall be, at all times while such bond is in effect, an Admitted Surety. The Surety company issuing the Performance Bond shall additionally have at all such times a current A.M. Best rating of A VIII (A:8) or better.

12.1.7 **Premiums.** The premiums for the Performance Bond and Payment Bond are included in the Contract Price and shall be paid by Contractor at Contractor's Own Expense.

12.1.8 **Obligee.** The Performance Bond shall name County as obligee. All performance bonds, if any, purchased by Subcontractors shall name County as a dual obligee with Contractor.

12.1.9 **No Exoneration.** The Performance Bond and Payment Bond shall contain provisions to the effect that Changes, Change Orders, Unilateral Change Orders, Construction Change Directives, Modifications, Changes and Contract Adjustments shall in no way release or exonerate Contractor or its Surety from their obligations and that notice thereof is waived by the Surety.

12.1.10 **Communications.** County shall have the right to communicate with Surety with respect to matters that are related to performance of the Work. Contractor shall be provided with a copy of all such communications that are in writing. Such communications shall not create or be interpreted as creating any contractual obligation of County to Surety.

12.1.11 **No Limitation.** The requirements of this Section 12.1 pertaining to the Performance Bond and the Payment Bond shall be without limitation to any other obligations Contractor may have under Applicable Laws to provide bonding for the benefit of, and to assure payment to the Subcontractors performing the Work for, the Project.

12.1.12 **Subcontractor Bonds.** Each performance bond, if any, furnished by a first-Tier Subcontractor shall include a provision whereby the Surety consents to the contingent assignment of Contractor's rights under such bond to County as provided in Section 5.3, above.

12.1.13 **Claims.** By incorporation of the Construction Contract into the Performance Bond issued by Surety, Surety shall be deemed, subject to the other terms of the Performance Bond, to be bound by all of the obligations assumed by Contractor under the Contract Documents, including, without limitation, bound by any determination, resolution, award or judgment entered or made upon any Claim by or against Contractor.

ARTICLE 13 UNCOVERING AND CORRECTION OF THE WORK

13.1 UNCOVERING OF THE WORK

If a portion of the Work is covered contrary to the request or direction of County, Inspector of Record or Architect, or contrary to the requirements of the Contract Documents, it must, if required by the any of them, be uncovered for observation and be re-covered by Contractor at Contractor's Own Expense.

13.2 CORRECTION OF THE WORK

Contractor shall promptly correct Defective Work, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. All such Defective Work shall be either: (1) replaced and all the Work disturbed thereby made good by Contractor at Contractor's Own Expense; or (2) County may exercise its option pursuant to Section 13.4, below, to accept such Work and adjust the Contract Price.

13.3 GUARANTEE TO REPAIR PERIOD

13.3.1 **Guarantee To Repair Period.** Besides guarantees and warranties required elsewhere in the Contract Documents, Contractor guarantees the Work as provided hereinbelow. The period of this guarantee, termed the "Guarantee To Repair Period," is for one (1) year commencing as follows:

.1 for any portion of the Work that, upon Substantial Completion of the overall Work, is fully and finally complete and usable in all respects independent of other portions of the Work that are not fully and finally complete, on the date of Substantial Completion of such portion of the Work;

.2 for space beneficially occupied or for separate systems fully utilized prior to Substantial Completion, from the first date of such beneficial occupancy or full utilization, as established by an appropriate written notice by County of intent to take beneficial occupancy; or

.3 for all Work other than that described in Subparagraph 13.3.1.1, above or Subparagraph 13.3.1.2, above, from the date of Final Completion of the Work.

13.3.2 Repair by Contractor. Subject to the provisions of Paragraph 13.3.3, below, Contractor shall do the following: (1) correct, repair, replace, remove and restore, to the County's satisfaction, any Defective Work that becomes apparent during the progress of the Work or during the Guarantee To Repair Period; (2) correct, repair, replace, remove and restore, to the County's satisfaction, any other parts of the Work and any other real or personal property which is damaged or destroyed as a result of Defective Work or the correction of Defective Work; and (3) remove from the Site all the Work identified by the County as Defective Work, whether incorporated or not and whether discovered before or after Substantial or Final Completion. Ordinary wear and tear, abuse, or neglect by County or by County employees, its staff, visitors, public or others (except for those under the control or responsibility of Contractor or its Subcontractors) who are authorized or admitted by County to enter, use or occupy the Work, or who enter, use or occupy the Work after Final Completion, are excepted from the foregoing guarantee. All Losses resulting from Defective Work, including, without limitation, all costs of such correction, repair, replacement, removal and restoration, additional testing, inspection and additional service fees and costs of the Inspector of Record, Architect, County Consultants or others whose services may be made necessary thereby as well as any Loss to any other parts of the Work and any other real or personal property which is damaged or destroyed as a result of Defective Work or the correction, repair, replacement, removal or restoration of Defective Work, shall be paid for by Contractor at Contractor's Own Expense. Contractor shall correct, repair, replace, remove and restore Defective Work at such times as are acceptable to the County and in such a manner as to avoid, to the greatest extent practicable, disruption to the activities of the County, its staff, visitors, the public or others. Contractor shall notify the County in writing upon the completion of such correction, repair, replacement, removal and restoration.

13.3.3 Notice by County. Except as otherwise provided in this Paragraph 13.3.3 where immediate corrections are needed due to dangerous conditions or risk of imminent Loss or interruption of County operations, the County will give notice to Contractor of Defective Work observed prior to Final Completion in accordance with the provision of Section 15.1, below, governing the occurrence of an Event of Contractor Default and the Contractor shall proceed to cure such Event of Contractor Default in accordance with the requirements of Section 15.1, below, and Paragraph 13.3.2, above. With respect to Defective Work observed after Final Completion, the County will give notice to Contractor with reasonable promptness and Contractor shall commence the correction, repair, replacement, removal and restoration as required by Paragraph 13.3.2, above, no later than ten (10) Days after mailing of such notice to Contractor and Contractor shall thereupon diligently and continuously prosecute such correction, replacement, repair, or restoration to completion. Notwithstanding the foregoing, if in the County's opinion the presence of Defective Work, whether observed prior to Final Completion or after Final Completion and during the Guarantee To Repair Period, poses a risk or threat: (1) to life, safety or the protection of property; (2) of imminent Loss to the County or to any other person or entity; or (3) of causing an interruption in the operations of the County, then County will have the right, in the exercise of its sole and absolute discretion, to proceed with correction or replacement of the Defective Work without prior notice to Contractor, but in such cases will attempt to notify Contractor as soon as possible of the conditions encountered and the action taken by County. Such action by County without prior notice to Contractor shall not relieve Contractor of its responsibility for the costs of such County action or for any Loss occasioned by the Defective Work or necessitated by the County's action, whether such Loss occurs before or after such County action is implemented or completed.

13.3.4 Correction by County. If Contractor fails to perform any of its obligations under Paragraph 13.3.2, above, to correct, repair, replace, remove or restore then County, or Separate Contractors under the County's direction, may, notwithstanding any other provisions of this Article 13, proceed to do so and all costs associated therewith (including, without limitation, the cost to store any materials removed) shall be the responsibility of and paid by Contractor at Contractor's Own Expense. Such action by County will not relieve Contractor of the guarantees provided in this Article 13 or elsewhere in the Contract Documents. In addition to Contractor's other obligations under Paragraph 13.3.2, above, Contractor shall correct, repair, replace, remove and restore, to the County's satisfaction and at

Contractor's Own Expense any other parts of the Work and any other real or personal property that are damaged or destroyed as a result of such actions by County or the Separate Contractors.

13.3.5 Sale. If Contractor does not pay the costs of, or any of the Losses associated with, the correction, repair, replacement, removal or restoration required by the provisions of Paragraph 13.3.2 through Paragraph 13.3.4, above, then within five (5) Days after notice by the County, County may sell any materials or other items of Work removed at auction or at private sale or otherwise dispose of such materials or items and shall account for the net proceeds thereof, after deducting all such costs and Losses, and all costs of sale. If such net proceeds of sale do not cover the Losses for which Contractor is liable to the County, the County may at its option reduce the Contract Price or any payments due to Contractor by such deficiency or recover such deficiency from Contractor.

13.3.6 No Limitation. Contractor's obligations under this Article 13 are in addition to, and not in limitation of, its warranty obligations under Section 3.5, above, and any other obligation, guaranty or warranty of Contractor or any other third party under the Contract Documents. Nothing contained in this Article 13 shall be construed to shorten any periods of limitation with respect to other obligations of Contractor under the Contract Documents that are for longer specified periods. Establishment of the Guarantee To Repair Period in no way limits either Contractor's liability for Defective Work or the time within which proceedings may be commenced to enforce Contractor's obligations under the Contract Documents.

13.4 ACCEPTANCE OF NONCONFORMING WORK

Notwithstanding any other provisions of the Contract Documents to the contrary, the County shall have the option, exercised in its sole and absolute discretion after notice to Contractor, in lieu of requiring that Defective Work be remedied or corrected, to reduce the Contract Price to reflect the reduced value of the performance received by County. Such option shall be exercised solely by written notice to Contractor and shall not be implied from any act or omission by County. If there are no remaining payments of the Contract Price to be made to Contractor, or if the remaining payments and retention are insufficient to cover the amount of the reduction of the Contract Price, Contractor shall promptly pay to County the amount of any such deficiency.

ARTICLE 14 MISCELLANEOUS PROVISIONS

14.1 GOVERNING LAW

The interpretation and enforcement of the Construction Contract and other Contract Documents and of the performance by the parties thereunder shall, notwithstanding application of the principles of conflicts of laws, be governed by the laws of the State of California. The Superior Court for the County of Riverside shall have exclusive jurisdiction and venue over any legal proceedings arising out of or involving the interpretation or enforcement of, or other matters relating to, the Construction Contract, the other Contract Documents or the performance of the parties thereunder.

14.2 TIME OF ESSENCE

All time limits stated in the Contract Documents relative to Contractor's performance of its obligations under the Contract Documents are of the essence.

14.3 SUCCESSORS AND ASSIGNS

The Construction Contract and other Contract Documents shall be binding on successors, assigns and legal representatives of County and Contractor, respectively. Contractor shall not assign, sublet or transfer an interest in or claim under this Construction Contract without advance written approval of County, which approval may be granted or withheld by County in its sole and absolute discretion, and any assignment, subletting or transfer without written approval by County shall be deemed void from its inception. Any assignment, subletting or transfer, whether or not approved by County, will not release Contractor from any of its obligations under the Contract Documents to County. County shall have the right to assign, sublet or transfer its interest in or any claim under the Construction Contract upon written notice to Contractor.

14.4 WRITTEN NOTICE

Any notice from one party to the other or otherwise under the Contract Documents shall be in writing and shall be dated and signed by the party giving such notice or by a duly authorized representative of such party. Any such notice shall be deemed to have been duly served if served in the following manner, and in accordance with Civil Code §8100 et seq.:

14.4.1 Notice to County. If notice is given to County: (1) by personal delivery thereof to County; or (2) by depositing same in United States mail, enclosed in a sealed envelope addressed to County at Facilities Management, 3450 14th Street, 2nd Floor, Riverside CA 92501, and to such other address as set forth in the Bidding Documents as the location for submission of Bids and sent by registered or certified mail with postage prepaid, or express mail or overnight delivery by an express mail carrier; or (3) by leaving the notice and mailing a copy in the manner provided in Code of Civil Procedure §415.20.

14.4.2 Notice to Contractor. If notice is given to Contractor: (1) by personal delivery thereof to Contractor; or (2) by depositing same in United States mails, enclosed in a sealed envelope addressed to Contractor at its address stated in the Construction Contract, or if none is so stated at the address on the records of the Contractor's State License Board and sent by registered or certified mail with postage prepaid or express mail or overnight delivery by an express mail carrier; or (3) by leaving the notice and mailing a copy in the manner provided in Code of Civil Procedure §415.20.

14.4.3 Notice to Claimant. If notice is given to a claimant as defined in Civil Code §8004: (1) by personal delivery thereof to claimant; or (2) by depositing same in United States mail, enclosed in a sealed envelope addressed to claimant at its address stated in: a preliminary notice, stop payment notice, or claim against a payment bond; or on the records of the Contractor's State License Board; and sent by registered or certified mail with postage prepaid or express mail or overnight delivery by an express mail carrier; or (3) by leaving the notice and mailing a copy in the manner provided in code of Civil Procedure §415.20.

14.4.4 Notice to Surety. If notice is given to the Surety: (1) by personal delivery to the Surety; or (2) by depositing same in United States mail, enclosed in a sealed envelope, addressed to the Surety at the address of the Surety shown in the applicable Performance Bond or Payment Bond, or if none is shown, the address on the records of the Department of Insurance, and sent by registered or certified mail with postage prepaid or express mail or overnight delivery by an express mail carrier; or (3) by leaving the notice and mailing a copy in the manner provided in Code of Civil Procedure §415.20.

14.5 RIGHTS AND REMEDIES

14.5.1 County Rights. Rights and remedies available to the County under the Contract Documents are in addition to and not a limitation of County's rights and remedies otherwise available under other provisions of the Contract Documents or Applicable Laws.

14.5.2 Writing Required. Provisions of the Contract Documents may be waived by County only in writing signed by the Director stating expressly that it is intended as a waiver of specified provisions of the Contract Documents.

14.5.3 Subsequent Breach. A waiver by either party of any breach of any term, covenant, or condition contained in the Contract Documents shall not be deemed to be a waiver of any subsequent breach of the same or any other term, covenant, or condition contained therein whether of the same or a different character.

14.6 NO NUISANCE

Contractor shall not maintain, commit or permit the maintenance or commission of any nuisance in connection with the performance of Work.

14.7 EXTENT OF AGREEMENT

The Contract Documents represent the full and complete understanding of every kind or nature between the parties and all preliminary negotiations and prior representations, proposals and contracts, of whatever kind or nature, are merged herein and superseded hereby. No verbal agreement or implied covenant shall be held to vary the provisions of the Contract Documents. Any modification of this Construction Contract or the other Contract Documents will be effective only by written instrument signed by both County and Contractor and shall, if required by Applicable Laws, be formally approved or ratified by the Board of Supervisors.

14.8 NO THIRD-PARTY RIGHTS

Nothing contained in the Construction Contract or the other Contract Documents is intended to make any person or entity who is not a signatory to this Construction Contract a third-party beneficiary of any right of Contractor (including, without limitation, any right of Contractor to a benefit derived from, or to the enforcement of, an obligation assumed by County) that is expressly or impliedly created by the terms of the Contract Documents or by operation of Applicable Laws.

14.9 SEVERABILITY

Should any part, term, portion or provision of the Construction Contract or the other Contract Documents, or the application thereof to any party or circumstance, be held to be illegal, invalid or in conflict with Applicable Laws, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms, portions or provisions, or the application thereof to any other party or circumstances, shall be deemed severable and the same shall remain enforceable and valid to the fullest extent permitted by Applicable Laws.

14.10 PROVISIONS REQUIRED BY APPLICABLE LAWS

Each and every provision of law and clause required by Applicable Laws to be inserted in the Construction Contract or other Contract Documents shall be deemed to be inserted in the Contract Documents shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or if inserted and requires correction, then upon request of either party these General Conditions shall forthwith be amended by the parties to the Construction Contract to make such insertion or correction.

14.11 SURVIVAL

All provisions of the Contract Documents that either expressly, or by their nature, require performance or assumption by Contractor of an obligation that extends beyond termination of the Construction Contract or Final Completion of the Work, including, without limitation, Contractor's obligations of, or relating to, indemnification, insurance, ownership of documents, retention and audit of books and records, warranties and guaranties and resolution of Claims shall be deemed to survive either termination of the Construction Contract or Final Completion of the Work.

14.12 FEDERAL GRANTS

In the event of a federal grant or other federal financing participation in the funding of the Project, Contractor shall, as required in connection with, or as a condition to, such federal grant or other federal financing participation, permit access to and grant the right to examine its books covering its services performed and expenses incurred under the Construction Contract or other Contract Documents by the federal agency and comply with all applicable federal agency requirements including, without limitation, those pertaining to work hours, overtime compensation, non-discrimination, and contingent fees.

14.13 PROHIBITED INTERESTS

Contractor agrees not to accept any employment or representation which will, or is likely to, make Contractor "financially interested" (as provided in California Government Code §§1090 and 87100, hereinafter "financially interested") in any decision made by County on any matter in connection with which Contractor has been retained in connection with the Project. Without limitation to the foregoing, transactions and interests prohibited by this Section 14.13 include the

following: (1) no official or employee of County who is authorized in such capacity and on behalf of County to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with construction of the Project, shall become directly or indirectly financially interested in the performance of the Construction Contract or in any part thereof; (2) no officer, employee, architect, attorney, engineer or inspector of or for County who is authorized in such capacity and on behalf of County to exercise any executive, supervisory or other similar functions in connection with Construction Contract or in any part thereof; and (3) Contractor shall receive no compensation hereunder, and shall repay County for any compensation received by Contractor hereunder, should Contractor or any of the Subcontractors aid, abet or knowingly participate in violation of this Section 14.13.

14.14 ASSIGNMENT OF ANTI-TRUST ACTIONS

California Public Contract Code §7103.5(b), which is hereby incorporated by this reference, provides:

"In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, contractor or the subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act, (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to Contractor, without further acknowledgement by the parties."

Contractor for itself and all the Subcontractors agrees to assign to County all rights, title and interest in and to all such causes of action Contractor and all the Subcontractors may have in connection with purchases related to or under the Contract Documents. This assignment shall become effective at the time County tenders Final Payment to Contractor, and Contractor shall require assignments from all the Subcontractors to comply herewith.

14.15 NO WAIVER

County's approval, acceptance, use or payment for any or part of Contractor's performance of the Work shall not in any way alter Contractor's obligations, or waive any of County's rights, under Contract Documents.

14.16 CONSENT TO PHOTOGRAPHING

Contractor is advised that County intends, from time to time, to take photographs, videotapes and/or motion pictures of the Work, and workers located on the Site and proximate settings. Contractor consents to the use of Contractor's name and likeness in instructional or training uses, news releases, advertising and/or publicity throughout the world in perpetuity, in all media now known or hereafter invented. Contractor shall include in its contracts with its Subcontractors a consent by the Subcontractor to the use of Subcontractor's name and the likenesses of its employees on the same terms as provided for herein applicable to such consent by Contractor.

ARTICLE 15 DEFAULT, TERMINATION AND SUSPENSION

15.1 COUNTY REMEDIES FOR DEFAULT

15.1.1 Event of Default. Each and any of the following shall be considered an Event of Contractor Default:

- .1** Contractor files a petition, or has filed against it a petition, for bankruptcy or is adjudged bankrupt;
- .2** Contractor makes a general assignment for the benefit of its creditors;
- .3** a receiver is appointed on account of Contractor's insolvency;

.4 Contractor defaults, by failing or refusing to perform any obligation set forth in the Construction Contract, General Conditions or elsewhere in the Contract Documents (including, without limitation, the performance or installation of Defective Work) and thereafter: (1) fails to commence to cure such default within two (2) working days after receipt of written notice of default; (2) if the default can be cured within three (3) Days, Contractor fails or refuses after commencing to cure in accordance with Clause (1) hereof to fully cure such default within three (3) Days after receipt of written notice of default; or (3) if the default cannot be fully cured within three (3) Days, Contractor fails after commencing to cure in accordance with Clause (1) hereof to diligently and continuously prosecute and fully cure such default within ten (10) Days after receipt of such written notice;

.5 Contractor fails or refuses to perform an obligation set forth in the Construction Contract, General Conditions or other Contract Documents that either (1) cannot be cured, or (2) cannot be cured within the 10-Day cure period set forth in Subparagraph 15.1.1.4, above;

.6 a breach of any other agreement between County and Contractor as provided in Paragraph 15.1.9, below; or

.7 if Contractor was previously prequalified as a condition for its bidding the Project pursuant to a Prequalification conducted by County, Contractor's prequalification status has been revoked or cancelled due to any of the following: (1) receipt by County of new information indicating that a statement made in Contractor's Prequalification Submittal (as defined in the Prequalification Documents) was false or misleading; (2) ownership of 50% of more of the stock or assets Contractor has changed; (3) if Contractor is a Project Joint Venture, its Principal Managing Partner (as those terms are defined in the Prequalification Documents) has ceased to function, or fully function, in the capacity of a Principal Managing Partner; or (4) Contractor has failed to comply with the requirements of the Prequalification Documents pertaining to minimum safety Prequalification requirements for Subcontractors.

15.1.2 County's Remedies. Without limitation to the County's other rights or remedies under the Contract Documents or Applicable Laws, if there is an Event of Contractor Default, County shall have the right to exercise any one or more of the following remedies:

.1 Take Over Work. County may, without terminating the Construction Contract and without incurring any additional liability or responsibility to Contractor (including, without limitation, any obligation to agree to a Contract Adjustment for any portion of the taken-over or non-taken-over Work), take over and perform, or engage others to perform, all or a portion of the Work.

.2 Suspend Work. County may, without terminating the Construction Contract and without incurring any additional liability or responsibility to Contractor (including, without limitation, any obligation to agree to a Contract Adjustment for any portion of the suspended or non-suspended Work), suspend Contractor's performance of all or a portion of the Work for as long a period of time as the County determines, in its sole discretion, is appropriate.

.3 Termination. County may, without incurring any additional liability or responsibility to Contractor, terminate the Construction Contract, the Work or any portion thereof.

.4 Surety. If there is an Event of Contractor Default pursuant to any of Subparagraphs 15.1.1.1 through 15.1.1.5, above, County may, with or without terminating the Construction Contract and without incurring any additional liability or responsibility to Contractor or Surety (including, without limitation, any obligation to agree to a Contract Adjustment), exercise its rights under the Performance Bond furnished by Contractor by giving Surety ten (10) Days' written notice of demand to perform; provided, however, that if the Surety fails, within seven (7) Days after receipt by Surety of written demand, to deliver to the County written notice of its unconditional intention to perform or does not commence performance of the Work within ten (10) Days from receipt of such notice of demand, the County may, at Contractor's Own Expense and/or the expense of the Surety, and with or without terminating the Construction Contract, proceed to complete the Work by any other means County deems expedient. By executing its Performance Bond incorporating the terms of the Construction Contract, Surety shall be deemed to have agreed, without limitation, to the provisions of this Paragraph 15.1.2 as constituting a binding obligation of Surety under its Performance Bond that shall control over any conflicting provisions set forth in the Performance Bond. Neither delivery by Surety of such written notice of unconditional intention to perform nor its timely performance of the Work in accordance with the terms of the Contract Documents and Performance Bond shall constitute waiver by Surety of any rights it may have under the Performance Bond and Applicable Laws to limit its liability to the penal amount of the Performance Bond.

15.1.3 Contractor Tools, Equipment. Upon County's exercise of one or more of its remedies following an Event of Contractor Default, County shall have the right, but not the obligation, to perform or complete all or any portion of the Work using any means that County may deem expedient, including, without limitation, taking possession and utilization of any or all of the materials, equipment, appliances, tools, plant and other property not owned by Contractor that are on the Site for County's use in performing the Work.

15.1.4 Contractor Obligations. Upon exercise by County of its remedies following an Event of Contractor Default, Contractor shall, unless County directs in writing otherwise, do the following:

- .1 immediately discontinue performance of the Work to the extent specified in writing by County;
 - .2 remove no materials, equipment or tools (other than those owned by Contractor and not necessary for performance of a portion of the Work not terminated or discontinued) from the Site unless directed to do so by County and take all actions necessary or appropriate, or that the County may direct in writing, for the protection and preservation of the Work, any materials, equipment or tools at the Site and any materials or equipment in transit to the Site;
 - .3 place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for Contractor to continue performance of such portion, if any, of the Work that is not discontinued or terminated by County in its written notice;
 - .4 provide to the County, in writing, no later than two (2) Days after request by County, a statement listing or providing: (1) all subcontract agreements, purchase orders and contracts that are outstanding, as well as any change orders, amendments and modifications thereto; (2) the status of invoicing, payments and balance owing under each such subcontract agreement, purchase order and contract; (3) the status of performance and any claims asserted under each such subcontract agreement, purchase order and contract; and (4) providing such other information as the County may determine to be necessary in order to decide whether to accept assignment of any such subcontract agreement, purchase order or contract;
 - .5 promptly following and in accordance with County's written direction: (1) assign to the County or its designee those subcontract agreements, purchase orders or contracts, or portions thereof, that the County elects in writing to accept by assignment; (2) cancel, on the most favorable terms reasonably possible, any subcontract agreement, purchase order or contract, or portion thereof, that the County does not elect to accept by assignment; and (3) if requested by County, settle, with the prior written approval of County of the terms of settlement, outstanding liabilities to Subcontractors with respect to the Work terminated or discontinued;
 6. not terminate any insurance required by the Contract Documents;
 7. thereafter continue only such performance as may be directed by County;
 8. deliver to the County the documents required to delivered pursuant to Paragraph 1.3.6, above;
- and
9. at the written request and option of County, exercised in its sole discretion, deliver to the County, and transfer title to the County of, any completed items, materials, products, equipment or other unincorporated parts of the Work that have not been previously delivered to the Site.

15.1.5 Accounting and Payment

.1 Full Termination or Discontinuance.

(1) Further Payment. In the event an exercise by County of any of its remedies following an Event of Contractor Default results in a termination or discontinuance of the entire Work, then no further payment shall be due to Contractor for the Work until an accounting has been conducted in accordance with this Paragraph 15.1.5.

(2) Time for Accounting. Within forty-five (45) Days after Final Completion of the Work by Contractor, Surety, County or others at request of County, an accounting shall be made pursuant to this Paragraph 15.1.5 of the amount due to Contractor or County.

(3) Payment Amount. If, based on the accounting conducted pursuant to this Paragraph 15.1.5, the Contractor Amount exceeds the County Amount, then the difference shall be paid by County to Contractor within fifteen (15) Days after demand by Contractor following completion of such accounting. If the County Amount exceeds the Contractor Amount, then the difference shall be paid by Contractor to County within fifteen (15) Days after demand by County following completion of such accounting. Payment by Contractor of the amount due to County pursuant to such accounting shall not be construed as a release of Contractor's obligation to County for, or County's right to recover from Contractor, any Losses, of any kind whatsoever, not part of the calculation of the County Amount (including, without limitation, additional Losses related to circumstances that formed the basis for calculation of the County Amount) that may be then or thereafter owing to or recoverable by County under Applicable Laws or the Contract Documents.

(4) Contractor Amount. The Contractor Amount used as the basis for payment pursuant to the accounting under this Paragraph 15.1.5 shall be calculated as follows:

(a) take a portion of the Contract Price determined by multiplying (i) the Contract Price, by (ii) the County's Good Faith Determination of the percentage of the Work properly performed by Contractor and (A) in permanent place, (B) previously fabricated and delivered to the Site or (C) fabricated and en route for delivery to the Site and delivered to the Site within a reasonable time after Contractor's receipt of such written notice; and

(b) subtract therefrom all amounts previously paid by County to Contractor or to Subcontractors.

(5) County Amount. The County Amount used as the basis for payment pursuant to the accounting under this Paragraph 15.1.5 shall be calculated based on the sum of all past, present and future Losses to County resulting or reasonably certain to result, directly or indirectly, from any or all of the following: (a) any negligence, willful misconduct, or Defective Work on the part of Contractor or any Subcontractor; (b) any Event of Contractor Default, whether or not constituting the basis of the County's termination or discontinuance; (c) the County's exercise of its rights and remedies under and in accordance with the Contract Documents or Applicable Laws following the occurrence of an Event of Contractor Default; and (d) the payment by County of amounts to Contractor or any Subcontractor that were not owing to Contractor or that were in excess of the amount to which Contractor was entitled under the Contract Documents.

.2 Partial Termination or Discontinuance. In the event an exercise by County of its remedies for an Event of Contractor Default results in a discontinuance or termination of only a portion of the Work, then the Contract Price and Contract Time shall be adjusted under the provisions of Article 7 and Article 8, above, applicable to Deleted Work. Contractor shall thereafter continue to be paid for its performance of the other portions of the Work in accordance with the terms of the Contract Documents, less any amounts that County is entitled to withhold under the terms of the Contract Documents.

.3 Exclusive Compensation. Contractor agrees to accept such amounts, if any, as allowed under this Paragraph 15.1.5 as its sole and exclusive compensation in the event of an exercise by County of its remedies permitted by the Contract Documents or Applicable Laws following an Event of Contractor Default.

15.1.6 Surety. Without limitation to any of the County's other rights or remedies under a Performance Bond furnished by Contractor, Contract Documents or Applicable Laws, the County has the right to suspend, take over or terminate the performance of the Work by Surety in the event of any of the following: (1) failure of Surety or its contractors to begin the Work within a reasonable time in such manner as to ensure full compliance with the Contract Documents within the Contract Time; (2) abandonment of the Work by Surety or its contractors; (3) if at any time the County makes a Good Faith Determination that the Work is unnecessarily or unreasonably delayed by Surety or its contractors; (4) violation by Surety or its contractors of any terms of the Contract Documents, Performance Bond or Applicable Laws; or (5) failure by Surety or its contractors to follow instructions of the County for performance of the Work or for performance of the Work within the Contract Time. By executing its Performance Bond incorporating the terms of the Construction Contract, Surety shall be deemed to have agreed, without limitation, to the provisions of this

Paragraph 15.1.6 as constituting a binding obligation of Surety under its Performance Bond that shall control over any conflicting provisions set forth in the Performance Bond.

15.1.7 Conversion. In the event a termination for cause by the County is adjudged by a court or by binding arbitration conducted in accordance with the Contract Documents to have been wrongful, such termination shall be deemed converted to a termination for convenience pursuant to Section 15.3, below, in which case Contractor agrees to accept such amount, if any, as permitted by Paragraph 15.3.3, below, as its sole and exclusive compensation and agrees to waive any right to recovery of any other compensation or Loss, including, but not limited to, loss of anticipated profits, loss of revenue, lost opportunity or other consequential, direct, indirect or incidental damages, of any kind.

15.1.8 Substantial Performance Waived. The legal doctrine that a contractor may recover for substantial performance of a building contract is to have no application to the Construction Contract. Any Event of Contractor Default, whether occurring before or after the Work is Substantially Completed, shall be deemed material and shall give rise to the right of County to exercise its remedies permitted under the Contract Documents or Applicable Laws.

15.1.9 Cross Default. Contractor agrees that a breach of any other agreement between Contractor and County, whether related or unrelated to the Project, that is not cured in accordance with the terms of such other agreement constitutes an Event of Contractor Default under the Construction Contract, thereby entitling County to assert all its rights and remedies hereunder including, but not limited to, a specific right of off set by County against any amounts otherwise payable to Contractor under the Construction Contract or any other agreement between Contractor and County.

15.1.10 Rights Cumulative. All of County's rights and remedies under the Contract Documents are cumulative, and shall be in addition to and not a limitation upon those rights and remedies available under Applicable Laws.

15.1.11 Materiality. Designation in the Contract Documents of certain defaults as "material" shall not be construed as implying that other defaults not so designated are not material nor as limiting County's right to terminate or exercise its other rights or remedies for default to only material defaults.

15.1.12 County Action. No termination or action taken by County after termination shall prejudice any rights or remedies of County provided by Applicable Laws or by the Contract Documents, including, without limitation, the right of County to proceed against Contractor to recover all Losses suffered by reason of Contractor's default.

15.2 SUSPENSION BY COUNTY FOR CONVENIENCE

15.2.1 Suspension Order. Without limitation to the County's rights under Section 15.1, above, County may, at any time, for its convenience and without the occurrence of any Event of Contractor Default, order Contractor, in writing, to suspend, delay or interrupt performance of the Work, in whole or in part. Upon receipt of such an order, Contractor shall comply with its terms and take all reasonable steps to minimize additional costs that are incurred applicable to the portion of the Work suspended, delayed or interrupted by County.

15.2.2 Resumption. If an order issued by the County pursuant to this Section 15.2 is canceled or expires, Contractor shall resume and continue with the previously affected portion of the Work. In such event, Contractor shall be entitled to a Contract Adjustment for additional Allowable Costs necessarily caused by such order and compensation allowed under Section 3.3 of the Construction Contract for Compensable Delay; provided, however, that no such Contract Adjustment shall be made: (1) to the extent that performance either is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor or any of the Subcontractors is responsible or for which Contractor would not be entitled to a Contract Adjustment; (2) to the extent that a Contract Adjustment on account thereof is made or denied under another provision of the Contract Documents; or (3) for any general or specific escalation in prices of the Work.

15.2.3 Limitation. The provisions of this Section 15.2 shall not apply unless a written order is issued by County pursuant to this Section 15.2.

15.3 TERMINATION BY COUNTY FOR CONVENIENCE

15.3.1 Right to Terminate for Convenience. Without limitation upon any of County's other rights or remedies under the Contract Documents or Applicable Laws, County shall have the option, at its sole discretion and without the occurrence of any Event of Contractor Default or any other cause, to terminate the Construction Contract or Work, in whole or in part, for its convenience by giving five (5) Days written notice to Contractor.

15.3.2 Contractor Obligations. Upon receipt of notice of termination for convenience pursuant to this Section 15.3, Contractor shall, unless such notice directs otherwise, comply with all of the provisions of Paragraph 15.1.4, above.

15.3.3 Contractor Compensation. Following a termination for convenience pursuant to this Section 15.3 and within sixty (60) Days after receipt of a complete and timely Application for Payment from Contractor, an accounting shall be conducted in accordance with the process set forth in Paragraph 15.1.5, above. In such event, the amount due to Contractor shall be the Contractor Amount as calculated in the same manner provided for in Paragraph 15.1.5, above, except that there shall be added to the calculation of the Contractor Amount an amount for: (1) the reasonable, actual and direct Allowable Costs incurred and paid by Contractor (and not by Subcontractors) for (a) demobilizing Contractor's facilities from the Site, and (b) Contractor's administering the close out of its participation in the Project for a period of no longer than fifteen (15) Days; plus (2) a markup to Contractor on the Contractor's Allowable Costs incurred under Clause (1) of this Paragraph 15.3.4 that is based on the percentage for Allowable Markup that Contractor is permitted to charge pursuant to Article 7, above, for Compensable Changes involving Extra Work that is Self-Performed Work.

15.3.4 Exclusive Compensation. Contractor agrees to accept the compensation allowed under Paragraph 15.3.3, above, as its sole and exclusive compensation in the event of a termination by County for convenience and waives any claim for Loss related to County's termination for convenience, including, but not limited to, loss of anticipated profits, loss of revenue, lost opportunity, or other consequential, direct, indirect, or incidental damages, of any kind.

15.3.5 Subcontractors. Contractor shall include provisions in all of its subcontracts, purchase orders and other contracts with the Subcontractors permitting termination for convenience by Contractor on terms that are consistent with, and that afford no greater rights of recovery against Contractor for termination than are afforded to Contractor under, this Section 15.3.

15.4 TERMINATION BY CONTRACTOR

15.4.1 Contractor's Remedies. Subject to the provisions of Paragraph 15.4.2, below and Paragraph 15.4.3, below, Contractor's sole right to terminate the Construction Contract shall be its right to terminate, for cause only, upon the occurrence of either of the following:

.1 the entire Work is stopped for one hundred sixty (160) consecutive Days, through no act or fault of Contractor or any of the Subcontractors, of any Tier, or any employee or agent of any of them, due to issuance of an order of a court or other Governmental Authority or due to a declaration of a national emergency making material unavailable; or

.2 the entire Work is suspended by Contractor, in accordance with a proper exercise by Contractor of its rights under Section 9.8, above, for a continuous period of thirty (30) Days.

15.4.2 Notice of Intention to Terminate. If one of the reasons to terminate as described in Paragraph 15.4.1, above, exists, Contractor may, upon thirty (30) Days written notice to County, terminate the Construction Contract and recover from County as its sole and exclusive compensation such sums as are permitted under Paragraph 15.3.3, above.

15.4.3 Continuous Performance. Provided that Contractor is paid undisputed sums due in accordance with the requirements of the Construction Contract, Contractor shall not stop, delay or interrupt continuous performance of the Work by reason of any dispute or disagreement with County, including, without limitation, any disputes or disagreements over payments of money claimed due under the Contract Documents.

15.5 WARRANTIES

All obligations of Contractor and the Subcontractors under the Contract Documents with respect to warranties and guarantees of the Work will continue in force and shall apply, notwithstanding a termination or other discontinuance of the Work by County or Contractor pursuant to an exercise of rights by either under this Article 15, to any portion of the Work that at the time of such termination or discontinuance has been completed or partially completed by Contractor to the point that it is substantially ready (exclusive of any incidental work that may be needed to connect such portion to other Work to other Work or Existing Improvements or to energize such portion of the Work for operation) for use or occupancy by County.

ARTICLE 16 NON-DISCRIMINATION

16.1 NON-DISCRIMINATION IN SERVICES

16.1.1 Contractor must, in accordance with Applicable Laws, not discriminate in the provision of services hereunder because of race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability. For the purpose of this Section 16.1, discrimination in the provision of services may include, but is not limited to the following:

- .1** denying any person any service or benefit or the availability of a facility;
- .2** providing any service or benefit to any person which is not equivalent to, or is in a non-equivalent manner or at a non-equivalent time from, that provided to others;
- .3** subjecting any person to segregation or separate treatment in any manner related to the receipt of any service;
- .4** restricting any person in any way in the enjoyment of any advantage or privilege enjoyed by others receiving any service or benefit; or
- .5** treating any person differently from others in determining admission, enrollment, eligibility, membership, or any other requirement or condition which persons must meet in order to be provided any service or benefit.

16.1.2 Contractor shall ensure that services are provided without regard to race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability.

16.1.3 Contractor shall establish and maintain written procedures under which any person applying for, performing or receiving services hereunder, may seek resolution from Contractor of a complaint with respect to any alleged discrimination. Such persons shall be advised by Contractor of these procedures. A copy of such procedures shall be posted by Contractor in a conspicuous place, available and open to the public, in each of Contractor's facilities where services are provided hereunder.

16.2 NON-DISCRIMINATION IN EMPLOYMENT

Contractor must, in accordance with Applicable Laws, not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability. Without limitation to any other provisions of this Section 16.2, in the performance of the obligations under the Contract Documents, Contractor and the Subcontractors shall comply with all applicable provisions of the California Fair Employment Practices Act (California Government Code §§12940-48) and the applicable equal employment provisions of the Civil Rights Act of 1964 (42 U.S.C. §§200e - 217), whichever is more restrictive. Contractor and the Subcontractors shall ensure that qualified applicants are employed and that employees are treated during employment without regard to race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability, in accordance with requirements of Applicable Laws. Such shall include, but not be limited to, the following:

.1 employment, promotion, demotion, transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation; or

.2 selection for training, including apprenticeship.

16.2.1 Contractor agrees to post in conspicuous places in each of Contractor's facilities providing services hereunder, available and open to employees and applicants for employment, notices setting forth the provisions of this Section 16.2.

16.2.2 Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability, in accordance with requirements of Applicable Laws.

16.2.3 Contractor shall send to each labor union, or workers' representative with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or the workers' representative of Contractor's commitments under this Section 16.2.

16.2.4 Contractor certifies and agrees that it will deal with the Subcontractors, bidders and vendors without regard to race, color, religion, national origin, ancestry, sex, age, sexual orientation, marital status, AIDS or disability, in accordance with the requirements of Applicable Laws.

16.2.5 In accordance with Applicable Laws, Contractor shall allow duly authorized representatives of the County, State, and Federal government access to its employment records during regular business hours in order to verify compliance with the provisions of this Section 16.2. Contractor shall provide such other information and records as such representatives may require in order to verify compliance with the provisions of this Section 16.2.

16.2.6 If County finds that any of the provisions of this Section 16.2 have been violated by Contractor or any of the Subcontractors, such violation shall constitute a material breach of the Construction Contract for which County may cancel, terminate or suspend the Construction Contract. While County reserves the right to determine independently that the anti-discrimination provisions of the Construction Contract have been violated, a determination by the California Fair Employment and Housing Commission or the Federal Equal Employment Opportunity Commission that Contractor or the Subcontractor has violated State or Federal anti-discrimination laws shall constitute a finding by County that Contractor or the Subcontractor has violated the provisions of this Section 16.2.

16.2.7 Contractor hereby agrees that it will comply with §504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794) and similar Applicable Laws relating to employment of or access to persons with disabilities, all requirements imposed by applicable Federal Regulations, and all guidelines and interpretations issued pursuant thereto, to the end that no qualified disabled person shall, on the basis of disability, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity of Contractor receiving Federal Financial Assistance.

END OF GENERAL CONDITIONS

THE PRESS-ENTERPRISE

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County of Riverside - Clerk of the Board
PO Box 1147
Riverside, California 92502

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Invoice Text:

NOTICE INVITING BIDS NOTICE IS HEREBY GIVEN that the County of Riverside ("County") invites sealed Bids for the construction of the following project ("Work"): Flood Control and Water Conservation District Office Tenant Improvement Project (FM08947014286) Bids shall be prepared in conformance with the Instructions to Bidders and other Bidding Documents. Bids must be received, by hand delivery or mail, by the Clerk of the Board located on the 1st floor of the County Administrative Center, 4080 Lemon Street, Riverside, CA 92501, no later than the Bid Closing Deadline of 10:00 a.m. on 04/22/26, to be thereafter on said date and at said location publicly opened and read aloud. The Bidder assumes sole responsibility for timely receipt of its Bid. On and after March 11, 2026, and up to seventy-two (72) hours prior to the Bid Closing Deadline, copies of Bidding Documents will be available to Bidders for pick-up by Bidder at, or for mailing to Bidder upon written request by Bidder submitted to, A&I Reprographics, 3939 E. Guasti Rd., Unit B, Ontario, CA 91761, Phone: 909 390-4839; Website: <https://www.aandiplanroom.com>. At the time of such pick-up, a non-refundable fee will be charged for each set of Bidding Documents furnished to bidders. Bidders and Plan Holders shall agree to and sign the County's "Sensitive Security Information Confidentiality Agreement" form, to be provided by A&I Reprographics prior to issuance of any bidding documents. The Bidding Documents may also be viewed in person at A&I Reprographics' office at the above-referenced address, between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday (except Holidays) and on A&I Reprographics' Website: <https://www.aandirepro.com>. Pursuant to Labor Code section 1771.1, any contractor bidding, or subcontractor to

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County of Riverside - Clerk of the Board
PO Box 1147
Riverside, California 92502

Publication: The Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc: 0011782281

FILE NO. 0011782281

PROOF OF PUBLICATION

I am a citizen of the United States. I am over the age of eighteen years and not party to or interested in the above-entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, under date of August 25, 1995, Case Number 267864, and under date of September 16, 2013, Case Number RIC 1309013; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

03/11/2026, 03/18/2026

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Date: March 18, 2026.

At: Riverside, California



Signature

NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the County of Riverside ("County") invites sealed Bids for the construction of the following project ("Work"):

**Flood Control and Water Conservation
District Office Tenant Improvement Project
(FM08947014286)**

Bids shall be prepared in conformance with the Instructions to Bidders and other Bidding Documents. Bids must be received, by hand delivery or mail, by the Clerk of the Board located on the 1st floor of the County Administrative Center, 4080 Lemon Street, Riverside, CA 92501, no later than the Bid Closing Deadline of **10:00 a.m. on 04/22/26**, to be thereafter on said date and at said location publicly opened and read aloud. The Bidder assumes sole responsibility for timely receipt of its Bid.

On and after **March 11, 2026**, and up to seventy-two (72) hours prior to the Bid Closing Deadline, copies of Bidding Documents will be available to Bidders for pick-up by Bidder at, or for mailing to Bidder upon written request by Bidder submitted to, **A&I Reprographics, 3939 E. Guasti Rd., Unit B, Ontario, CA 91761, Phone: 909 390-4839; Website: <https://www.aandiroom.com>**. At the time of such pick-up, a non-refundable fee will be charged for each set of Bidding Documents furnished to bidders. Bidders and Plan Holders shall agree to and sign the County's "Sensitive Security Information Confidentiality Agreement" form, to be provided by A&I Reprographics prior to issuance of any bidding documents. The Bidding Documents may also be viewed in person at A&I Reprographics' office at the above-referenced address, **between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday (except Holidays) and on A&I Reprographics' Website: <https://www.aandirepro.com>**.

Pursuant to Labor Code section 1771.1, any contractor bidding, or subcontractor to be listed on a bid proposal subject to Public Contract Code section 4104, shall not be qualified to bid after March 1, 2015, unless currently registered and qualified to perform public works pursuant to Labor Code section 1725.5. No Contractor or subcontractor may enter into a contract (after April 1, 2015) without proof of current registration to perform public works.

A mandatory Pre-Bid Conference will be conducted on **03/25/26**, commencing promptly at **10:00 a.m.**, at **1995 Market St, Riverside, CA 92501**. **Attendance at the mandatory Pre-Bid Conference is required as a condition of bidding.** Sign language services are available for the Pre-Bid Conference upon written request received by email at **rbaluyot@rivco.org** at least three (3) business days prior to the Pre-Bid Conference.

The Bidder receiving the Award by the County is required:

(1) to furnish a Performance Bond and Payment Bond as provided in the Instructions to Bidders and other Bidding Documents;

(2) both at the time Bidder submits its Bid and other Bid Submittals and at the time of Award, to: (a) hold a contracting license, active and in good standing, issued by the Contractors State License Board for the State of California for the following license classification(s): B; and (b) hold, or designate a Subcontractor that holds, the certification(s) required by Applicable Laws to perform the following work: complete interior office remodel including, but not limited to, mechanical, electrical, plumbing, fire protection, fire life safety, interior wall construction, flooring, ceiling, audio visual, telecom, and other office interior work; and

(3) to comply with the provisions of the California Labor Code, including, without limitation, Sections 1771.4, 1773.1, 1774, 1775 and 1776 of the California Labor Code and including, without limitation, the obligations to pay the general prevailing rates of wages in the locality in which the Work is to be performed and comply with Section 1777.5 of the California Labor Code governing employment of apprentices. Copies of the prevailing rates of per diem wages are on file at California State Department of Industrial Relations, 464 West Fourth St., Suite 348, San Bernardino, CA 92401, and are available to any interested party on request.

THIS IS A PUBLIC WORKS PROJECT AND

SUBJECT TO COMPLIANCE MONITORING AND ENFORCEMENT BY THE DEPARTMENT OF INDUSTRIAL RELATIONS. The awarded prime contractor shall post job site notices as prescribed by regulation starting January 1, 2015. Contractor or subcontractor shall furnish records specified in Labor Code section 1776 to the Labor Commissioner.

Substitution of securities for any moneys withheld by County shall be permitted as provided for by Section 22300 of the California Public Contract Code.

Capitalized terms used herein shall have the meanings assigned to them in the Bidding Documents. For information contact: Facilities Management, 3450 14th Street, 2nd Floor, Riverside, CA 92501.

Alternative formats available upon request to individuals with disabilities. If you require reasonable accommodation, please contact Clerk of the Board at (951) 955-1069.

Dated: March 4, 2026

KIMBERLY A. RECTOR Clerk of the Board of Supervisors By: Ana Garcia, Clerk of the Board Assistant

The Press-Enterprise

Published: 3/11, 3/18/26