

PROJECT MANUAL

**CAMP AFFLERBAUGH CCTV PROJECT
6631 STEPHENS RANCH ROAD
LA VERNE, CA 91750
SPECS. NO.7701; C.P. NO. 87700**

**Huitt-Zollars, Inc.
555 West 5th Street
*Los Angeles, CA 90013***

DECEMBER 2024

**COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUSINESS RELATIONS AND CONTRACTS DIVISION
900 SOUTH FREMONT AVENUE
ALHAMBRA, CA 91803-5311
(626) 300-2362**

PROJECT MANUAL - TABLE OF CONTENTS
BIDDING AND CONTRACT REQUIREMENTS

<u>DIVISON 00</u>	<u>BID REQUIREMENTS</u>	<u>PAGE(S)</u>
Section 00 01 00	Instructions to Bidders	1-36
Section 00 03 00	Form of Bid	1-3
Section 00 03 10	Best Management Practices	1-1
Section 00 03 11	Construction and Demolition Debris Recycling Requirements	1-1
Section 00 03 12	Insurance Requirements	1-1
Section 00 04 10	Bid Bond	1-1
Section 00 04 30	List of Subcontractors	1-4
Section 00 04 35	Community Business Enterprise Participation Form	1-2
Section 00 04 36	Description of Efforts to Employ Youth	1-3
Section 00 04 38	Request for County Program Preference Consideration	1-2
Section 00 04 38A	Subconsultant Certification Form	1-1
Section 00 04 40	Equals	1-2
Section 00 04 50	Noncollusion Affidavit	1-1
Section 00 04 60	Attestation of Willingness to Consider GAIN/GROW Participants	1-1
Section 00 04 65	3-Year Contracting History	1-1
Section 00 04 70	False Claims	1-2
Section 00 04 71	Civil Litigation History	1-2
Section 00 04 72	Criminal Convictions	1-2
Section 00 04 73	Debarment	1-2
Section 00 04 74	Labor Law/Prevailing Wage	1-2
Section 00 04 75	Integrated Pest Management Program Compliance Certification	1-1
Section 00 04 76	Charitable Contributions Certification	1-1
Section 00 04 77	Prospective Contractor List of Terminated Contracts	1-1
Section 00 04 78	SB 1439 Questionnaire	1-1
Section 00 04 79	Contribution and Agent Declaration Form	1-5
Section 00 04 85	Contractor Employee Jury Service Program	1-1
Section 00 04 86	COVID-19 Vaccination Certification of Compliance	1-1
Section 00 04 90	Contractor's Industrial Safety Record	1-1
Section 00 04 91	Injury and Illness Prevention Plan and Code of Safe Practices Affidavit	1-1
Section 00 04 92	Bidder's Organization Questionnaire/Affidavit	1-2
Section 00 04 93	Certification of Compliance with the County's	

	Defaulted Property Tax Reduction Program	1-1
Section 00 04 94	Avoidance of Conflict of Interest	1-1
Section 00 04 95	Familiarity with the County Lobbyist Ordinance Certification	1-1
Section 00 04 96	Proposer's EEO Certification	1-1
Section 00 04 97	Compliance with Fair Chance Employment Hiring Practices Certification	1-1
Section 00 04 98	Zero Tolerance Human Trafficking Policy Certification	1-1
Section 00 04 99	Disallowed Cost Attestation	1-1

CONTRACT FORMS

Section 00 05 00	Sample Agreement	1-30
Section 00 06 10	Bond of Faithful Performance	1-1
Section 00 06 20	Payment Bond for Labor and Materials	1-1

CONDITIONS OF THE CONTRACT

Section 00 07 00	General Conditions	1-53
Section 00 08 00	Supplemental Conditions	1-20
Section 00 09 12	Local and Targeted Worker Hire Program	1-9

DIVISION 1

GENERAL REQUIREMENTS

Section 01 00 00	Project General Requirements	1-7
Section 01 12 16	Phasing of the Work	1-4
Section 01 14 00	Alteration Project Procedures	1-4
Section 01 26 13	Contractor's Request for Information	1-3
Section 01 29 73	Schedule of Values	1-2
Section 01 29 76	Progress Payment Procedures	1-6
Section 01 31 00	Coordination and Meetings	1-5
Section 01 31 19	Progress Meetings	1-2
Section 01 32 00	Construction Schedules	1-13
Section 01 32 33	Photographic Documentation	1-2
Section 01 33 00	Submittals	1-11
Section 01 33 23	Shop Drawings, Product Data and Samples	1-6
Section 01 35 46	Indoor Air Quality Procedures	1-3
Section 01 35 91	Special Procedures for Historic Treatment	1-8
Section 01 45 00	Quality Control	1-6

Section 01 50 00	Temporary Facilities	1-5
Section 01 57 00	Storm Water Pollution Prevention	1-7
Section 01 57 19	Temporary and Environmental Controls	1-10
Section 01 60 00	Product Handling	1-2
Section 01 66 00	Transport, Handling and Storage	1-2
Section 01 74 19	Construction and Demolition Debris Recycling	1-2
Section 01 74 23	Final Cleaning	1-3
Section 01 75 00	Project Added Stock	1-2
Section 01 77 00	Contract Closeout	1-7
Section 01 78 23	Operations and Maintenance	1-5
Section 01 78 36	Guarantees and Warranties	1-3
Section 01 78 39	Project Record Documents	1-3
Section 01 91 00	Commissioning	1-24

DIVISION 02

EXISTING CONDITIONS

Section 02 41 16	Selective Demolition

DIVISION 03

CONCRETE

Section 03 10 00	Concrete Forming
Section 03 20 00	Concrete Reinforcing
Section 03 30 00	Cast-in-Place Concrete

DIVISION 05

METALS

Section 05 05 19	Post-Installed Concrete Anchors
Section 05 12 10	Welding

DIVISION 7

THERMAL AND MOISTURE PROTECTION

Section 07 60 00	Flashing and Sheet Metal
Section 07 92 00	Joint Sealants

DIVISION 9

FINISHES

Section 09 29 00	Gypsum Board
Section 09 90 00	Painting and Coating

DIVISION 23

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

Section 23 05 00	Common Work Results For HVAC
Section 23 05 53	HVAC Identification
Section 23 05 93	Testing, Adjusting, And Balancing For HVAC
Section 23 07 00	HVAC Insulation
Section 23 20 13	Above Ground HVAC Piping
Section 23 80 00	Heating, Ventilating and Air Conditioning Equipment Fan Coil Units
Section 23 82 19	Fan Coil Units

DIVISION 26

ELECTRICAL

Section 26 05 26	Grounding and Bonding
Section 26 05 33	Raceway, Boxes, Fittings, and Supports
Section 26 05 43	Underground Ducts and Raceways for Electrical Systems
Section 26 05 53	Identification for Electrical Systems
Section 26 22 00	Low-Voltage Transformers
Section 26 24 16	Panelboards and Signal Terminal Cabinets
Section 26 27 26	Wiring Devices
Section 26 28 13	Fuses
Section 26 28 16	Enclosed Switches and Circuit Breakers

DIVISION 27

COMMUNICATION SYSTEMS

Section 27 00 00	Communications Systems
Section 27 05 00	Common Work Results
Section 27 05 26	Grounding and Bounding for Communications Systems
Section 27 05 28	Pathways for Communications Systems
Section 27 05 53	Identification for communications systems
Section 27 11 00	Communications Equipment Room Fittings
Section 27 13 00	Communications Backbone Cabling
Section 27 15 00	Communications Horizontal Cabling
Section 27 20 00	Data Communication

DIVISION 28

ELECTRONIC SAFETY AND SECURITY

Section 28 05 00	Security Systems General Requirements
Section 28 05 53	Identification for electronic safety and security
Section 28 08 00	Security Testing and Commissioning
Section 28 23 00	Video Surveillance System

DIVISION 32

EXTERIOR IMPROVEMENTS

Section 32 12 16	Asphalt Paving
Section 32 31 13	Chain Link Fences and Gates
Section 32 90 00	Planting

APPENDICES:

- A. Limited Asbestos and Lead-Based Paint XRF Survey Report for The Conduit Penetrations Project Located At Camp Afflerbaugh by The Bainbridge Environmental Consultants, dated August 9, 2016
- B. Limited Asbestos & Lead-Based Paint Inspection Report for Afflerbaugh Page Detention Facility by ENCORP, dated August 4, 2020
- C. County of Los Angeles Probation Department Directive D1079- Worksite, Tool and Materials Safety and Security Procedures, dated March 3, 2006
- D. Daily Contractor Roster
- E. Management Services Bureau On-Site Contractor Security Policy by the County of Los Angeles Probation Department
- F. County of Los Angeles Probation Department Background Request Form

SECTION 00 01 00

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 COPIES OF BIDDING DOCUMENTS

- a. Complete set of the Bidding Documents may be downloaded for free from the Los Angeles County Public Works website <http://dpw.lacounty.gov/go/constructioncontracts>.
- b. Complete sets of Bidding Documents shall be used in preparing bids; the County does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- c. All Bidders for this solicitation are strongly encouraged to register at <http://dpw.lacounty.gov/general/contracts/opportunities/>. Only those Bidders registered for this solicitation through the DPW website will receive automatic notification when any update to this solicitation is made. **County does not have an obligation to notify any Bidders other than through the DPW website automatic notification system.**
- d. Electronic Submission of Bid

Bids will only be accepted electronically through BidExpress, a secure online bidding service website, at www.bidexpress.com.

To submit the bid electronically, register with BidExpress, one week prior to the bid opening date. Once the Bidder is registered, an invitation will be sent to the Bidder to allow access to the solicitation on www.bidexpress.com. A Infotech/BidExpress Set-up Guide is included as an Enclosure for reference. There is a nominal service fee to use BidExpress.

Visit the Infotech Knowledge Center at the following link for more information: [Bid Express® help guides](http://www.bidexpress.com).
<https://infotechinc.zendesk.com/hc/en-us/categories/360003900254-Bid-Express-at-www-bidexpress-com>.

- e. The bid opening will be held using Microsoft Teams, or County accepted platform. The information and link to access the bid opening will be posted on Public Works website, on the project information link. Any changes to this procedure will be issued in a Notice to Bidders for this project.

1.02 QUALIFICATIONS OF BIDDERS AND SUBCONTRACTORS

- a. The Bidder and each listed subcontractor must have a valid license, issued by the Contractors' State License Board, for the type of work proposed to be performed by the Bidder and each listed subcontractor under the contract. The required license(s) is required at time of bid in order to be considered a responsive bid.
- b. This project requires the Bidder to possess a license classification of "B" at time of bid.
- c. In addition to Article 1.02, a. and b., the specifications set forth require specialty licenses, experience requirements, and required certifications from manufacturers concerning approved installers. The apparent successful Bidder shall be required to demonstrate to the County's satisfaction within 10 calendar days of the bid opening that the Bidder and proposed subcontractors (whether required to be listed or not) possess these specialty licenses, experience requirements, and required certifications.
- d. All Bidders and their subcontractors must be registered with the Department of Industrial Relations. Qualified contractors and subcontractors are listed on searchable database at:
<https://cadir.my.salesforce-sites.com/ContractorSearch>.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- a. Before submitting a bid, each Bidder must: a) examine the Contract Documents thoroughly; b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress, or performance of the Work; c) become familiar with federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the Work; and d) study and carefully correlate Bidder's observations with the Contract Documents.
- b. The submission of a bid will constitute an incontrovertible representation by the Bidder that Bidder has complied with every requirement of this Article and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

1.04 INTERPRETATIONS

- a. All questions about the meaning or intent of the Contract Documents shall be submitted to the Department in writing. Replies will be issued by Notice to Bidders. Questions received less than ten (10) calendar days prior to the

date for opening of bids will not be answered. Only questions answered by formal written notice will be binding. Oral and other interpretations or clarifications will be without legal effect.

1.05 BID SECURITY

- a. Bid security is required of each Bidder and shall be made payable to Los Angeles County, in an amount of ten percent (10%) of the Bidder's bid price, in the form of cash, a certified check, a cashier's check, or a bid bond issued by a California-admitted Surety.
- b. The bid security of the successful Bidder will be retained until such Bidder has executed the Agreement and contract security, whereupon it will be returned; if the successful Bidder fails to execute and deliver the Agreement and furnish the required insurance and contract security within fourteen (14) calendar days of notification from County, the County may annul the Notice of Award and the bid security of that Bidder may be forfeited. The bid security of any Bidder whom the County believes to have a reasonable chance of receiving the award may be retained until the earlier of the effective date of the contract or the ninety-first (91) day after bid opening. Bid security of other Bidders will be returned within thirty (30) days of the bid opening.

1.06 CONTRACT TIME

- a. The number of days within which, or the date by which, the Work is to be completed (the contract time) is set forth in Section 01 00 00, "Project General Requirements." By submitting a bid, each Bidder agrees that the contract time is reasonable and the Bidder is capable of performing all Work within the contract time.

1.07 LIQUIDATED DAMAGES

- a. Provisions for liquidated damages, if any, are set forth in Section 01 00 00, "Project General Requirements."

1.08 SUBSTITUTE MATERIAL AND EQUIPMENT

- a. The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications unless the Bidder complied with the procedure for substitution of Equals as set forth in the General Conditions.

- b. If any proposed substitution of an Equal is determined by the County to not be an Equal, the Contractor must complete the Work in accordance with the Drawings and Specifications for the accepted bid amount.

1.09 SUBCONTRACTORS

- a. In accordance with Sections 4100 to 4113, inclusive of the Public Contract Code of the State of California, Contractors shall list, on the form provided, the name, license number, business location and classification of work for each subcontractor who will perform work, labor, or render service on the construction work in excess of one-half (1/2) of one percent (1%) of the total bid.

1.10 FORM OF BID

- a. The Form of bid is attached hereto. Additional copies may be obtained from Contracts Administration Section, Business Relations and Contracts Division, 8th Floor.
- b. The bid price of each item on the form must be stated in words and numerals; in case of a conflict, words will take precedence. Bid prices must be given for all bid items shown on the Form of Bid, including all additive alternatives. Failure to provide prices for all bid items may result in a determination by the County that the Form of Bid is nonresponsive.
- c. Bids by corporations must be executed in the corporate name by the President or a Vice-President (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of corporation shall be shown below the signature.
- d. Bids by partnership must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.
- e. All names must be typed or printed below the signature.
- f. Bid Documents, Form of Bid, Section 00 03 00, must confirm receipt of any Notice to Bidders (if any).

1.11 SUBMITTAL OF BIDS

- a. Bids will only be accepted electronically through BidExpress, a secure online bidding service website, at www.bidexpress.com. Bids shall be submitted at the time indicated in the Information for Bidders.

1. The following documents shall be submitted at the time of bid.

Required bid form documents:

- Section 00 03 00 Form of Bid
- Section 00 03 10 Best Management Practices
- Section 00 03 11 Construction and Demolition
Debris Recycling Requirements
- Section 00 03 12 Insurance Requirements
- Section 00 03 13 LTWHP Jobs Coordinator
- Section 00 04 00 Attestation of Contractor's
Qualifications
- Section 00 04 10 Bid Bond (scanned copy)
- Section 00 04 30 List of Subcontractors
- Section 00 04 38 Request for Preference Consideration
- Section 00 04 38A Subconsultant Certification Form
- Section 00 04 78 SB 1439 Questionnaire-primary firm
- Section 00 04 79 Contribution and Agent Declaration
Form-primary firm

Failure to confirm receipt of any Notice to Bidder(s) provided to bidders on Form of Bid, Section 00 03 00, as required, may result in a determination that the apparent low bidder is nonresponsive and/or nonresponsible.

2. Original Bid Bond shall be mailed in within two (2) calendar days from the bid opening. This is required only from the first, second, and third apparent lowest bidders.
3. The following document shall not be submitted at time of bid. Section 00 04 40, Equals, will only be required from the first, second, and third apparent lowest bidders and returned to the County no later than two (2) calendar days from the bid opening.

- Section 00 04 40 Equals

- b. No mention shall be made of sales tax or use tax, as all bid prices submitted will be considered as including such tax.

- c. The County may consider nonresponsive any bid not prepared and submitted in accordance with the provisions herein and, therefore, reserves the right to reject any or all bids so submitted. The County also reserves the right to accept alternative bids when called for and when items are to be bid on as units, to accept the bid for the list of such items in its entirety, or to accept any portion or portions of same.
- d. **The following documents shall not be submitted at the time of bid. These forms will be required only from the first, second, and third apparent lowest bidders and returned to the County no later than seven (7) calendar days from the bid opening.**

Section 00 04 35	Community Business Enterprises (CBE) Participation Form
Section 00 04 50	Noncollusion Affidavit
Section 00 04 60	Attestation of Willingness to Consider GAIN/GROW Participants
Section 00 04 65	3-Year Contracting History
Section 00 04 70	False Claims
Section 00 04 71	Civil Litigation History
Section 00 04 72	Criminal Convictions
Section 00 04 73	Debarment
Section 00 04 74	Labor Law/Prevailing Wage
Section 00 04 75	Integrated Pest Management Program Compliance Certification
Section 00 04 76	Charitable Contributions Certification
Section 00 04 77	Prospective Contractor List of Terminated Contracts
Section 00 04 78	SB 1439 Questionnaire-subconsultants/subcontractors
Section 00 04 79	Contribution and Agent Declaration Form-subconsultants/subcontractors
Section 00 04 85	Contractor Employee Jury Service Program-primary firm and subconsultants/subcontractors
Section 00 04 90	Contractor's Industrial Safety Record
Section 00 04 91	Injury and Illness Prevention Plan and Code of Safe Practices Affidavit
Section 00 04 92	Bidder's Organization Questionnaire/Affidavit
Section 00 04 93	Certification of Compliance with the County's Defaulted Property Tax Reduction Program
Section 00 04 94	Avoidance of Conflict of Interest
Section 00 04 95	Familiarity with the County Lobbyist Ordinance Certification
Section 00 04 96	Proposer's EEO Certification

Section 00 04 97	Compliance with Fair Chance Employment Hiring Practices Certification
Section 00 04 98	Zero Tolerance Human Trafficking Policy Certification
Section 00 04 99	Disallowed Cost Attestation

- e. Upon the County's request, each bidder agrees to provide the County with a cost breakdown of the bid in Construction Specification Institute (CSI) format. Failure to provide this information may result in a determination that the Bidder is nonresponsive and/or not responsible.

1.12 MODIFICATION AND WITHDRAWAL OF BIDS

- a. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a bid must be executed) and delivered to the place where bids are to be submitted or by a Bidder's representative with proper identification and verification, at any time prior to the closing time for receipt of bids.
- b. Relief of Bidders shall be as provided in Sections 5100-5107, inclusive, of the Public Contract Code of the State of California.

1.13 OPENING OF BIDS

- a. Bids shall be opened publicly, read aloud, and the amount of the base bids and alternates (if any) shall be made available after the opening of bids.
- b. Preliminary bids results will be posted on the same day on the Department of Public Works Website: <http://dpw.lacounty.gov/general/contracts/opportunities/>.

1.14 AWARD OF CONTRACT

- a. If the County determines to award a contract, it shall be awarded to a responsive and responsible Bidder with the lowest bid price with preference to businesses that are certified by the County as a Local Small Business Enterprise, as set forth in Article 1.30 of these Instructions to Bidders. If there are alternatives, the lowest bid price shall be determined by adding the lump sum bid and the price of all alternatives. This does not preclude the Board of Supervisors from selecting any combination of alternates after the lowest responsible bidder has been determined. The Board of Supervisors reserves the right to reject any or all bids or to waive in the public interest technical errors and discrepancies in bids submitted.

- b. The Board shall have the right to delay the award of the contract for 90 days after bids are opened and declared, unless otherwise agreed to by the County and Bidders. Bidders may withdraw their bids 91 calendar days after bids are publicly opened and declared by submitting written notice addressed to the Department. In evaluating bids, the County shall consider whether or not the bids comply with requirements, alternatives, and unit prices, if requested in the Form of Bid.

- c. Extended Overhead Daily Rate

Extended Overhead Daily Rate is the sum of the Contractor's home office and field office overhead as applicable to this project.

The Bid Form contains an Extended Overhead Daily Rate which will be used to determine the additional compensation due the Contractor for each day of Compensable Delay. The number of days of Compensable Delay shown as a multiplier in the paragraph below is not intended as an estimate of the number of days of Compensable Delay, as defined in Section 00 07 00, General Conditions, Article 17.F.2 may be greater or lesser than the 30 days shown below.

The Extended Overhead Daily Rate in the Bid Form will be used in the evaluation of bids by multiplying the Extended Overhead Daily Rate times 30 days of Compensable Delay and adding it to the bidder's Lump Sum Bid price. However, the amount of the multiplied Extended Overhead Daily Rate for 30 days of Compensable Delay will not be included in the base contract amount.

- d. Consultant Services Agreement

Following the determination of the successful bidder by the County, the County will issue a consultant services agreement for the preparation of the baseline construction schedule. The successful bidder shall return the signed consultant services agreement within three days of the County's issuance. Upon the County's receipt of the signed consultant services agreement, the County will authorize preparation of the Detailed Network Construction Schedule in accordance with Section 01 32 00 and preparation of the Schedule of Values in accordance with Section 01 29 73 of the project specifications. Only after acceptance by the County of the Detailed Network Construction Schedule in accordance with the minimum requirements set forth in Section 01 32 00, Construction Schedule, Section 01 29 73, Schedule of Values, Section 01 33 00, Submittals, and execution by the bidder of a contract for the entire project will the County execute a contract for the construction of the project.

Upon receipt by the County, of an acceptable Detailed Network Construction Schedule, Schedule of Values, and list of Submittals, the Bidder shall receive payment of the sum of Five Thousand Dollars (\$5,000) as compensation to perform the work required to provide a Detailed Network Construction Schedule, Schedule of Values, and list of Submittals. The payment of \$5,000 shall be deducted from the overall construction contract base bid and shall not be in addition to it.

e. Failure to Produce Detailed Network Schedule and Schedule of Values

The Contractor must have or obtain expertise in the type of automated scheduling specified. The successful Bidder will have ten (10) calendar days from the issuance of a Notice to Proceed under the consultant services agreement to submit its Detailed Network Construction Schedule and Schedule of Values. The successful Bidder will have three (3) calendar days to provide County requested revisions to the Detailed Network Construction Schedule and Schedule of Values provided under the Consultant Services Agreement.

Submission of an acceptable Detailed Network Construction Schedule and Schedule of Values is a condition precedent to the execution of the construction contract by the County. Failure to meet these requirements may result in a determination and a recommendation that the Board of Supervisors determine that the successful Bidder is non-responsible because such failure reflects on the Bidder's ability to manage the work.

f. Execution of Contract by Bidder

Following bid opening and upon notification from Public Works, the apparent successful Bidder will be required to deliver within fourteen (14) calendar days to the offices of Public Works certificate(s) issued by the insurance carrier(s), payment and performance bonds, and three (3) signed and notarized contract signature pages. The contract pages must be signed by the corporate president and secretary, managing partner or sole proprietor.

g. Execution of Contract by County

When the Board of Supervisors or the Director has formally awarded the contract to the Successful Bidder, the County will execute the contract and issue the fully executed contract to the Contractor followed by the Notice to Proceed.

h. Failure to Resolve Equals

In accordance with the General Conditions, paragraph 2, subparagraph d, the first, second and third apparent lowest bidders will have two (2) calendar days after the bid opening to submit their list of Equals and ten (10) calendar days after the bid opening to submit all substantiating data and test results.

i. Protest Policy

The County will handle and process any and all protests in connection with this Bid according to the County of Los Angeles Contracting Manual, Countywide Construction Contracting Policy Guidelines, no. P-05-04, "Bid Protests", dated March 31, 2003. Bidders who wish to file a protest shall do so in accordance with the requirements specified in Construction Contracting Policy Guideline no. P-05-04, which can be found at <http://dpw.lacounty.gov/general/bids/BidProtests.pdf>

Policy Overview

The County of Los Angeles will process bid protests in a timely and consistent manner to assure that all prospective contractors/consultants are accorded fair and equal consideration for the award of County contracts.

Purpose and Scope

The purpose of this Policy Guideline is to convey the County's general course of action for addressing bid protests asserted by prospective contractors. This guideline will address the administrative guidelines for protests arising from the acquisition of construction and construction-related services under both the Invitation for Bid (IFB) and Request for Proposal (RFP) methods of solicitation.

Application and Responsibility

This Policy Guideline applies to all County departments involved in the contractor selection process for construction and construction-related contracts.

Policy Guidelines

1. **Introduction.** Protests received by the County before contract award shall be immediately forwarded to the contract administrator issuing the IFB or RFP. The contract administrator will prepare a written response, reviewed by County Counsel if necessary, and approved by the department/agency head or his/her designee.
2. **Timely Filing.** The protest of a likely contract award to the apparent lowest bidder (IFB) or best-qualified firm or consultant (RFP) must be made prior to contract award. Untimely notice will not serve the interests of either party. Protests should be received by the County at the earliest practical time.

3. **Post-Award Protests.** With respect to protests received after contract award, the County will not suspend contract performance or terminate the awarded contract unless so directed by the Board.
4. **Protest Format.** The protesting party's protest should reference all pertinent County, State, Federal, or local laws or regulations that are relied upon in support of the protest. Any documents relevant to the protest should be submitted. The County, at its discretion, may decide the protest without requesting further submittal(s) from the party submitting the protest. Thus, the initial protest should include all matters that the party wishes the County to consider in deciding the protest outcome. Such matters include, but are not limited to, the following:
 - (1) The name and address of the party and its relationship to the procurement.
 - (2) Identification of the proposed project or contract.
 - (3) Description of the nature of the protest.
 - (4) Identification of the provision(s) of the solicitation, regulations, or laws upon which the protest is based (i.e., identification of the technical specifications or item of content in the IFB/RFP).
 - (5) Copies of all (or any) documentation supporting the allegations in the protest.
 - (6) Statement of the specific relief requested.
5. **Protest Submittal.** The best interests of the parties are served if the protest is (1) filed with the contract administrator, (2) filed in a timely fashion, and (3) filed in the format and detail described in Protest Format above. A contractor may also appear in person before the Board. The Board, acting in the best interests of the County, may decide to continue with the award and acquisition subject to resolution of the protest.
6. **Protest Remedies.** A decision by the responsible official will be made based on the merits of the protest. A written response will be provided by the County and all findings and specified remedies will be considered final. The Board may suspend a contract upon a finding that the protest has merit and is based on solid legal principles.
7. **Authority for Administration of Protests.** The responsible official may assign contract administrators to conduct the administrative processing of protests filed with the County. Assigned contract administrators shall be responsible for proper distribution of protest submittals and responses, coordination of staff evaluation of the protest, compliance with the time limits stated herein, and maintenance of all documents related to the protest. The responsible official shall request County Counsel to review and advise the contract administrator concerning any legal issues involved in protests.

1.15 PERFORMANCE AND OTHER BONDS

- a. The General Conditions and Supplementary Conditions set forth requirements as to performance bonds and other bonds. When the successful Bidder delivers the executed Agreement to the County, it shall be accompanied by the required contract security.

1.16 COMMUNITY BUSINESS ENTERPRISE (CBE) PARTICIPATION

- a. The County encourages the participation of Community Business Enterprises (CBE) in the project and has established a goal of twenty-five percent (25%) CBE participation which all contractors must aspire to meet. Participation in the Work is based on total monetary value of the proposed subcontract. CBEs are defined as Minority/Women/Disadvantaged/Disabled Veteran/Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning owned Business Enterprises (M/W/D/DVBE/LGBTQQ).
- b. Bidders shall meet the established goal as indicated above. If the Bidder does not meet this established goal, Bidder shall document its good faith efforts to utilize CBEs. The Bidder shall submit the documentation of its good faith efforts to the County. County will evaluate the Bidder's good faith efforts to meet the CBE participation goal by the following criteria:
 1. Bidder attended any pre-solicitation or pre-bid meetings scheduled by the County to inform all Bidders of the CBE program requirements for the Project.
 2. Bidder identified and selected specific items of the Project for which the contract will be awarded to be performed by CBEs to provide an opportunity for participation by those enterprises.
 3. Bidder advertised, not less than ten (10) calendar days before the date the bids are opened, in one or more daily or weekly newspaper trade association publications, minority- or trade-oriented publications, trade journals, or other media, specified by the local agency for CBEs that are interested in participating in the Project.
 4. Bidder provided written notice of his or her interest in bidding on the contract to the CBEs required to be notified by the Project specifications not less than ten (10) calendar days prior to the opening of bids.
 5. Bidder followed up initial solicitations of interest by contacting the enterprises to determine with certainty whether the enterprises were interested in performing specific items of the Project.

6. Bidder provided interested CBEs with information about the plans, specifications, and requirements for selected subcontracting or material supply work.
 7. Bidder requested assistance from minority and women community organizations; minority and women contractor groups; local, state, or federal minority and women business assistance offices; or other organizations that provide assistance in the recruitment and placement of minority or women business enterprises, if any are available.
 8. Bidder negotiated in good faith with the CBEs, and did not unjustifiably reject as unsatisfactory bids prepared by any CBE.
 9. Where applicable, the Bidder advised and made efforts to assist interested CBEs in obtaining bonds, lines of credit, or insurance required by these Contract Documents.
 10. Bidder's efforts to obtain CBE participation could reasonably be expected by the County to produce a level of participation sufficient to meet the goals and requirements of the County.
- c. Bidder may request for a certified CBE listing via email the County of Los Angeles Office of Small Business at:

osb@dcba.lacounty.gov

For additional information, contact the County of Los Angeles Department of Consumer and Business Affairs (Small Business Services). The website is: dcba.lacounty.gov. The County of Los Angeles Certification Portal from the Office of Small business is at the same website for firms seeking County certification.

- d. Contractors, material, and services and supplies vendors interested in becoming registered as certified minority or women business enterprises may contact the County of Los Angeles Countywide Contract Compliance Section, at (626) 943-5619.
- e. The first, second, and third apparent lowest bidders are required to submit documentation which describes the Bidder's good faith efforts to utilize CBEs within the timeframe indicated in Article 1.11 Submittal of Bids, paragraph d.

1.17 BEST MANAGEMENT PRACTICE (BMP) REQUIREMENTS

- a. Contractor shall comply with the Los Angeles County Department of Public Works Construction Site Best Management Practices (BMP's) Manual, latest edition. A copy of the BMP Manual can be obtained at the Los Angeles County Department of Public Works Cashier's Office, 900 South Fremont Avenue, Alhambra, CA 91803, or call (626) 458-6959. Specific requirements for this Project are listed in Sections 00 03 10, 01 00 00, and 01 57 00.
- b. Contractor shall use Construction and Demolition Debris Recycling Best Management Practices. Specific requirements are listed in Section 01 74 19. Copies of the Best Management Practices handbook are available at the Cashier's Office at the Department of Public Works at no cost to bidders.

1.18 RECYCLED BOND PAPER-CONTRACT LANGUAGE

Consistent with the Board of Supervisor's policy to reduce the amount of solid waste deposited at the County landfills, the Contractor agrees to use recycled content paper to the maximum extent possible on the project.

1.19 IMPROPER CONSIDERATIONS

- a. **Attempt to Secure Favorable Treatment**
It is improper for any County officer, employee, or agent to solicit consideration, in any form, from a Bidder with the implication, suggestion or statement that the Bidder's provision of the consideration may secure more favorable treatment for the Bidder in the award of a Contract or that the Bidder's failure to provide such consideration may negatively affect the County's consideration of the Bidder's submission. A Bidder must not offer or give either directly or through an intermediary, consideration, in any form, to a County officer, employee, or agent for the purpose of securing favorable treatment with respect to the award of a Contract.
- b. **Notification to County**
A Bidder must immediately report any attempt by a County officer, employee, or agent to solicit such improper consideration. The report must be made to the Los Angeles County Fraud Hotline at (800) 544-6861 or <https://fraud.lacounty.gov/>. Failure to report such a solicitation may result in the Bidder's submission being eliminated from consideration.
- c. **Form of Improper Consideration**
Among other items, such improper consideration may take the form of cash, discounts, services, the provision of travel or entertainment, or tangible gifts.

1.20 CONSIDERATION OF GAIN/GROW PROGRAM PARTICIPANTS FOR EMPLOYMENT

As a threshold requirement for consideration for contract award, Bidders/Proposers shall demonstrate a proven record of hiring the County's Department of Public Social Services' (DPSS) Greater Avenues for Independence (GAIN) or General Relief Opportunity for Work (GROW) participants or shall attest to a willingness to consider GAIN/GROW participants for any future employment opening if they meet the minimum qualifications for that opening. Additionally, Bidders/Proposers shall attest to a willingness to provide employed GAIN/GROW participants access to Bidders'/Proposers' employee mentoring program, if available, to assist these individuals in obtaining permanent employment and/or promotional opportunities.

The County will refer GAIN/GROW participants by job category to the Contractor. DPSS may be contacted at the following locations:

Central County	(323) 730-6452
East San Fernando Valley	(818) 729-8933
Palmdale-Lancaster	(661) 575-2646
Pomona	(909) 392-3071
San Gabriel Valley	(626) 927-2723
South County	(310) 603-8359
Southeast County	(323) 261-3065
West County	(310) 655-7725
West San Fernando Valley	(818) 718-4337

Bidders/Proposers who are unable to meet this requirement shall not be considered for contract award.

1.21 CHILD SUPPORT COMPLIANCE PROGRAM

Contractor is required to fully comply with all applicable state and federal reporting requirements relating to employment reporting for its employees. Contractor is required to fully comply with all lawfully served wage and earnings assignment orders and notices of assignment. Failure to comply with state and federal reporting requirements regarding employees, or failure to implement lawfully served wage and earnings assignment orders or notices of assignment, constitutes a default under the contract, and failure to cure the default within 90 days of notice by the County, shall subject the contract to termination. Failure to comply with these requirements may be cause for debarment.

1.22 FEDERAL EARNED INCOME CREDIT

Contractor shall notify its employees, and shall require each subcontractor to notify its employees, that they may be eligible for the Federal Earned Income Credit under the Federal income tax laws. Such notice shall be provided in accordance with the requirements set forth in Internal Revenue Service Notice 1015.

1.23 REDUCTION OF SOLID WASTE

Consistent with the Board of Supervisors' policy to reduce the amount of solid waste deposited at the County landfills, the Contractor agrees to use recycled-content paper to the maximum extent possible on the project.

1.24 INJURY AND ILLNESS PREVENTION PLAN (IIPP) AND CODE OF SAFE PRACTICES (CSP) AFFIDAVIT

The apparent low Bidder shall submit Section 00 04 91, INJURY and ILLNESS PREVENTION PLAN (IIPP) AND CODE OF SAFE PRACTICES (CSP) affidavit no later than seven (7) calendar days after the bid opening. The affidavit requires that the Bidder shall have an IIPP and a CSP which complies with Cal/OSHA Regulations, and that all subcontractors supplying employees to the jobsite will be required to prove to the Contractor that they have an IIPP and a CSP which complies with Cal/OSHA Regulations, and that their jobsite employees have been trained on IIPP and CSP.

Failure to submit this affidavit as required, may result in a determination that the apparent low Bidder is nonresponsive.

1.25 DETERMINATION OF BIDDER RESPONSIBILITY

- a. A responsible Bidder is a Bidder who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible consultants.
- b. Bidders are hereby notified that, in accordance with Chapter 2.202 of the County Code, the County may determine whether the Bidder is responsible based on a review of the Bidder's performance on any contracts, including but not limited to County contracts. Particular attention will be given to violations of labor laws related to employee compensation and benefits, and evidence of false claims made by the Bidder against public entities. Labor law violations which are the fault of subcontractors and of which the Bidder had no knowledge shall not be the basis of a determination that the Bidder is not responsible.

- c. The County may declare a Bidder to be non-responsible for purposes of this contract if the Board of Supervisors, in its discretion, finds that the Bidder has done any of the following: (1) violated a term of a contract with the County; (2) committed an act or omission which negatively reflects on the Bidder's quality, fitness or capacity to perform a contract with the County, any other public entity, or a nonprofit corporation created by the County, or engaged in a pattern or practice which negatively reflects on same; (3) integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity.
- d. If there is evidence that the highest ranked Bidder may not be responsible, the Department shall notify the Bidder in writing of the evidence relating to the Bidder's responsibility, and its intention to recommend to the Board of Supervisors that the Bidder be found not responsible. The Department shall provide the Bidder and/or the Bidder's representative with an opportunity to present evidence as to why the Bidder should be found to be responsible and to rebut evidence which is the basis for the Department's recommendation.
- e. If the Bidder presents evidence in rebuttal to the Department, the Department shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the Board of Supervisors. The final decision concerning the responsibility of the Bidder shall reside with the Board of Supervisors.
- f. The terms shall also apply to proposed subcontractors of Bidders on County contracts.

1.26 BIDDER DEBARMENT

- a. The Bidder is hereby notified that, in accordance with Chapter 2.202 of the County Code, the County may debar the Bidder from proposing on, or being awarded, and/or performing work on other County contracts for a specified period of time, which generally will not exceed five years but may exceed five years or be permanent if warranted by the circumstances, and the County may terminate any or all of the Bidder's existing contracts with the County, if the Board of Supervisors finds, in its discretion, that the Bidder has done any of the following: (1) violated a term of a contract with the County or a nonprofit corporation created by the County; (2) committed an act or omission which negatively reflects on the Bidder's quality, fitness or capacity to perform a contract with the County, any other public entity, or a nonprofit corporation created by the County, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity.

- b. If there is evidence that the highest ranked Bidder may be subject to debarment, the Department shall notify the Bidder in writing of the evidence which is the basis for the proposed debarment, and shall advise the Bidder of the scheduled date for a debarment hearing before the Contractor Hearing Board.
- c. The Contractor Hearing Board shall conduct a hearing where evidence on the proposed debarment is presented. The Bidder and/or the Bidder's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the Contractor Hearing Board shall prepare a tentative proposed decision, which shall contain a recommendation regarding whether the Bidder should be debarred, and, if so, the appropriate length of time of the debarment. The Bidder and the Department shall be provided an opportunity to object to the tentative proposed decision prior to its presentation to the Board of Supervisors.
- d. After consideration of any objections, or if no objections are received, a record of the hearing, the proposed decision and any other recommendation of the Contractor Hearing Board shall be presented to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the Contractor Hearing Board.
- e. If a Bidder has been debarred for a period longer than five years, that Bidder may, after the debarment has been in effect for at least five years; submit a written request for review of the debarment determination to reduce the period of debarment or terminate the debarment. The County may, in its discretion, reduce the period of debarment or terminate the debarment if it finds that the Bidder has adequately demonstrated one or more of the following: (1) elimination of the grounds for which the debarment was imposed; (2) a bona fide change in ownership or management; (3) material evidence discovered after debarment was imposed; or (4) any other reason that is in the best interests of the County.
- f. The Contractor Hearing Board will consider requests for review of a debarment determination only where (1) the Bidder has been debarred for a period longer than five years; (2) the debarment has been in effect for at least five years; and (3) the request is in writing, states one or more of the grounds for reduction of the debarment period or termination of the debarment, and includes supporting documentation. Upon receiving an appropriate request, the Contractor Hearing Board will provide notice of the hearing on the request. After the hearing, the Contractor Hearing Board shall conduct a hearing where evidence on the proposed reduction of debarment period or termination of debarment is presented. This hearing shall be conducted and the request for review decided by the Contractor Hearing Board pursuant to the same procedures as for a debarment hearing.

The Contractor Hearing Board's proposed decision shall contain a recommendation on the request to reduce the period of debarment or terminate the debarment. The Contractor Hearing Board shall present its proposed decision and recommendation to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny, or adopt the proposed decision and recommendation of the Contractor Hearing Board.

- g. These terms shall also apply to proposed subcontractors of Bidders on County contracts.

1.27 CONTRACTOR EMPLOYEE JURY SERVICE PROGRAM

The prospective contract is subject to provisions of the County's ordinance entitled Contractor Employee Jury Service ("Jury Service Program") as codified in Sections 2.203.010 through 2.203.090 of the Los Angeles County Code.

- a. Unless Contractor has demonstrated to the County's satisfaction either that Contractor is not a "Contractor" as defined under the Jury Service Program (Section 2.203.020 of the County Code) or that Contractor qualifies for an exception to the Jury Service Program (Section 2.203.070 of the County Code), Contractor shall have and adhere to a written policy that provides that its Employees shall receive from the Contractor, on an annual basis, no less than five days of regular pay for actual jury service. The policy may provide that Employees deposit any fees received for such jury service with the Contractor or that the Contractor deduct from the Employee's regular pay the fees received for jury service.
- b. For purposes of this Section, "Contractor" means a person, partnership, corporation or other entity which has a contract with the County or a subcontract with a County contractor and has received or will receive an aggregate sum of \$50,000 or more in any 12-month period under one or more County contracts or subcontracts. "Employee" means any California resident who is a full-time employee of Contractor. "Full time" means 40 hours or more worked per week, or a lesser number of hours if the lesser number is a recognized industry standard and is approved as such by the County. If Contractor uses any subcontractor to perform services for the County under the Contract, the subcontractor shall also be subject to the provisions of this Section. The provisions of this Section shall be inserted into any such subcontract agreement and a copy of the Jury Service Program shall be attached to the agreement.
- c. If a contractor does not fall within the Jury Service Program's definition of "Contractor" or if it meets any of the exceptions to the Jury Service Program, then the contractor must so indicate in the Certification Form and Application for Exception and include with its submission all necessary documentation to support the claim such as tax returns or a collective bargaining agreement, if

applicable. Upon reviewing the contractor's application, the County will determine, in its sole discretion, whether the contractor falls within the definition of Contractor or meets any of the exceptions to the Jury Service Program. The County's decision will be final.

- d. If a contractor is not required to comply with the Jury Service Program when the contract commences, the contractor will have a continuing obligation to review the applicability of its "exception status" from the Jury Service Program, and the contractor must immediately notify the County if the contractor at any time either comes within the Jury Service Program's definition of "contractor" or if the contractor no longer qualifies for an exception to the Program. In either event, the contractor must immediately implement a written policy consistent with the Jury Service Program. The County may also require, at any time during the contract and at its sole discretion, that a contractor demonstrate to the County's satisfaction that the contractor either continues to remain outside the Jury Service Program's definition of "Contractor" and/or the contractor continues to qualify for an exception to the Program.
- e. If a contractor uses a subcontractor to perform services for the County under the contract, the subcontractor shall also be subject to the provisions of the Jury Service Program, unless the subcontractor 1) does not fall within the definition of "contractor" or 2) meets one of the exceptions to the Jury Service Program. The provisions of the Jury Service Program must be inserted into any applicable agreement and a copy of the Jury Service Program shall be attached to the agreement.
- f. A contractor's violation of the Jury Service Program may constitute a material breach of the contract. In the event of such material breach, County may, in its sole discretion, terminate the contract and/or bar a contractor from the award of future County contracts for a period of time consistent with the seriousness of the breach.

1.28 VENDOR REGISTRATION WITH THE COUNTY OF LOS ANGELES

All potential bidders/proposers with the County of Los Angeles are required to register in WebVen and have a valid vendor number assigned to them. The vendor number is required by the Auditor-Controller and is necessary for any payments to be made to a contractor who is awarded a County project. Vendor registration can be done online at <http://camisvr.co.la.ca.us/webven> or calling the County's Internal Service Department Central Purchasing Vendor Relations Unit at (323) 267-2650. If you are awarded a contract and you do not have a valid vendor number, your payments will be delayed until you are registered.

1.29 NO PAYMENT FOR SERVICES PROVIDED FOLLOWING EXPIRATION/TERMINATION OF AGREEMENT

Contractor shall have no claim against County for payment for any money or reimbursement, of any kind whatsoever, for any service provided by Contractor after the expiration or other termination of this Agreement. Should Contractor receive any such payment it shall immediately notify County and shall immediately repay all such funds to County. Payment by County for services rendered after expiration/termination of this Agreement shall not constitute a waiver of County's right to recover such payment from Contractor. This provision shall survive the expiration or other termination of this Agreement.

1.30 COUNTY'S PREFERENCE PROGRAM: LOCAL SMALL BUSINESS ENTERPRISE

Overview of County's Preference Program

The County of Los Angeles has The Local Small Business Enterprise (LSBE) preference program. The Board of Supervisors encourages business participation in the County's contracting process by continually streamlining and simplifying our selection process and expanding opportunities for these businesses to compete for County opportunities.

The LSBE Preference Program requires that a business must complete County of Los Angeles certification prior to requesting a preference in a solicitation. This program and how to obtain certification are further explained in this solicitation.

The maximum percentage of a LSBE Preference Program preference shall be 7 percent of the lowest responsible bidder meeting specifications and the maximum financial value shall be one hundred fifty thousand dollars (\$150,000) for any bid.

Sanctions and financial penalties may apply to a business that knowingly, and with intent to defraud, seeks to obtain or maintain certification as a certified LSBE when not qualified.

a. Local Small Business Enterprise (LSBE) Preference Program

The County will give LSBE preference during the solicitation process to businesses that meet the definition of a LSBE, consistent with Chapter 2.204.030C.1 of the Los Angeles County Code. An LSBE is defined as a business: 1) certified by the State of California as a small business and has had its principal place of business located in Los Angeles County for at least one year; or 2) certified as a small business enterprise with other certifying agencies pursuant to the Department of Consumer and Business Affairs's (DCBA) inclusion policy that: a) has its principal place of business located in

Los Angeles County, and b) has revenues and employee sizes that meet the State's Department of General Services requirements. **The business must be certified by the Department of Consumer and Business Affairs as meeting the requirements set forth above prior to requesting the LSBE Preference in a solicitation.**

To apply for certification as an LSBE, businesses should contact the County of Los Angeles Department of Consumer and Business Affairs at <http://dcba.lacounty.gov>

Certified LSBEs may only request the preference if the certification process has been completed and certification is affirmed. Businesses must complete and submit Section 00 04 38 Request for Preference Consideration Form and submit a letter of certification from the County of Los Angeles Department of Consumer and Business Affairs (DCBA) with their proposal. As shown on the County DCBA letter, the certification must be valid as of the bid due date.

Information about the State's small business enterprise certification regulations is in the California Code of Regulations, Title 2, Subchapter 8, Section 1896 et seq., and is also available on the California Department of General Services Office of Small Business Certification and Resources Web site at <http://www.pd.dgs.ca.gov/smbus/default>.

d. Should one or more of the Bidders request and be granted the Local Small Business Enterprise (LSBE) Preference, the bid amount shall be adjusted as follows:

Local Small Business Enterprise (LSBE) Preference: Seven percent of the lowest bid amount will be calculated, which shall not exceed \$150,000, and that amount will be deducted from the bid amounts submitted by all LSBE bidders who requested and were granted the LSBE Preference.

The contract award will be the bidder's original bid price, not the price with preference(s) that is used for evaluation purposes.

Preference Program Enterprises (PPEs) - Prompt Payment Program

It is the intent of the County that Certified Preference Program Enterprises (PPEs) receive prompt payment for services they provide to County Departments. Prompt payment is defined as fifteen (15) calendar days after receipt of an approved, undisputed invoice which has been properly matched against documents such as a receiving, shipping, or services delivered report, or any other validation of receipt document consistent with Board Policy 3.035 (Preference Program Payment Liaison and Prompt Payment Program).

1.31 NOTICE TO EMPLOYEES REGARDING THE SAFELY SURRENDERED BABY LAW

The Contractor shall notify and provide to its employees, and shall require each subcontractor to notify and provide to its employees, a fact sheet regarding the Safely Surrendered Baby Law, its implementation in Los Angeles County, and how to safely surrender a baby. The fact sheet is available on the Internet at www.babysafela.org for printing purposes.

The Contractor acknowledges that the County places a high priority on the implementation of the Safely Surrendered Baby Law. The Contractor understands that it is the County's policy to encourage all County Contractors to voluntarily post the County's "Safely Surrendered Baby Law" poster in a prominent position at the Contractor's place of business. The County's Department of Children and Family Services will supply the Contractor with the poster to be used.

1.32 REQUIRED CERTIFICATION/DISCLOSURE

Bids must provide full disclosure on violations and civil/criminal legal actions as provided for on the bidding requirement forms Sections 00 04 70, 00 04 71, 00 04 72, 00 04 73, and 00 04 74. Failure to complete these forms may result in a determination that the Bidder is nonresponsive and/or not responsible.

1.33 NOTIFICATION TO COUNTY OF PENDING ACQUISITIONS/MERGERS BY BIDDING COMPANY

The Bidder shall notify the County of any pending acquisitions/mergers of its company unless otherwise legally prohibited from doing so. If the Bidder is restricted from legally notifying the County of pending acquisitions/mergers, then it should notify the County of the actual acquisitions/mergers as soon as the law allows and provide to the County the legal framework that restricted it from notifying the County prior to the actual acquisitions/mergers. This information shall be provided by the Bidder on Section 00 04 92 - Bidder's Organization Questionnaire/Affidavit. Failure of the Bidder to provide this information may eliminate its bid from any further consideration. Bidder shall have a continuing obligation to notify the County and update any changes to its response in Section 00 04 92 - Bidder's Organization Questionnaire/Affidavit during the solicitation.

1.34 COUNTY'S DEFAULTED PROPERTY TAX REDUCTION PROGRAM

The prospective contract is subject to the requirements of the County's Defaulted Property Tax Reduction Program (Los Angeles County Code, Chapter 2.206). Prospective contractors should carefully read the Defaulted Tax Program Ordinance and the pertinent provisions of the sample contract which are incorporated by reference into and made a part of this solicitation. The Defaulted Tax Program applies to both contractors and their subcontractors.

Bidders/proposers shall be required to certify that they are in full compliance with the provisions of the Defaulted Tax Program and shall maintain compliance during the term of any contract that may be awarded pursuant to this solicitation or shall certify that they are exempt from the Defaulted Tax Program by completing Certification of Compliance with the County's Defaulted Property Tax Reduction Program required forms. Failure to maintain compliance, or to timely cure defects, may be cause for termination of a contract or initiation or debarment proceedings against the non-compliant contractor (Los Angeles County Code, Chapter 2.202).

Bids/proposals that fail to comply with the certification requirements of the Defaulted Tax Program will be considered non-responsive and excluded from further consideration.

1.36 LOCAL AND TARGETED WORKER HIRE PROGRAM

Local and Targeted Worker Hire Program applies to this project.

- A. At least 30 percent of total California construction labor hours worked on each project must be performed by a qualified Local Resident. Where allowable, contractors are encouraged to achieve higher participation levels for Local Residents.
- B. At least 10 percent of total California hours worked shall be performed by County residents classified as a Targeted Worker facing barriers to employment. Hours worked by a Targeted Worker who is also a Local Resident may be applied towards the 30 percent Local Resident hire goal. A Target Worker is a resident of the County who has indices of career-limiting circumstances, specifically, one or more of the following:
 - 1. Has a documented annual income at or below 100 percent of the Federal Poverty Level;
 - 2. No high school diploma or GED;
 - 3. A history of involvement with the criminal justice system;
 - 4. Protracted unemployment (receiving unemployment benefits for at least 6 months);
 - 5. Is a current recipient of government cash or food assistance benefits;
 - 6. Is homeless or has been homeless within the last year;
 - 7. Is a custodial single parent;
 - 8. Is a former foster youth; or
 - 9. Is a veteran, or is the eligible spouse of a veteran of the United States armed forces, under Section 2(a) of the Jobs for Veterans Act (38 U.S.C.4215[a]).
 - 10. Eligible Migrant and seasonal farmworkers
 - 11. English Language Learners
 - 12. Older Individuals (55+)
 - 13. Disabled

14. Individuals with Low Levels of Literacy

- C. A Local Resident is defined as an individual living within the Tier 1 or Tier 2 ZIP Codes of the County. Before employing worker(s) from Tier 2 ZIP Codes, the available pool of local residents whose primary place of residence is within Tier 1 ZIP Codes must first be exhausted. Tier 1 means ZIP Codes within five (5) miles of the proposed project site, and where the average percentage of households living below 200 percent of the Federal Poverty Level (FPL) is greater than the County average for such households. Tier 2 means any ZIP Codes within the County where the average percentage of households living below 200 percent of the FPL is greater than the County average for such households. This definition shall also apply to affordable housing projects and for privately financed developments located on County property.
- D. Contractor shall comply with the provision required under the Local and Targeted Hire Program in the Agreement.
- E. In addition, there shall be a **mandatory** requirement to use a Jobs Coordinator to be hired directly by the contractor, prior to the start of work on the project. The Jobs Coordinator is an independent third-party individual, entity, or employee with whom the Prime Contractor enters into a contract or employs to facilitate the implementation of the Local and Targeted Worker Hiring Requirements of this Agreement. The Jobs Coordinator may be selected from the approved Jobs Coordinators list available as Form 00 09 12-5. If the Prime Contractor utilizes an employee as a Jobs Coordinator, the Jobs Coordinator must be able to demonstrate or document to the County the minimum qualifications and/or experience to fulfill the duties and responsibilities as outlined in Sections 2.02 and 2.03.
- F. Per State Labor Code, a minimum ratio of one apprentice hour for every five journeyman hours shall be enforced, and contractors shall strive to obtain half of all apprentice hours on the project be performed by Local and Targeted Workers. Hours worked by an apprentice who is also a Targeted Worker or a Local Resident may be applied towards the 30 percent Local Resident and/or the 10 percent Targeted Worker hire goals.

1.37 Contractor CARD Track/Monitoring Database

The County maintains the Contractor Alert Reporting Database (CARD), which is used to track/monitor poorly performing contractors. When a County department identifies a significant performance/non-compliance issue(s) with a contractor, the department will provide notice to the contractor and will give the contractor an opportunity to correct the issue(s). If the contractor does not take any appropriate steps to correct the issue(s), the County department will enter the contractor, along with any other relevant information pertaining to the contractor's performance issue(s), into CARD.

The information entered into CARD can be accessed by all County departments, and will be used, along with any other relevant information not included in CARD, in determining bidder responsibility. If a department reviews this information and determines that a finding of non-responsibility should be pursued, the department will adhere to the guidelines specified in the Los Angeles County Code Chapter 2.202, and the County's Implementation Procedures for Determinations of Contractor Non-Responsibility and Contractor Debarment.

1.38 Time Off for Voting

The Contractor shall notify its employees, and shall require each subcontractor to notify and provide to its employees, information regarding the time off for voting law (Elections Code Section 14000). Not less than 10 days before every statewide election, every Contractor and subcontractors shall keep posted conspicuously at the place of work, if practicable, or elsewhere where it can be seen as employees come or go to their place of work, a notice setting forth the provisions of Section 14000.

1.39 ADDITIONAL BIDDER REQUIREMENTS

- a. **A pre-bid conference** and site visitation will be **held on December 18, 2024, at 10:00 a.m.**, at the project site to provide information regarding the project, bidding process and answer questions that potential bidders may have. Interested parties are requested to meet promptly at 6631 Stephens Ranch Road, La Verne, CA 91750. Attendance is strongly encouraged but not mandatory.
- b. The following documents are Appendices to the Project Manual.

APPENDICES:

- A. Limited Asbestos and Lead-Based Paint XRF Survey Report for The Conduit Penetrations Project Located At Camp Afflerbaugh by The Bainbridge Environmental Consultants, dated August 9, 2016.
- B. Limited Asbestos & Lead-Based Paint Inspection Report for Afflerbaugh Page Detention Facility by ENCORN, dated August 4, 2020.
- C. County of Los Angeles Probation Department Directive D1079-Worksite, Tool and Materials Safety and Security Procedures, dated March 3, 2006
- D. Daily Contractor Roster
- E. Management Services Bureau On-Site Contractor Security Policy by the County of Los Angeles Probation Department.
- F. County of Los Angeles Probation Department Background Request Form

1.40 PUBLIC WORKS CONTRACTOR REGISTRATION PROGRAM

- a. This project is a public work as defined in Section 1720 of the California Labor Code, and subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR).
- b. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to requirements of Section 4104 of the California Public Contract Code, or engage in the performance of any contract for public works, unless currently registered with the Department of Industrial Relations and qualified to perform public work pursuant to California Labor Code Section 1725.5.
- c. The County shall not accept any bid nor award any contract without proof of the contractor and subcontractor's current registration to perform the project. A copy of the confirmed registration from the Department of Industrial Relations website (<https://efiling.dir.ca.gov/PWCR/Search.action>) must be attached in applicable part of the bid package. The bid submitted by an unregistered contractor shall be basis for considering the bid non-responsive [with limited exceptions from this requirement for bid purposes only under Labor Code Section 1771.1].
- d. An inadvertent error in listing an unregistered subcontractor pursuant to Labor Code Section 1725.5 in a bid proposal shall be grounds for considering the bid non-responsive, unless:
 - (1) The subcontractor is registered prior to the bid opening.
 - (2) Within 24 hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in subparagraph (E) of paragraph (2) of subdivision (a) of Section 1725.5.
 - (3) The subcontractor is replaced by another registered subcontractor pursuant to Section 4107 of the Public Contract Code.
- e. All contractors and subcontractors must furnish certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement) in a format prescribed by the Labor Commission.
- f. The prime contractor is required to post job site notices prescribed below:

8 Calif. Code Reg. §16451(d):

"This public works project is subject to monitoring and investigative activities by the Compliance Monitoring Unit (CMU) of the Division of Labor Standards Enforcement, Department of Industrial Relations, State of California. This Notice is intended to provide information to all workers employed in the execution of the contract for public work and to all contractors and other persons having access to the job site to enable the CMU to ensure compliance with and enforcement of prevailing wage laws on public works projects.

"The prevailing wage laws require that all workers be paid at least the minimum hourly wage as determined by the Director of Industrial Relations for the specific classification (or type of work) performed by workers on the project. These rates are listed on a separate job site posting of minimum prevailing rates required to be maintained by the public entity which awarded the public works contract. Complaints concerning nonpayment of the required minimum wage rates to workers on this project may be filed with the CMU at any office of the Division of Labor Standards Enforcement (DLSE).

Local Office Telephone Number:

*Division of Labor Standards Enforcement Office
320 W. Fourth Street, Suite 450
Los Angeles, CA 90013
(213) 620-6330*

"Complaints should be filed in writing immediately upon discovery of any violations of the prevailing wage laws due to the short period of time following the completion of the project that the CMU may take legal action against those responsible.

"Complaints should contain details about the violations alleged (for example, wrong rate paid, not all hours paid, overtime rate not paid for hours worked in excess of 8 per day or 40 per week, etc) as well as the name of the employer, the public entity which awarded the public works contract, and the location and name of the project.

"For general information concerning the prevailing wage laws and how to file a complaint concerning any violation of these prevailing wage laws, you may contact any DLSE office. Complaint forms are also available at the Department of Industrial Relations website found at <http://www.dir.ca.gov/Public-Works/PublicWorks.html>."

- g. In addition, electronic certified payroll records must be submitted to the County through an online system designated by the County.

1.41 MENTAL HEALTH SERVICES FOR CRITICAL INCIDENTS

In the event of a serious accident on the Project site, the Los Angeles County Department of Mental Health (DMH) will, if requested, respond. The response may be within a few hours or as long as a few days after the incident, depending on when the request was made. The services DMH will provide include crisis intervention, normalization of the stress response that survivors may be experiencing, stress management techniques and resources if the stress reactions increase in frequency or intensity. Requests for services may be made by calling the DMH Emergency Outreach Bureau Deputy Director, (213) 738-4924, during normal business hours or the ACCESS Center, (800) 854-7771, evenings, holidays, and weekends.

1.42 CONTRACTOR INDEPENDENCE/PROHIBITION FROM PARTICIPATION IN FUTURE SOLICITATION(S)

In accordance with Board Policy No. 5.090, Contractor Independence, The County Board of Supervisors has adopted a countywide policy that prohibits any person, or any firm or any subsidiary of a firm (collectively "firm") from submitting a bid or proposal in any County solicitation process where the person or firm, assisted in the development of the solicitation document(s).

A Bidder/Proposer, or a Contractor or its subsidiary or Subcontractor ("Bidder/Proposer/Contractor"), is prohibited from submitting a bid or proposal in a County solicitation if the Bidder/Proposer/Contractor has provided advice or consultation for the solicitation. A Bidder/Proposer/Contractor is also prohibited from submitting a bid or proposal in a County solicitation if the Bidder/Proposer/Contractor has developed or prepared any of the solicitation materials on behalf of the County. A violation of this provision will result in the disqualification of the Bidder/Contractor/Proposer from participation in the County solicitation or the termination or cancellation of any resultant County contract.

1.43 Background and Security Investigations

Background and security investigations of Contractor's staff may be required at the discretion of the County as a condition of beginning and continuing work under any resulting Contract. The cost of background checks is the responsibility of the Contractor.

1.44 Local Small Business Enterprise/Social Enterprise/Disabled Veterans Business Enterprise Utilization

Local Small Business Enterprise means a business that is certified by the County of Los Angeles as a Local Small Business Enterprise (Local SBE), consistent with Chapter 2.204 of the Los Angeles County Code.

1. When requested by the County, the contractor shall provide to the County via methods specified by the County, such as submission of electronic live (or dynamic) data on invoices for the prime and all subcontractors using County-designated third party software system or to a County approved website, or other means of submitting expenditure information on subcontractors, including but not limited to the following information: the name, business address, California Contractor License number and telephone number/email address of each subcontractor who will perform work or labor for the contractor on the Project in an amount in excess of one-half of 1 percent of the contractor's total bid. In addition, the contractor shall be required to provide each of the specified subcontractors' Local SBE status (i.e., whether any of the listed subcontractors are Local SBE's), Social Enterprise (SE) status, and Disabled Veterans Business Enterprise status, and the proposed monetary amount of the work the subcontractor will perform on the Project. In addition, at the time of submittal of the final invoice, the contractor shall indicate, via methods specified by the County, the actual dollar amounts paid to each listed subcontractor who performed work on the project.
2. Contractor's failure to comply with the provisions of this Article is a material breach of the Agreement. The parties agree that it will be impracticable or extremely difficult to fix the extent of actual damages resulting from the failure to the Contractor to comply with this Article. The parties agree that under the current circumstances a reasonable estimate of such damages is specified in the Schedule for Liquidated Damages for Local Small Business Enterprise Utilization hereunder, and that the Contractor shall be liable to the County for said amounts.

If in the judgment of the Director, or his/her designee, the Contractor is deemed to be in non-compliance with the terms and obligations assumed hereby, the Director or his/her designee, at his/her option, in addition to, or in lieu of, other remedies provided herein in this Agreement, may deduct and withhold liquidated damages from County's final payment to the Contractor as follows:

Schedule For Liquidated Damages for Local Small Business Enterprise/Social Enterprise/Disabled Veterans Business Enterprise Utilization

<u>Final Invoice Price</u>	<u>Liquidated Damages</u>
Up to \$100,000	\$50.00 plus 0.1% of contract amount
\$100,001 to \$500,000	\$150.00 plus 0.07% of all over \$100,000
Over \$500,000	\$430.00 plus 0.05% of all over \$500,000

1.45 Proposer's Acknowledgement of County's Commitment to Zero Tolerance Human Trafficking

On October 4, 2016, the Los Angeles County Board of Supervisors approved a motion taking significant steps to protect victims of human trafficking by establishing a zero tolerance human trafficking policy. The policy prohibits contractors engaged in human trafficking from receiving contract awards or performing services under a County contract.

Contractors are required to complete 00 04 98 Zero Tolerance Human Trafficking Policy Certification, certifying that they are in full compliance with the County's Commitment to Zero Tolerance Human Trafficking provision as defined in "Compliance with County's Zero Tolerance Human Trafficking" in the Agreement. Further, contractors are required to comply with the requirements under said provision for the term of any contract awarded pursuant to this solicitation.

1.46 Claims

Notwithstanding Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, Section 9204 of the Public Contract Code shall apply to any claim by the Contractor in connection with the Project.

a) Upon receipt of a claim pursuant to Section 9204 of the Public Contract Code, the County will conduct a reasonable review of the claim and, within a period not to exceed 45 Days, provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the Contractor and the County may, by mutual agreement, extend the aforementioned time period.

b) The Contractor shall furnish reasonable documentation to support the claim.

c) If Board approval is needed to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the Board does not meet within the 45 Days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the County will have up to 3 Days following the next duly publicly noticed meeting of the Board after the 45-Day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

d) Any payment due on an undisputed portion of the claim will be processed and made within 60 Days after the County issues its written statement. If the County fails to issue a written statement, paragraph (j) shall apply.

e) If the Contractor disputes the County's written response, or if the County fails to respond to a claim issued pursuant to Section 9204 within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the County will schedule a meet and confer conference within 30 Days for settlement of the dispute.

f) Within 10 business days (Monday-Thursday) following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the County will provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim will be processed and made within 60 Days after the County issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the County and the Contractor sharing the associated costs equally. The County and the Contractor shall mutually agree to a mediator within 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. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside those established in Section 9204.

g) Mediation shall include any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in Section 9204.

h) Unless otherwise agreed to by the County and the Contractor in writing, the mediation conducted pursuant to Section 9204 shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

i) Section 9204 does not preclude the County from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under Section 9204 does not resolve the parties' dispute.

j) Failure by the County to respond to a claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of Section 9204 shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the County's failure to have responded to a claim, or its failure to otherwise meet the time requirements of Section 9204, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.

k) Amounts not paid in a timely manner as required by Section 9204 will bear interest at 7 percent per annum.

l) If a Subcontractor or a lower tier Subcontractor lacks legal standing to assert a claim against the County because privity of the Contract does not exist, 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 its 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 by 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. Within 45 Days of receipt of this written request, the Contractor shall notify the Subcontractor in writing as to whether the Contractor presented the claim to the County and, if the original Contractor

did not present the claim, provide the Subcontractor with a statement of the reasons for not having done so.

m) A waiver of the rights granted by Section 9204 is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the Contractor and the County may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) the County may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of Section 9204, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in Section 9204.

1.47 Proposer's Acknowledgement of County's Commitment to Fair Chance Employment Hiring Practices

On May 29, 2018, the Los Angeles County Board of Supervisors approved a Fair Chance Employment Policy in an effort to remove job barriers for individuals with criminal records. The policy requires businesses that contract with the County to comply with fair chance employment hiring practices set forth in California Government Code Section 12952, Employment Discrimination: Conviction History (Section 12952).

Contractors are required to complete Compliance with Fair Chance Employment Hiring Practices Certification (Required Forms), certifying that they are in full compliance with Section 12952, as indicated in the Sample Contract. Further, contractors are required to comply with the requirements under Section 12952 for the term of any contract awarded pursuant to this solicitation.

1.48 Default Method of Payment: Direct Deposit or Electronic Funds Transfer (EFT)

The County, at its sole discretion, has determined that the most efficient and secure default form of payment for goods and/or services provided under an agreement/contract with the County shall be Electronic Funds Transfer (EFT) or direct deposit, unless an alternative method of payment is deemed appropriate by the Auditor-Controller (A-C).

Upon contract award or at the request of the A-C and/or the contracting department, the Contractor shall submit a direct deposit authorization request with banking and vendor information, and any other information that the A-C determines is reasonably necessary to process the payment and comply with all accounting, record keeping, and tax reporting requirements.

Any provision of law, grant, or funding agreement requiring a specific form or method of payment other than EFT or direct deposit shall supersede this requirement with respect to those payments.

Upon contract award or at any time during the duration of the agreement/contract, a Contractor may submit a written request for an exemption to this requirement. The A-C, in consultation with the contracting department(s), shall decide whether to approve exemption requests.

1.49 Disallowed Cost

If Proposer's compliance with a County contract has been reviewed by the Department of the Auditor-Controller within the last 10 years, Proposer must not have unresolved questioned costs identified by the Auditor-Controller, in an amount over \$100,000.00, that are confirmed to be disallowed costs by the contracting County department, and remain unpaid for six months or more from the date of disallowance, unless such disallowed costs are the subject of current good faith negotiations to resolve the disallowed costs, in the opinion of the County.

1.50 Compliance with the County Policy of Equity

The consultant acknowledges that the County takes its commitment to preserving the dignity and professionalism of the workplace very seriously, as set forth in the County Policy of Equity (CPOE) (<https://ceop.lacounty.gov/>). The consultant further acknowledges that the County strives to provide a workplace free from discrimination, harassment, retaliation and inappropriate conduct based on a protected characteristic, and which may violate the CPOE. The consultant, its employees and subconsultants acknowledge and certify receipt and understanding of the CPOE. Failure of the consultant, its employees or its subconsultants to uphold the County's expectations of a workplace free from harassment and discrimination, including inappropriate conduct based on a protected characteristic, may subject the consultant to termination of contractual agreements as well as civil liability.

1.51 Integrated Pest Management (IPM) Program Compliance

1.51.1 The County of Los Angeles is a permittee to a National Pollutant Discharge Elimination System Permit (NPDES Permit) issued by the Los Angeles Regional Water Quality Control Board to reduce or eliminate pollutants moved into surface water through storm water management systems and facilities. One of the conditions of the NPDES Permit is the implementation of an Integrated Pest Management Program (IPM Program) crafted to reduce the impact of pesticides and fertilizers to surface water.

1.51.2 The prospective contract is subject to the requirements of the County's IPM Program. Two main components of the Program include a training component for contractor employees who apply pesticides on County owned or maintained property, as well as monthly and annual reporting to the Los Angeles County Department of Agricultural Commissioner/ Weights and Measures (ACWM).

1.51.3 Proposers are required to complete Integrated Pest Management Program Compliance Certification in Required Forms, acknowledging and certifying compliance with the County's Integrated Pest Management Program, Compliance with County's Integrated Pest Management Program in Sample Contract. Further, contractors are required to comply with the requirements under said provision for the term of any contract awarded pursuant to this solicitation.

1.52 COVID-19 Vaccinations of County Contractor Personnel

When applicable and required by the County, the Contractor shall comply with all other applicable local, departmental, State, and federal laws, regulations, and requirements for COVID-19.

1.53 Contractor Development and Bonding Program

Contractor Development and Bonding Program (CDABP) - Administered by the Chief Executive Office of the County of Los Angeles for all County Construction Contracting Departments. The CDABP provides a broad range of contractor technical assistance, training, and support in qualifying for bonds, as well as contract financing for County awarded contracts. CDABP assistance is available to prime and subcontractors. The CDABP is a County funded resource designed to reduce the barriers to small and diverse firms seeking to bid and contract on County projects. For information on the CDABP, please contact contract administrator.

Americans with Disabilities Act (ADA) Information



Individuals requiring reasonable accommodations may request written materials in alternate formats, physical accessibility accommodations, sign language interpreters or other reasonable accommodations by contacting our departmental Americans with Disabilities Act Coordinator at (626) 458-7337, from 7:30 a.m. to 5:00 p.m., Monday through Thursday (excluding holidays). Persons who are hearing impaired may make contact by first dialing the California Relay Service at 7-1-1. Requests should be made at least one week in advance to ensure availability. When making a reasonable accommodation request, please reference Business Relations and Contracts Division **[BRC-2]**.

* * *

SECTION 00 03 00**FORM OF BID TO BE USED BY BIDDERS**

The undersigned proposes to furnish all materials, labor, and equipment required for the construction to complete the Camp Afflerbaugh CCTV Project, in accordance with Drawings and Specifications 7701, including addenda thereto, if any, adopted by the Board of Supervisors, and on file in the office of the Board of Supervisors, as follows:

The lowest bid price shall be determined by adding the following items: Lump Sum Bid in Words (1) + [Extended Overhead Daily Rate (3) x Multiplied by 30 days] (5) = Total Lump Sum Bid. Preference as stated in Section 00 01 00, 1.30, will be applied to the Total Lump Sum Bid, if applicable, to determine the final total bid amount.

1. LUMP SUM BID:

The lump sum bid for the work, including Best Management Practices (BMP) and Construction and Demolition Debris Recycling, and Mandatory Jobs Coordinator, requirements complete according to the Drawings and Specifications, will be:

(\$ _____) (_____)
Lump sum bid in figures Lump sum bid in words

2. EXTENDED OVERHEAD DAILY RATE:

The daily rate for the sum of the Contractor's field office and home office overhead applicable to this project, for each day of compensable delay will be:

(\$ _____) (_____)
Daily Rate in figures Daily rate in words

3. COUNTY PROGRAM PREFERENCE:

The Local Small Business Enterprise Program Preference is provided by the County for purposes of bid evaluation only, as specified in Article 1.30 of Section 00 01 00. If Bidder is a qualifying Local Small Business Enterprise, check "yes" in the box below. Section 00 04 38 Request for County Program Preference Consideration

must be submitted at the time of bid with a copy of the certification letter issued by the County of Los Angeles Department of Consumer and Business Affairs. If non-qualifying, check "no" in the appropriate box.

LSBE Yes ☐ No ☐

NOTE: Any alteration or addition to the Form of Bid may invalidate same. All blank spaces shall be filled out completely. Line out nonapplicable blanks. An incomplete form may invalidate bid. The County reserves the right to waive any informalities or to reject any or all bids or to accept any alternatives when called for.

I (We) certify that on _____, 20____, License No. _____, license classification(s) _____, was issued to me (us), in the name of _____, by the Contractors' State License Board, pursuant to California Statutes of 1929, as amended, and that said license has not been revoked.

Firm Ownership Information

Check where applicable:

1. ☐ Minority-Owned
☐ Woman-Owned
☐ Disadvantaged-Owned
☐ Disabled Veteran-Owned
☐ LGBTQQ-Owned

2. ☐ An individual
☐ A corporation. Name
state or territory of
Incorporation

☐ A copartnership

☐ A joint venture

Race/Ethnic Composition

For statistical purposes only.

- ☐ Black/African American
☐ Hispanic/Latino
☐ Asian or Pacific Islander
☐ Native Americans
☐ Subcontinent Asian
☐ White

If a copartnership or joint venture, list names of individuals comprising same below

Date signed _____, 20____

Respectfully submitted,

Place _____

City and State

Firm Name (if applicable)

Bidder's address, E-mail address, and telephone:

Number and Street

Signature and Print Name

City and State

Zip Code

Title and E-mail Address

Telephone

Signature and Print Name

Fax

Title and E-mail Address

SECTION 00 03 10

BEST MANAGEMENT PRACTICES (BMP) REQUIREMENTS

Best Management Practices (BMPs) shall be defined as any program, technology, process, siting criteria, operating method, measure or device which controls, prevents, removes, or reduces Storm Water pollution. The Contractor shall comply with the Los Angeles County Department of Public Works Construction Site Best Management Practices (BMP's) Manual, latest edition.

BMPs for contractor activities shall be continuously implemented throughout the year. BMPs for erosion and sediment control shall be implemented as required in Section 01 57 00. BMPs for erosion and sediment control shall also be implemented prior to the commencement of any contractor activity or construction operation.

The County, as a permittee, is subject to enforcement actions by the State Water Resources Control Board, Environmental Protection Agency, and private citizens. The County will assess the Contractor a penalty of \$1,000 for each calendar day that the Contractor has not fully implemented the BMPs specified for the Contract and/or is otherwise in noncompliance with these provisions in accordance with Section 01 57 00. In addition, the County will deduct from the final payment due the Contractor, the total amount of any fines levied on the County, plus legal and staff costs, as a result of the Contractor's lack of compliance with these provisions and/or less than complete implementation of the specified BMPs.

Full compensation for the implementation of BMPs, including the construction, deployment, maintenance, removal, and the furnishing of all necessary labor, equipment, and materials, shall be considered as included in the bid price of the total lump sum price bid in Section 00 03 00.

The lump sum bid for the IMPLEMENTATION OF BMPs for construction work according to Sections 01 00 00, 01 57 00, and 01 74 23 Specifications, will be:

(\$ _____) (_____)
BMP's lump sum bid in figures BMP's lump sum bid in words

SECTION 00 03 11

CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING REQUIREMENTS

Contractor shall submit a Construction and Demolition Recycling and Reuse Plan (RRP) for any work done for or on behalf of the County, to the Los Angeles County Department of Public Works, Environmental Programs Division in accordance with Part 2.2 of Section 01 74 19.

Full compensation for complying with the Construction and Demolition Debris Recycling Requirements, including the construction, removal, and the furnishing of all necessary labor, equipment, and materials, shall be included in the lump sum price bid.

The lump sum bid for COMPLYING WITH THE CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING REQUIREMENTS according to Section 01 74 19, will be:

(\$ _____) (_____)
Lump sum bid in figures Lump sum bid in words

Name of Bidder (Firm Name)

SECTION 00 03 12

INSURANCE REQUIREMENTS

The premium for the Builders Risk shall be included with the Lump Sum Bid, Section 00 03 00, and shall not be in addition to it.

Builders Risk:

Such coverage is required for this Project and shall supersede Section 00 07 00, Builder's Risk Course of Construction Insurance, Article 45, and shall:

1. Insure against damage from perils covered by the Causes-of-Loss Special Form (ISO form CP 10 30), and the perils of earthquake, flood, risk of transit loss, loss during storage (both onsite and offsite), and collapse during construction (without restricting collapse coverage to specified perils).
2. If Contractor's work involves testing air conditioning systems, boilers, pressure vessels, major machinery or major electrical panels, policy shall include coverage for such testing.
3. Be written on a completed-value basis and cover the entire value of the construction Project, including County-furnished materials and equipment, against loss or damage until completion and acceptance by the County.

The amount for Builders Risk according to Section 00 08 00 of the Specifications, will be:

(\$ _____)

Amount in figures

(_____)

Amount in words

Name of Bidder (Firm Name)

SECTION 00 03 13

**LOCAL AND TARGETED WORKER HIRE PROGRAM – MANDATORY JOBS
COORDINATOR**

The fee for the mandatory jobs coordinator shall be included with the Lump Sum Bid, Section 00 03 00, and shall not be in addition to it.

Mandatory Jobs Coordinator:

The County of Los Angeles has implemented a **mandatory** Local and Targeted Worker Hire Policy (LTWHP) which can be located in Section 00 09 12. There shall be a **mandatory** requirement to use a Jobs Coordinator to be hired directly by the contractor, prior to the start of work on the project. The Jobs Coordinator is an independent third-party individual, entity, or employee with whom the Prime Contractor enters into a contract or employs to facilitate the implementation of the Local and Targeted Worker Hiring Requirements of this Agreement.

(\$ _____)
Fee Amount in figures

(_____)
Amount in words

Name of Jobs Coordinator _____

Address _____

Phone Number & Email _____

SECTION 00 04 00

ATTESTATION OF CONTRACTOR'S QUALIFICATIONS

General Contractor's Firm Name (as shown on bid): _____

As specified in the bidding documents, in order to qualify to bid on this project, the General Contractor or its subcontractor, must have successfully completed within the last five years, at least three similar CCTV projects for a public entity, each with a construction value of \$2,000,000 and must have delivered a security system using multicast methodology. The General Contractor or its subcontractors must have a FLIR Enterprise Tier 3 or higher Certified Technician and must be Cisco Certified.

The assigned Project Manager and field activities construction coordinator must have a minimum of 10 years of experience. Must include a list of projects demonstrating 10 years of experience.

The general contractor hereby certifies to the County of Los Angeles that it possesses the qualifying experience.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge.

Executed this _____ day of _____, 2025 at _____
(Month) (City and State)

By: _____

(Signature of owner or officer of the General Contractor)

(Title)

SECTION 00 04 00

ATTESTATION OF CONTRACTOR'S QUALIFICATIONS

The general contractor shall submit verification and justification of its qualifying experience on this County provided form as part of its bid submittal. Failure to submit the information at the time of bid and to meet requirements for qualifying experience may result in a determination by the County that the Bidder is non-responsive and/or not qualified.

The County will determine, in its sole discretion, whether or not the information provided meets the requirements for qualifying experience in order for the general contractor to be considered a qualified bidder for this project.

PROJECT 1:

Project Name	Owner Contact Name and Address	Owner Phone and Email Address	Final Contract Value	Date Completed

Project description:

PROJECT 2:

Project Name	Owner Contact Name and Address	Owner Phone and Email Address	Final Contract Value	Date Completed

Project description:

PROJECT 3:

Project Name	Owner Contact Name and Address	Owner Phone and Email Address	Final Contract Value	Date Completed

Project description:

2. The General Contractor or its subcontractor, has a FLIR Enterprise Tier III or higher Certified Technician.

☐ Yes – List the name of the individual or company below and attach supporting documents.

☐ No (Contractor may be found nonresponsive if this box is checked.)

3. The General Contractor, or its subcontractor, is Cisco Certified.

☐ Yes – List the name of the individual or company below and attach supporting documents.

☐ No (Contractor will be found nonresponsive if this box is checked.)

4. The assigned Project Manager has 10 years of experience.

☐ Yes – List the name of the individual below and attach the projects completed for the 10 years of experience. Each project listed must have the information below. Please attach a separate sheet of paper for additional projects.

Project Name	Owner Contact Name and Address	Owner Phone and Email Address	Final Contract Value	Date Completed

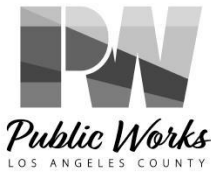
☐ No (Contractor may be found nonresponsive if this box is checked.)

5. The Field Activities Construction Coordinator must have 10 years of experience.

☐ Yes – List the name of the individual below and attach the projects completed for the 10 years of experience. Each project listed must have the information below. Please attach a separate sheet of paper for additional projects.

Project Name	Owner Contact Name and Address	Owner Phone and Email Address	Final Contract Value	Date Completed

☐ No (Contractor may be found nonresponsive if this box is checked.)



SECTION 00 04 10
BID BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____
(Bidder and Address)

as Principal and _____
(Surety and Address)

as Surety, as held and firmly bound unto the County of Los Angeles, hereinafter called the County, in the penal sum of ten percent (10%) of the total amount of the bid of the Principal above named, submitted by said Principal to the County, for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION of this obligation of such that:

WHEREAS, the Principal has submitted the above-mentioned Bid to the County, for certain construction specifically described as follows, for which bids are to be opened on _____

_____ for _____
(date of bid opening) (description of work, including location, project name, and project ID as it appears on the bid)

Now, THEREFORE, if the aforesaid Principal is awarded the contract and, within the time and manner required under the bidding or contract documents, after prescribed forms are presented to him for signature, enters into written contract, in the prescribed form, in accordance with the bids, and files the two bonds with the County, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by the law, then this obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

In the event suit is brought upon this bond by the County and judgment is recovered, the Surety shall pay all costs incurred by the County in such suit, including a reasonable attorney's fee to be fixed by the court.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of _____, 2024.

(SEAL)

(SEAL)

Principal

Signature and Title

Surety

Signature and Title

SECTION 00 04 30

SUBCONTRACTOR LISTING AND SUBCONTRACTING

Prime Contractors shall be governed by the provisions of Sections 4100 to 4113, inclusive, of the Public Contract Code of the State of California and shall set forth in their bids, on forms provided for same, the name and California contractor license number of each Subcontractor who will perform work or labor or render service to the prime Contractor in or about the construction of the work or improvement in amount in excess of one-half (1/2) of one percent (1%) of the prime Contractor's total bid.

Failure by a prime Contractor to specify a Subcontractor for any portion of the work in excess of one-half (1/2) of one percent (1%) of the total bid constitutes an agreement between the prime Contractor and the County that he is fully qualified to perform that portion of the work himself and will perform that portion of the work himself.

No prime Contractor whose bid is accepted shall substitute any person as subcontractor in place of the subcontractor listed, nor shall any subcontract be assigned or transferred except as provided for in the above Sections of the Public Contract Code of the State of California.

Prime Contractors in violation of any of the provisions of Sections 4100 to 4113, inclusive, of the Public Contract Code of the State of California are subject to possible cancellation of contract and monetary penalties as well as disciplinary action by the Contractors' State License Board.

LIST OF SUBCONTRACTORS

The following is a list of the proposed subcontractors to whom I (we) propose to sublet a portion or portions of this work.

<u>NAME</u>	<u>LICENSE NUMBER</u>	<u>LOCATION OF THE PLACE OF BUSINESS</u>	<u>CLASSIFICATION OF WORK TO BE EXECUTED</u>	<u>DIR REGISTRATION NUMBER AND EXPIRATION DATE</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

SECTION 00 04 35

COMMUNITY BUSINESS ENTERPRISES (CBE) PARTICIPATION FORM

Contractors are required to indicate their good faith effort in CBE participation by indicating on this form their proposed involvement on this project. CBEs are Minority/Women/Disadvantaged/Disabled Veteran/Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning owned Business Enterprises (MBE/WBE/DBE/DVBE/LGBTQQ).

LIST OF CBE PARTICIPATION

The following is a list of certified CBE subcontractors or suppliers to whom I (we) propose to sublet or procure a portion or portions of this work.

<u>NAME/ADDRESS</u>	<u>TYPE OF WORK OR PRODUCT</u>	<u>INDICATE MBE/ WBE/DBE/ DVBE/LGBTQQ</u>	<u>PERCENTAGE OF TOTAL CONTRACT VALUE</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

<u>NAME/ADDRESS</u>	<u>TYPE OF WORK OR PRODUCT</u>	<u>INDICATE MBE/ WBE/DBE/ DVBE/LGBTQQ</u>	<u>PERCENTAGE OF TOTAL CONTRACT VALUE</u>

SECTION 00 04 38

**REQUEST FOR PREFERENCE CONSIDERATION—LOW BID
SOLICITATION**

INSTRUCTIONS: Bidders requesting preference consideration must complete and include this form in their bid. In order to qualify for preference, firm must be certified by the County of Los Angeles Department of Consumer and Business Affairs (DCBA). Please reference and ATTACH your Certification Letter issued by DCBA to determine Federal/Non-Federal preference eligibility.

☐ PREFERENCE NOT REQUESTED

OR

☐ PREFERENCE REQUESTED (SELECT ALL THAT APPLY) Preference

Program	Reference
☐ Request for Local Small Business Enterprise (LSBE) Program Preference ☐ Certification for Non-Federally Funded County Solicitations ☐ Certification for Federally Funded County Solicitations	LACC 2.204 PCC 2002

DECLARATION: I DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE INFORMATION IS TRUE AND CORRECT.

PRIMARY FIRM NAME: _____

PRINT NAME: _____

SIGNATURE: _____

TITLE: _____

DATE: _____

LOS ANGELES COUNTY COMMUNITY BUSINESS ENTERPRISE (CBE) INFORMATION

TITLE		REFERENCE			
1 FIRM/ORGANIZATION INFORMATION		The information requested below is for statistical purposes only. On final analysis and consideration of award, contractor/vendor will be selected without regard to race/ethnicity, color, religion, sex, national origin, age, sexual orientation or disability.			
Total Number of Employees in California:					
Total Number of Employees (including owners). If the firm has more than one office location, all personnel from all offices must be included:					
Race/Ethnic Composition of Firm. Enter the make-up of Owners/Partners/Associate Partners into the following categories:					
Race/Ethnic Composition		Owners/Partners/ Associate Partners		Percentage of how ownership of the firm is distributed	
		Male	Female	Male	Female
Black/African American				%	%
Hispanic/Latino				%	%
Asian or Pacific Islander				%	%
Native Americans				%	%
Subcontinent Asian				%	%
White				%	%

TITLE		REFERENCE				
2 CERTIFICATION AS MINORITY, WOMEN, DISADVANTAGED, DISABLED VETERAN, AND LESBIAN, GAY, BISEXUAL, TRANSGENDER, QUEER, AND QUESTIONING-OWNED (LGBTQQ) BUSINESS ENTERPRISE		If your firm is currently certified as a minority, women, disadvantaged, disabled veteran or lesbian, gay, bisexual, transgender, queer, and questioning-owned business enterprise by a public agency, complete the following.  Check if not applicable				
Agency Name	Minority	Women	Disadvantaged	Disabled Veteran	LGBTQQ	

SECTION 00 04 38 A Subconsultant Certification Form

1. Certification as Minority, Women, Disadvantaged, Disabled Veteran, and Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning-Owned Business Enterprises: If any of your subconsultants/subcontractors is currently certified as these certifications by a public agency, complete the following and attach a copy of the proof of certification. Also include County of Los Angeles Local Small Business Enterprise/Social Enterprise/Disabled Veteran Business Enterprise certified subconsultants/subcontractors. All Subcontractors/Subconsultants listed in the bid/proposal shall be listed below. (Make a copy of this form, if necessary).

	Subconsultant Name	Local Small Business Enterprise	Small Business Enterprise	Minority	Women- Owned	Disadvant aged Business	Disabled Veteran Business Enterprise	Social Enterprise	Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning- Owned Business Enterprise
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

2. Declaration: I declare under penalty of perjury under the laws of the State of California that the above information is true and accurate.

Print Name:	Authorized Signature	Title	Date

SECTION 00 04 40
EQUALS

The undersigned desires to use the material, product, thing, or service described below, as "an equal" to such items as specified. In accordance with the General Conditions, Paragraph 2, Sub-paragraph D, the first, second, and third apparent low bidder will have two (2) calendar days after the bid opening to submit their list of equals and ten (10) calendar days after the bid opening to submit all substantiating data and test results. In accordance with Sub-paragraph E, the County, in its sole discretion, shall determine whether the substantiating data demonstrates that "an equal" submittal(s) is equal in all respects to the item specified in the bid documents. If the County determines that "an equal" submittal(s) has not been substantiated to be equal in all respects, the item specified in the bid documents shall be furnished and/or installed by Contractor without modification of the bid amount or contract documents. If the County finds that "an equal" submittal(s) is equivalent to the respective item(s) specified in the bid documents, then the undersigned may furnish such item(s), together with all necessary labor, materials, equipment, and incidentals required to perform and complete the work.

Date _____, 20____

Phone No. _____

Contractor's Name

Contractor's Address

Materials, apparatus, or equipment specified for which Bidder proposes "an equal." (Indicate where specified and page number.)

Complete description of the materials, apparatus, or equipment the Bidder desires to use as "an equal" and name of Subcontractor if different.

1. _____

2. _____

3.

4.

5.

6.

SECTION 00 04 50

NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER

State of California

ss.

County of _____

_____, being first duly sworn, deposes and says that he or she is _____ of _____ the party making the foregoing bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and 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; that 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, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

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

Date

SECTION 00 04 60

**ATTESTATION OF WILLINGNESS TO CONSIDER
GAIN/GROW PARTICIPANTS**

As a threshold requirement for consideration for contract award, Bidder/Proposer shall demonstrate a proven record for hiring GAIN/GROW participants or shall attest to a willingness to consider GAIN/GROW participants for any future employment opening if they meet the minimum qualifications for that opening. Additionally, Bidder/Proposer shall attest to a willingness to provide employed GAIN/GROW participants access to the Bidder/Proposer's employee mentoring program, if available, to assist these individuals in obtaining permanent employment and/or promotional opportunities.

To report all job openings with job requirements to obtain qualified GAIN/GROW participants as potential employment candidates, Bidder/Proposer shall email:

GAINGROW@DPSS.LACOUNTY.GOV and BSERVICES@WDACS.LACOUNTY.GOV.

Bidder/Proposers unable to meet this requirement shall not be considered for contract award.

Bidder/Proposer shall complete all of the following information, sign where indicated below, and return this form with their proposal.

A. Bidder/Proposer has a proven record of hiring GAIN/GROW participants.

_____ YES (subject to verification by County) _____ NO

B. Bidder/Proposer is willing to provide DPSS with all job openings and job requirements to consider GAIN/GROW participants for any future employment openings if the GAIN/GROW participant meets the minimum qualifications for the opening. "Consider" means that Proposer is willing to interview qualified GAIN/GROW participants.

_____ YES _____ NO

C. Bidder/Proposer is willing to provide employed GAIN/GROW participants access to its employee-mentoring program, if available.

_____ YES _____ NO _____ N/A (Program not available)

Proposer's Organization: _____

Signature: _____

Print Name: _____

Title: _____ Date: _____

Telephone No: _____ Email: _____

SECTION 00 04 65 3-YEAR CONTRACTING HISTORY

LIST ALL CURRENT AND COMPLETED CONTRACTS WITH THE COUNTY FOR THE PAST THREE YEARS (Begin with the most recent project)

Contract Type/Description _____	Contract Number _____	Contract Type/Description _____	Contract Number _____
Type of Work _____	_____	Type of Work _____	_____
Department _____	Contract Amount _____	Department _____	Contract Amount _____
Address _____	\$ _____	Address _____	\$ _____
County Contact Name/Phone _____ / _____	Date of Contract _____	County Contact Name/Phone _____ / _____	Date of Contract _____
IF CONSTRUCTION Architect Name/Phone _____ / _____	_____	IF CONSTRUCTION Architect Name/Phone _____ / _____	_____
Type of Facility _____		Type of Facility _____	
Contract Type/Description _____	Contract Number _____	Contract Type/Description _____	Contract Number _____
Type of Work _____	_____	Type of Work _____	_____
Department _____	Contract Amount _____	Department _____	Contract Amount _____
Address _____	\$ _____	Address _____	\$ _____
County Contact Name/Phone _____ / _____	Date of Contract _____	County Contact Name/Phone _____ / _____	Date of Contract _____
IF CONSTRUCTION Architect Name/Phone _____ / _____	_____	IF CONSTRUCTION Architect Name/Phone _____ / _____	_____
Type of Facility _____		Type of Facility _____	
Contract Type/Description _____	Contract Number _____	Contract Type/Description _____	Contract Number _____
Type of Work _____	_____	Type of Work _____	_____
Department _____	Contract Amount _____	Department _____	Contract Amount _____
Address _____	\$ _____	Address _____	\$ _____
County Contact Name/Phone _____ / _____	Date of Contract _____	County Contact Name/Phone _____ / _____	Date of Contract _____
IF CONSTRUCTION Architect Name/Phone _____ / _____	_____	IF CONSTRUCTION Architect Name/Phone _____ / _____	_____
Type of Facility _____		Type of Facility _____	

SECTION 00 04 70

FALSE CLAIMS

Bidders/Proposers shall provide either the certification requested below or the information requested on the next page. **Failure to certify or provide the requested information may result in a determination that the Bidder/Proposer is non-responsive. Failure to fully and accurately provide the requested certification or information may result in a determination that the Bidder/Proposer is not responsible.**

"False Claims Act", as used herein, is defined as either or both the Federal False Claims Act, 31 U.S.C. Sections 3729 et seq., and the California False Claims Act, Government Code Sections 12650 et seq.

FALSE CLAIMS ACT CERTIFICATION

If the Bidder/Proposer has no False Claims Act violations as described above, complete the following:

I, _____, hereby certify that neither
(print name of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

(Bidder/Proposer name as shown on Bid/Proposal)
nor _____
(name of responsible managing person licensed by Contractors' State License Board)

has been determined by a court or tribunal of competent jurisdiction to have violated the False Claims Act as defined above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

FALSE CLAIMS ACT VIOLATIONS

With regard to any determinations by a tribunal or court of competent jurisdiction that the False Claims Act, as defined above, has been violated by (1) the Bidder/Proposer submitting this Bid/Proposal, including any person who is an officer of, or in a management position with, or has an ownership interest in the contracting entity which is submitting this Bid/Proposal, or (2) the qualifying person licensed by the State Contractors' License Board to perform the work described in the Bid/Proposal, including any such person when they were an officer, manager, owner, or responsible managing employee of a construction contractor other than the Bidder/Proposer submitting this Bid/Proposal, Bidder/Proposer shall provide on the following page labeled "False Claim Act Violations Information:" (1) the date of the determination of the violation, (2) the identity of tribunal or court and the case name or number, if any, (3) the identity of government contract or project involved, (4) the identity of government agency involved, 5) the amount of fine imposed, and (6) any exculpatory information of which the County should be aware.

FALSE CLAIMS ACT VIOLATIONS INFORMATION

(1) Date of determination of the violation:

(2) Identity of tribunal or court and the case name or number, if any: _____

(3) Government contract or project involved: _____

(4) Government agency involved: _____

(5) Amount of fine imposed: _____

(6) Exculpatory information: _____

Declaration: I declare under penalty of perjury that the above information is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

SECTION 00 04 71
CIVIL LITIGATION HISTORY

Bidder/Proposer shall provide either the certification requested below or information requested on the next page. **Failure to provide such certification or information may result in a determination that the Bidder/Proposer is nonresponsive. Failure to fully and accurately provide the requested certification or information may result in a determination that the Bidder/Proposer is not responsible.**

For the two (2) years preceding the date of submittal of this Bid/Proposal, identify any civil litigation arising out of the performance of a construction contract within the State of California in which the (1) Bidder/Proposer submitting this Bid/Proposal, including any person who is an officer of, or in a management position with, or has an ownership interest in the contracting entity which is submitting this Bid/Proposal, or (2) the qualifying person licensed by the State Contractors' License Board to perform the work described in this Bid/Proposal, including any such person when they were an officer, manager, owner, or responsible managing employee of a construction contractor other than the Bidder/Proposer submitting this Bid/Proposal, was a named plaintiff or defendant in a lawsuit brought by or against the Owner. Do not include litigation which is limited solely to enforcement of mechanics' liens or stop notices. Provide on the following page labeled "Civil Litigation History Information:" (1) the name and court case identification number of each case, (2) the jurisdiction in which it was filed, and (3) the outcome of the litigation, e.g., whether the case is pending, a judgment was entered, a settlement was reached, or the case was dismissed. If a settlement was reached within the two years preceding the date of submittal of this Bid/Proposal, please provide the dollar value of the settled claim(s). The dollar value may be marked as confidential if Bidder/Proposer does not want the settlement information to be public record.

CIVIL LITIGATION CERTIFICATION

If the Bidder/Proposer has no civil litigation history to report as described above, complete the following:

I, _____, hereby certify that neither
(print name of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

(Bidder/Proposer name as shown on Bid/Proposal)

nor _____
(name of responsible managing person licensed by the Contractors' State License Board)

has been involved in civil litigation as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

CIVIL LITIGATION HISTORY INFORMATION

(1) Name of Case: _____

Court case identification number: _____

(2) Jurisdiction in which case was filed: _____

(3) Outcome of the case: _____

(1) Name of Case: _____

Court case identification number: _____

(2) Jurisdiction in which case was filed: _____

(3) Outcome of the case: _____

Declaration: I declare under penalty of perjury that the above information is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

SECTION 00 04 72

CRIMINAL CONVICTIONS

Bidder/Proposer shall provide either the certification requested below or information requested on the next page. **Failure to provide such certification or information may result in a determination that the Bidder/Proposer is nonresponsive. Failure to fully and accurately provide the requested certification or information may result in a determination that the Bidder/Proposer is not responsible.**

For the five (5) years preceding the date this Bid/Proposal is due, identify on the following page any criminal conviction in any jurisdiction of the United States for a violation of law arising out of the performance of a construction contract (1) by the Bidder/Proposer submitting this Bid/Proposal, including any person who is an officer of, or in a management position with, or has an ownership interest in the contracting entity which is submitting this Bid/Proposal, or (2) by the qualifying person licensed by the State Contractors' License Board to perform the work described in the Bid/Proposal, including any such person when they were an officer, manager, owner, or responsible managing employee of a construction contractor other than the Bidder/Proposer submitting this Bid/Proposal.

Provide on the following page labeled "Criminal Convictions Information:" (1) the date of conviction, (2) the name and court case identification number, (3) the identity of the law violated, (4) the identity of the prosecuting agency, (5) the contract or project involved, (6) the punishment imposed, and (7) any exculpatory information of which the Agency should be aware.

CRIMINAL CONVICTION CERTIFICATION

If the Bidder/Proposer has no criminal convictions to report as described above, complete the following:

I, _____, hereby certify that neither
(print name of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

(Bidder/Proposer name as shown on Bid/Proposal)

nor _____
(name of responsible managing person licensed by the Contractors' State License Board)

has been convicted of a criminal violation as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

CRIMINAL CONVICTIONS INFORMATION

- (1) Date of conviction: _____
- (2) Name of case: _____
Court case identification number: _____
- (3) Identity of the law violated: _____

- (4) Identity of the prosecuting agency: _____

- (5) Contract or project involved: _____

- (6) Punishment imposed: _____

- (7) Exculpatory information: _____

Declaration: I declare under penalty of perjury that the above information is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

SECTION 00 04 73

DEBARMENTS

Bidder/Proposer shall provide either the certification requested below or the information requested on the next page. **Failure to provide such certification or information may result in a determination that the Bidder/Proposer is nonresponsive. Failure to fully and accurately provide the requested certification or information may result in a determination that the Bidder/Proposer is not responsible.**

For the ten (10) years preceding the date this Bid/Proposal is due, identify on the following page any debarment by any Federal, State, or local public agency arising out of the performance of a construction contract (1) by the Bidder/Proposer submitting this Bid/Proposal, including any person who is an officer of, or in a management position with, or has an ownership interest in the contracting entity which is submitting this Bid/Proposal, or (2) by the qualifying person licensed by the Contractors' State License Board to perform the work described in the Bid/Proposal, including any debarment of any such person when they were an officer, manager, owner, or responsible managing employee of a construction contractor other than the Bidder/Proposer submitting this Bid/Proposal. Provide on the following page labeled "Debarment Information:" (1) the date of debarment and the duration of the debarment, (2) the project name or contract from which the debarment arose, (3) the identify of the debarring agency, (4) stated reason for debarment, and (5) any exculpatory information of which the Agency should be aware.

HISTORY OF DEBARMENT CERTIFICATION

If the Bidder/Proposer has no debarments to report as described above, complete the following:

I, _____, hereby certify that neither
(print name of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

(Bidder/Proposer name as shown on Bid/Proposal)

nor _____
(name of responsible managing person licensed by Contractors' State License Board)

has been debarred as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

DEBARMENT INFORMATION

- (1) Date and duration of debarment: _____

- (2) Project name or contract involved: _____

- (3) Debarring agency: _____

- (4) Stated reason for debarment: _____

- (5) Exculpatory information: _____

Declaration: I declare under penalty of perjury that the above information is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

SECTION 00 04 74

LABOR LAW/PAYROLL VIOLATIONS

Bidder/Proposer shall provide the certification requested below or the information requested on the next page. **Failure to provide such certification or information may result in a determination that the Bidder/Proposer is nonresponsive. Failure to fully and accurately provide the requested certification or information may result in a determination that the Bidder/Proposer is not responsible.**

"Labor law/payroll violation" means for purposes of this disclosure a violation of the Davis-Bacon Act (40 USC section 276a) and/or a violation of California Labor Code sections 1720 through 1861 concerning the payment of prevailing wages, employment of apprentices and hours and working conditions.

For the three (3) years preceding the date this Bid/Proposal is due, identify on the following page any determination made by any Federal, State, or local public agency of a labor law/payroll violation arising out of the performance of a construction contract (1) by the Bidder/Proposer submitting this Bid/Proposal, including any person who is an officer of, or in a management position with, or has an ownership interest in the contracting entity which is submitting this Bid/Proposal, or (2) by the qualifying person licensed by the Contractors' State License Board to perform the work described in the Bid/Proposal, including any such person when they were an officer, manager, owner, or responsible managing employee of a construction contractor other than the Bidder/Proposer submitting this Bid/Proposal. Provide on the following page labeled "Labor Law/Payroll Violations Information:" (1) the date of the determination of the violation, (2) the case number, if any, or other identifying information for the proceeding, (3) the identity of the government contract or project involved, (4) the identity of the government agency involved, (5) the description of violation, (6) the amount of any civil wage and penalty assessment, and (7) any exculpatory information of which the Agency should be aware.

LABOR LAW/PAYROLL VIOLATION CERTIFICATION

If the Bidder/Proposer has no labor law/payroll violations to report as described above, complete the following:

I, _____, hereby certify that neither
(print name of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

(Bidder/Proposer name as shown on Bid/Proposal)

nor _____
(name of responsible managing person licensed by Contractors' State License Board)

has been determined to have violated any Federal, State, or local labor laws as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

Labor Law/Payroll Violations

LABOR LAW/PAYROLL VIOLATIONS INFORMATION

- (1) Date of violation determination: _____
- (2) Case number: _____
- (3) Government contract or project involved: _____

- (4) Government agency involved: _____

- (5) Description of the violation (attach disposition letter): _____

- (6) Amount of any civil wage and penalty assessment: _____

- (7) Exculpatory information: _____

Declaration: I declare under penalty of perjury that the above information is true and correct.

Executed this _____ day of _____ at _____
(month and year) (city and state)

by _____
(signature of owner, officer, manager, or licensee responsible for submission of Bid/Proposal)

SECTION 00 04 75

INTEGRATED PEST MANAGEMENT PROGRAM COMPLIANCE CERTIFICATION

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:	Email address:	
Solicitation/Contract for Services		

PROPOSER CERTIFICATION

The County of Los Angeles is a permittee to a National Pollutant Discharge Elimination System Permit (NPDES Permit) issued by the Los Angeles Regional Water Quality Control Board to reduce or eliminate pollutants moved into surface water through storm water management systems and facilities. One of the conditions of the NPDES Permit is the Integrated Pest Management Program (IPM Program) which was developed to reduce the impact of pesticides and fertilizers to surface water. Among other things, the IPM Program imposes requirements to County Purchasing and Contracting, which are outlined in Integrated Pest Management Program Compliance of the proposed Contract. The entire Countywide IPM Program is available at [Los Angeles County Department of Agricultural Commissioner/ Weights and Measures \(ACWM\) and Home Page - Current - Integrated Pest Management \(lacounty.gov\)](http://lacounty.gov/ACWM)

Proposer acknowledges and certifies compliance with Integrated Pest Management Program Compliance of the proposed Contract and agrees that proposer or a member of its staff performing work under the proposed Contract will be in compliance, when applicable. Proposer further acknowledges that noncompliance with the County's IPM Program may result in rejection of any proposal, or cancellation of any resultant Contract, at the sole judgment of the County.

I declare under penalty of perjury under the laws of the State of California that the information herein is true and correct and that I am authorized to represent this company.

Print Name:	Title:
Signature:	Date:

SECTION 00 04 76
CHARITABLE CONTRIBUTIONS CERTIFICATION

Company Name

Address

Internal Revenue Service Employer Identification Number

California Registry of Charitable Trusts "CT" number (if applicable)

The Nonprofit Integrity Act (SB 1262, Chapter 919) added requirements to California's Supervision of Trustees and Fundraisers for Charitable Purposes Act which regulates those receiving and raising charitable contributions.

Check the Certification below that is applicable to your company.

- ☐ Proposer or Contractor has examined its activities and determined that it does not now receive or raise charitable contributions regulated under California's Supervision of Trustees and Fundraisers for Charitable Purposes Act. If Proposer engages in activities subjecting it to those laws during the term of a County contract, it will timely comply with them and provide County a copy of its initial registration with the California State Attorney General's Registry of Charitable Trusts when filed.

OR

- ☐ Proposer or Contractor is registered with the California Registry of Charitable Trusts under the CT number listed above and is in compliance with its registration and reporting requirements under California law. Attached is a copy of its most recent filing with the Registry of Charitable Trusts as required by Title 11 California Code of Regulations, sections 300-301 and Government Code sections 12585-12586.

Signature

Date

Please Print Name and Title of Signer

PROSPECTIVE CONTRACTOR LIST OF TERMINATED CONTRACTS

Contractor's Name: _____

Proposer must list all contracts that have been terminated within the past three years. Terminated contracts are those contracts terminated by an agency or firm before the contract's expiration date. Any and all terminated contracts should be accompanied with "Reason for termination". It should be noted that contracts that naturally expired need not be listed. The County is only seeking information on contracts that were terminated prior to expiration.

1. Name of Firm	Address of Firm	Contact Person	Telephone # ()	Email
Name or Contract No.		Reason for Termination:		
2. Name of Firm	Address of Firm	Contact Person	Telephone # ()	Email
Name or Contract No.		Reason for Termination:		
3. Name of Firm	Address of Firm	Contact Person	Telephone # ()	Email
Name or Contract No.		Reason for Termination:		
4. Name of Firm	Address of Firm	Contact Person	Telephone # ()	Email
Name or Contract No.		Reason for Termination:		

Section 00 04 78
SB 1439 QUESTIONNAIRE
Camp Afflerbaugh CCTV Project
BRC0000544

Proposers/Subconsultants/Subcontractors are all required to complete the SB 1439 Questionnaire.

If a question is not applicable, enter "N/A."

<i>PARTIES</i> <u>All</u> applicants, bidders, or proposers for a license/permit/franchise or other entitlement for use.	Individual/Company Name: Prime or subcontractor? Parent? Subsidiaries Related Business Entities? Any other entities directed or controlled by the individual or company? Name of party who signs an agreement:
<i>PARTIES' AGENTS</i> List all agents paid by <u>each</u> applicant or bidder for license/permit/franchise, or other entitlement for use.	Name: Company name (if any): Name: Company name (if any):
<i>PARTICIPANTS</i> List all individuals and/or businesses who contacted your Department to oppose or support the application with a financial interest in the decision.	Individual/Company Name: Prime or subcontractor? Parent? Subsidiaries? Related Business Entities? Any other entities directed or controlled by the individual or company?

Section 00 04 78
SB 1439 QUESTIONNAIRE
Camp Afflerbaugh CCTV Project
BRC0000544

<i>PARTICIPANTS' AGENTS</i> List all agents paid by <u>each</u> participant who contacted your Department opposed or supported the application who has a financial interest in the decision.	Name: Company name (if any):
<i>CONTRIBUTIONS</i> Did any party, participant or their agents to this agenda item disclose they made a campaign contribution of \$250 or more to a decision-maker during the permit, licensing, leasing or approval process <i>on or after Jan. 1, 2023?</i>	Date of contribution: Name of Contributor: Recipient Name: Amount:

It is Proposers'/Subconsultants'/Subcontractors' sole responsibility to inform Public Works immediately of any changes in the submitted information after submission.

Proposers/Subconsultants/Subcontractors declare under penalty of perjury that the information stated in this form is true and accurate.

I declare under penalty of perjury under the laws of the State of California that the information herein is true and correct and that I am authorized to represent this company.

Print Name:	Title:
Signature:	Date:

REQUIRED FORM
CONTRIBUTION AND AGENT DECLARATION FORM

This form must be completed separately by all bidders/proposers, including all prime contractors and subcontractors, and by all applicants for licenses, permits, and other entitlements for use issued by the County of Los Angeles ("County").

Pursuant to the Levine Act (Government Code section 84308), a member of the Board of Supervisors, other elected County officials (the Sheriff, Assessor, and the District Attorney), and other County employees and/or officers ("County Officers") are disqualified and not able to participate in a proceeding involving contracts, franchises, licenses, permits and other entitlements for use if the County Officer received more than \$250 in contributions in the past 12 months from the bidder, proposer or applicant, any paid agent of the bidder, proposer, or applicant, or any financially interested participant who actively supports or opposes a particular decision in the proceeding.

State law requires you to disclose information about contributions made by you, your company, and lobbyists and agents paid to represent you. Failure to complete the form in its entirety may result in significant delays in the processing of your application and potential disqualification from the procurement or application process.

You must fully answer the applicable questions below. You ("Declarant"), or your company, if applicable, including all entities identified below (collectively, "Declarant Company") must also answer the questions below. The term "employee(s)" shall be defined as employees, officers, partners, owners, or directors of Declarant Company.

An affirmative response to any questions will not automatically cause the disqualification of your bid/proposal, or the denial of your application for a license, permit or other entitlement. However, failure to answer questions completely, in good faith, or providing materially false answers may subject a bidder/proposer to disqualification from the procurement.

This material is intended for use by bidders/proposers, including all prime contractors and subcontractors, and by all applicants for licenses, permits, and other entitlements for use issued by the County of Los Angeles and does not constitute legal advice. If you have questions about the Levine Act and how it applies to you, you should call your lawyer or contact the Fair Political Practices Commission for further guidance.

REQUIRED FORM
CONTRIBUTION AND AGENT DECLARATION FORM

Complete each section below. State "none" if applicable.

A. **COMPANY OR APPLICANT INFORMATION**

1) Declarant Company or Applicant Name:

- a) If applicable, identify all subcontractors that have been or will be named in your bid or proposal:
- b) If applicable, variations and acronyms of Declarant Company's name used within the past 12 months:
- c) Identify all entities or individuals who have the authority to make decisions for you or Declarant Company about making contributions to a County Officer, regardless of whether you or Declarant Company have actually made a contribution:

[IF A COMPANY, ANSWER QUESTIONS 2 - 3]

- 2) Identify only the Parent(s), Subsidiaries and Related Business Entities that Declarant Company has controlled or directed, or been controlled or directed by. "Controlled or directed" means shared ownership, 50% or greater ownership, or shared management and control between the entities.
 - a) Parent(s):
 - b) Subsidiaries:
 - c) Related Business Entities:
- 3) If Declarant Company is a closed corporation (non-public, with under 35 shareholders), identify the majority shareholder.
- 4) Identify all entities (proprietorships, firms, partnerships, joint ventures, syndicates, business trusts, companies, corporations, limited liability companies, associations, committees, and any other organization or group of persons acting in concert) whose contributions you or Declarant Company have the authority to direct or control.

REQUIRED FORM

CONTRIBUTION AND AGENT DECLARATION FORM

- 5) Identify any individuals such as employees, agents, attorneys, law firms, lobbyists, and lobbying firms who are or who will act on behalf of you or Declarant Company and who will receive compensation to communicate with a County Officer regarding the award or approval of **this** contract or project, license, permit, or other entitlement for use.

*(Do **not** list individuals and/or firms who, as part of their profession, either (1) submit to the County drawings or submissions of an architectural, engineering, or similar nature, **or** (2) provide purely technical data or analysis, **and** who will not have any other type of communication with a County agency, employee, or officer.)*

- 6) If you or Declarant Company are a 501(c)(3) non-profit organization, identify the compensated officers of your organization and the compensated members of your board.

B. CONTRIBUTIONS

- 1) Have you or the Declarant Company solicited or directed your employee(s) or agent(s) to make contributions, whether through fundraising events, communications, or any other means, to a County Officer in the past 12 months? If so, provide details of each occurrence, including the date.

Date (contribution solicited, or directed)	Recipient Name (elected official)	Amount

*Please attach an additional page, if necessary.

- 2) Disclose all contributions made by you or any of the entities and individuals identified in Section A to a County officer in the past 12 months.

Date (contribution made)	Name (of the contributor)	Recipient Name (elected official)	Amount

REQUIRED FORM

*Please attach an additional page, if necessary.

CONTRIBUTION AND AGENT DECLARATION FORM

C. DECLARATION

By signing this Contribution and Agent Declaration form, you (Declarant), or you and the Declarant Company, if applicable, attest that you have read the entirety of the Contribution Declaration and the statements made herein are true and correct to the best of your knowledge and belief. (Only complete the one section that applies.)

There are _____ additional pages attached to this Contribution Declaration Form.

COMPANY BIDDERS OR APPLICANTS

I, _____ (Authorized Representative), on behalf of _____ (Declarant Company), at which I am employed as _____ (Title), attest that after having made or caused to be made a reasonably diligent investigation regarding the Declarant Company, the foregoing responses, and the explanation on the attached page(s), if any, are correct to the best of my knowledge and belief. Further, I understand that failure to answer the questions in good faith or providing materially false answers may subject Declarant Company to consequences, including disqualification of its bid/proposal or delays in the processing of the requested contract, license, permit, or other entitlement.

IMPORTANT NOTICE REGARDING FUTURE AGENTS AND FUTURE CONTRIBUTIONS:

By signing this Contribution and Agent Declaration form, you also agree that, if Declarant Company hires an agent, such as, but not limited to, an attorney or lobbyist during the course of these proceedings and will compensate them for communicating with the County about this contract, project, permit, license, or other entitlement for use, you agree to inform the County of the identity of the agent or lobbyist and the date of their hire. You also agree to disclose to the County any future contributions made to members of the County Board of Supervisors, another elected County officer (the Sheriff, Assessor, and the District Attorney), or any other County officer or employee by the Declarant Company, or, if applicable, any of the Declarant Company's proposed subcontractors, agents, lobbyists, and employees who have communicated or will communicate with the County about this contract, license, permit, or other entitlement after the date of signing this disclosure form, and within 12 months following the approval, renewal, or extension of the requested contract, license, permit, or entitlement for use.

Signature

Date

REQUIRED FORM

CONTRIBUTION AND AGENT DECLARATION FORM

INDIVIDUAL BIDDERS OR APPLICANTS

I, _____, declare that the foregoing responses and the explanation on the attached sheet(s), if any, are correct to the best of my knowledge and belief. Further, I understand that failure to answer the questions in good faith or providing materially false answers may subject me to consequences, including disqualification of my bid/proposal or delays in the processing of the requested license, permit, or other entitlement.

IMPORTANT NOTICE REGARDING FUTURE AGENTS AND FUTURE CONTRIBUTIONS:

If I hire an agent or lobbyist during the course of these proceedings and will compensate them for communicating with the County about this contract, project, permit, license, or other entitlement for use, I agree to inform the County of the identity of the agent or lobbyist and the date of their hire. I also agree to disclose to the County any future contributions made to members of the County Board of Supervisors, another elected County official (the Sheriff, Assessor, and the District Attorney), or any other County officer or employee by me, or an agent such as, but not limited to, a lobbyist or attorney representing me, that are made after the date of signing this disclosure form, and within 12 months following the approval, renewal, or extension of the requested contract, license, permit, or entitlement for use.

Signature

Date

SECTION 00 04 85
COUNTY OF LOS ANGELES CONTRACTOR EMPLOYEE JURY SERVICE PROGRAM
APPLICATION FOR EXCEPTION AND CERTIFICATION FORM

The County's solicitation for this contract/purchase order (Request for Proposal or Invitation for Bid) is subject to the County of Los Angeles Contractor Employee Jury Service Program (Program), Los Angeles County Code, Chapter 2.203. All bidders or proposers, whether a contractor or subcontractor, must complete this form to either: 1) request an exception from the Program requirements; or 2) certify compliance. Upon review of the submitted form, the County department will determine, in its sole discretion, whether the bidder or proposer is exempted from the Program.

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:		
Solicitation For (Type of Goods or Services):		

If you believe the Jury Service Program does not apply to your business, check the appropriate box in Part I (attach documentation to support your claim); or, complete Part II to certify compliance with the Program. Whether you complete Part I or II, please sign and date this form below.

Part I: Jury Service Program is not Applicable to my Business

- ☐ My business does not meet the definition of "contractor," as defined in the Program as it has not received an aggregate sum of \$50,000 or more in any 12-month period under one or more County contracts or subcontracts (this exception is not available if the contract/purchase order itself will exceed \$50,000). I understand that the exception will be lost and I must comply with the Program if my revenues from the County exceed an aggregate sum of \$50,000 in any 12-month period.

- ☐ My business is a small business as defined in the Program. It: 1) has ten or fewer employees; and, 2) has annual gross revenues in the preceding 12 months which, if added to the annual amount of this contract, are \$500,000 or less; and 3) is not an affiliate or subsidiary of a business dominant in its field of operation as defined below. I understand that the exemption will be lost and I must comply with the Program if the number of employees in my business and my gross annual revenues exceed the above limits.

"Dominant in its field of operation" means having more than ten employees, including full-time and part-time employees, and annual gross revenues in the preceding 12 months, which, if added to the annual amount of the contract awarded, exceed \$500,000.

"Affiliate or subsidiary of a business dominant in its field of operation" means a business which is at least 20 percent owned by a business dominant in its field of operation, or by partners, officers, directors, majority stockholders, or their equivalent of a business dominant in that field of operation.

- ☐ My business is subject to a Collective Bargaining Agreement (attach agreement) that expressly provides that it supersedes all provisions of the Program.

OR

Part II: Certification of Compliance

- ☐ My business has and adheres to a written policy that provides, on an annual basis, no less than five days of regular pay for actual jury service for full-time employees of the business who are also California residents, **or** my company will have and adhere to such a policy prior to award of the contract.

I declare under penalty of perjury under the laws of the State of California that the information stated above is true and correct.

Print Name:	Title:
Signature:	Date:

To be submitted with each Bid for a contract

Project Identification _____

Bid Date _____

This information must include all construction work undertaken in the State of California by the Bidder and any partnership, joint venture, or corporation that any principal of the Bidder participated in as a principal or owner for the last five calendar years and the current calendar year prior to the date of Bid submittal. Separate information shall be submitted for each particular partnership, joint venture, corporate, or individual Bidder. The Bidder may attach any additional information or explanation of data which he would like taken into consideration in evaluating the safety record. An explanation must be attached of the circumstances surrounding any and all fatalities.

SECTION 00 04 90
CONTRACTOR'S INDUSTRIAL SAFETY RECORD
5-Calendar Years Prior to Current Year

	2020	2021	2022	2023	2024	TOTAL	CURRENT YEAR (2025)
1. No. of Contracts							
2. Total dollar amount of contracts (in thousands of dollars)							
*3. No. of fatalities							
*4. No. of lost workdays due to injuries							
*5. No. of days of restricted work activity due to injuries							
*6. Injuries without lost workdays							

*The information required for these items is the same as required for columns 1, 4, 5, and 6, Log and Summary of Occupational Injuries and Illnesses, CAL/OSHA Form 200.

The above information was compiled from the records that are available to me at this time and I declare under penalty of perjury that the information is true and accurate within the limitations of those records.

Name of Bidder (Print)

Signature

Address

Contractors' State License No. & Classification

City

Telephone

SECTION 00 04 91

INJURY AND ILLNESS PREVENTION PLAN (IIPP)
AND CODE OF SAFE PRACTICES (CSP) AFFIDAVIT

The apparent low Bidder shall submit this form to the County which states that the Bidder has an IIPP which complies with Cal/OSHA Regulations and CSP, that all subcontractors supplying employees to the jobsite will be required to prove to the Contractor that they have an IIPP which complies with Cal/OSHA Regulations and a CSP, and that their jobsite employees have been trained on IIPP and CSP.

Failure to submit this affidavit as required may result in a determination that the successful Bidder is nonresponsive and/or nonresponsible.

I, _____, hereby certify to the
County

of Los Angeles on behalf of _____
the following:

1. The Contractor identified above has an injury and illness Prevention Plan (IIPP) and a Code of Safe Practices (CSP) which comply with Cal/OSHA Regulations.
2. The employees of the Contractor identified above who will be assigned to the jobsite have been trained on the IIPP and CSP.
3. All subcontractors supplying employees to the jobsite will be required to prove to the Contractor that they have an IIPP and a CSP which comply with Cal/OSHA Regulations and their jobsite employees have been trained on the IIPP and CSP.

I declare under penalty of perjury under the law of the State of California that the foregoing is true and correct.

Executed this _____ day of _____
(month and year)

at _____

By _____

SECTION 00 04 92

BIDDER'S ORGANIZATION QUESTIONNAIRE/AFFIDAVIT

Please complete, date and sign this form and place it in your Bid. The person signing the form must be authorized to sign on behalf of the Bidder and to bind the applicant in a Contract.

1. If your firm is a corporation, state its legal name (as found in your Articles of Incorporation) and State of Incorporation:

_____	_____	_____
Name	State	Year Inc.

2. If your firm is a partnership or a sole proprietorship, state the name of the proprietor or managing partner:

3. If your firm is doing business under one or more DBA's, please list all DBA's and the County(ies) of registration:

Name	County of Registration	Year Became DBA

_____	_____	_____

_____	_____	_____

4. Is your firm wholly or majority owned by, or a subsidiary of, another firm: _____ if yes,

Name of parent firm: _____

State of incorporation or registration of parent firm: _____

5. Please list any other names your firm has done business as within the last five (5) years.

Name	Year of Name Change

_____	_____

_____	_____

6. Indicate if your firm is involved in any pending acquisition/merger, including the associated company name. If not applicable, so indicate below.

Bidder acknowledges that if any false, misleading, incomplete, or deceptively unresponsive statements in connection with this Bid are made, the Bidder may be rejected. The evaluation and determination in this area shall be at the Director's sole judgment and his/her judgment shall be final:

Bidder's Name

Address:

e-mail

address: _____ Telephone number: _____

Fax number: _____

On behalf of _____ (Bidder's name), I _____
(Name of Bidder's authorized representative), certify that the information contained in this Bidder's Organization Questionnaire/Affidavit is true and correct to the best of my information and belief.

Signature

Internal Revenue Service
Employer Identification Number

Title

California Business License Number

Date

County WebVen Number

SECTION 00 04 93

**CERTIFICATION OF COMPLIANCE WITH THE COUNTY'S
DEFAULTED PROPERTY TAX REDUCTION PROGRAM**

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:	Email address:	
Solicitation/Contract For	Services:	

The Proposer/Bidder/Contractor certifies that:

- ☐ It is familiar with the terms of the County of Los Angeles Defaulted Property Tax Reduction Program, Los Angeles County Code Chapter 2.206; **AND**

To the best of its knowledge, after a reasonable inquiry, the Proposer/Bidder/Contractor is not in default, as that term is defined in Los Angeles County Code Section 2.206.020.E, on any Los Angeles County property tax obligation; **AND**

The Proposer/Bidder/Contractor agrees to comply with the County's Defaulted Property Tax Reduction Program during the term of any awarded contract.

- OR -

-
- ☐ I am exempt from the County of Los Angeles Defaulted Property Tax Reduction Program, pursuant to Los Angeles County Code Section 2.206.060, for the following reasons:

I declare under penalty of perjury under the laws of the State of California that the information stated above is true and correct.

Print Name:	Title:
Signature:	Date:

SECTION 00 04 94

AVOIDANCE OF CONFLICT OF INTEREST

The Los Angeles County Code, Section 2.180.010, provides as follows:

CONTRACTS PROHIBITED

Notwithstanding any other section of this Code, the County shall not contract with, and shall reject any proposals submitted by, the persons or entities specified below, unless the Board of Supervisors finds that special circumstances exist which justify the approval of such contract:

1. Employees of the County or of public agencies for which the Board of Supervisors is the governing body;
2. Profit-making firms or businesses in which employees described in number 1 serve as officers, principals, partners, or major shareholders;
3. Persons who, within the immediately preceding 12 months, came within the provisions of number 1, and who:
 - a. Were employed in positions of substantial responsibility in the area of service to be performed by the contract; or
 - b. Participated in any way in developing the contract or its service specifications; and
4. Profit-making firms or businesses in which the former employees, described in number 3, serve as officers, principals, partners, or major shareholders.

Contracts submitted to the Board of Supervisors for approval or ratification shall be accompanied by an assurance by the department submitting, district or agency that the provisions of this section have not been violated.

Proposer Name (please print)

Proposer's Official Title (please print)

Proposer's Signature

SECTION 00 04 95
FAMILIARITY WITH THE COUNTY LOBBYIST ORDINANCE
CERTIFICATION

The Proposer certifies that it is familiar with the terms of the County of Los Angeles Lobbyist Ordinance, Los Angeles Code Chapter 2.160. The Proposer also certifies that all persons acting on behalf of the Proposer organization have and will comply with it during the proposal process.

Signature:_____

Date:_____

SECTION 00 04 96

PROPOSER'S EEO CERTIFICATION

Company Name

Address

Internal Revenue Service Employer Identification Number

GENERAL

In accordance with provisions of the County Code of the County of Los Angeles, the Proposer certifies and agrees that all persons employed by such firm, its affiliates, subsidiaries, or holding companies are and will be treated equally by the firm without regard to or because of race, religion, ancestry, national origin, or sex and in compliance with all anti-discrimination laws of the United States of America and the State of California.

CERTIFICATION	YES	NO
1. Proposer has written policy statement prohibiting discrimination in all phases of employment.	()	()
2. Proposer periodically conducts a self-analysis or utilization analysis of its work force.	()	()
3. Proposer has a system for determining if its employment practices are discriminatory against protected groups.	()	()
4. When problem areas are identified in employment practices, Proposer has a system for taking reasonable corrective action to include establishment of goal and/or timetables.	()	()

Signature

Date

Name and Official Title (please print)

00 04 97
COMPLIANCE WITH FAIR CHANCE EMPLOYMENT
HIRING PRACTICES CERTIFICATION

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:	Email address:	
Solicitation/Contract for _____ Services		

PROPOSER/CONTRACTOR CERTIFICATION

The Los Angeles County Board of Supervisors approved a Fair Chance Employment Policy in an effort to remove job barriers for individuals with criminal records. The policy requires businesses that contract with the County to comply with fair chance employment hiring practices set forth in California Government Code Section 12952, Employment Discrimination: Conviction History (California Government Code Section 12952), effective January 1, 2018.

Proposer/Contractor acknowledges and certifies compliance with fair chance employment hiring practices set forth in California Government Code Section 12952 and agrees that Proposer/Contractor and staff performing work under the Contract will be in compliance. Proposer/Contractor further acknowledges that noncompliance with fair chance employment practices set forth in California Government Code Section 12952 may result in rejection of any proposal, or termination of any resultant Contract, at the sole judgment of the County.

I declare under penalty of perjury under the laws of the State of California that the information herein is true and correct and that I am authorized to represent this company.

Print Name:	Title:
Signature:	Date:

SECTION 00 04 98

**ZERO TOLERANCE HUMAN TRAFFICKING
POLICY CERTIFICATION**

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:	Email address:	
Solicitation/Contract for _____ Services		

PROPOSER CERTIFICATION

Los Angeles County has taken significant steps to protect victims of human trafficking by establishing a zero tolerance human trafficking policy that prohibits contractors found to have engaged in human trafficking from receiving contract awards or performing services under a County contract.

Proposer acknowledges and certifies compliance with (Compliance with County's Zero Tolerance Human Trafficking Policy) of the proposed Contract and agrees that proposer or a member of his staff performing work under the proposed Contract will be in compliance. Proposer further acknowledges that noncompliance with the County's Zero Tolerance Human Trafficking Policy may result in rejection of any proposal, or cancellation of any resultant Contract, at the sole judgment of the County.

I declare under penalty of perjury under the laws of the State of California that the information herein is true and correct and that I am authorized to represent this company.

Print Name:	Title:
Signature:	Date:

SECTION 00 04 99

DISALLOWED COST ATTESTATION

Company Name:		
Company Address:		
City:	State:	Zip Code:
Telephone Number:	Email address:	
Solicitation/Contract for _____ Services		

PROPOSER ATTESTATION

If Proposer's compliance with a County contract has been reviewed by the Department of the Auditor-Controller within the last 10 years, Proposer must not have unresolved questioned costs identified by the Auditor-Controller, in an amount over \$100,000.00, that are confirmed to be disallowed costs by the contracting County department, and remain unpaid for six months or more from the date of disallowance, unless such disallowed costs are the subject of current good faith negotiations to resolve the disallowed costs, in the opinion of the County.

Proposer acknowledges and certifies compliance with the above paragraph.

I declare under penalty of perjury under the laws of the State of California that the information herein is true and correct and that I am authorized to represent this company.

Print Name:	Title:
Signature:	Date:

SECTION 00 05 00

AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____ 2XXX,
by and between the COUNTY OF LOS ANGELES, State of California (hereinafter called
the County), and

CONTRACTOR
A California Corporation
ADDRESS
CITY, STATE, ZIP
TELEPHONE

(hereinafter called the Contractor),

WITNESSETH:

1. Contractor's Services

That the Contractor, in consideration of the promises of the County hereinafter set forth, hereby agrees to furnish all tools, equipment, labor, and material necessary to perform and complete in a good and workmanlike manner,

PROJECT NAME
ADDRESS
SPECS NO.

within the time and in accordance with the recommendation of the Director of the Los Angeles County Public Works, dated month-day, 2XXX, Plans and Specifications Number, the Notice Inviting Bids, Notice to Bidders A, etc. (if any), and the lump sum bid of the Contractor, including Additive Alternates 1, all of which are incorporated herein as though fully set forth, and are hereby agreed by the parties to constitute the Contract documents.

2. Consideration

That the County agrees, in consideration of the performance of this Contract, to pay to the Contractor, and the Contractor agrees to accept in full satisfaction for the work done hereunder, a sum of amount in words Dollars (\$ amount: base bid amount minus schedule fee minus extended overhead and minus unit, if applicable) which

Specs. No. 7701

Agreement 00 05 00-1

sum shall be paid to the Contractor at the time and in the manner set forth in the specifications.

3. Extended Overhead Daily Rate

The Contractor's Extended Overhead Daily Rate is \$XXX, as set forth in the Contractor's Form of Bid, Section 00 03 00, which Extended Overhead Daily Rate shall be payable to the Contractor for each day of Compensable Delay to fully compensate the Contractor for any damages resulting from or associated with Compensable Delay, including, but not limited to, home office and field office overhead, as specified in Specification Section 00 01 00, Instructions to Bidders, 1.14c and in accordance with Specification Section 00 07 00, General Conditions, Article 17, Time Extensions and Compensation for Delay.

4. Notice to Employees Regarding the Federal Earned Income Credit

Contractor shall notify its employees, and shall require each subcontractor to notify its employees, that they may be eligible for the Federal Earned Income Credit under the Federal income tax laws. Such notice shall be provided in accordance with the requirement set forth in Internal Revenue Service Notice 1015.

5. County Rights

The County may employ, either during or after performance of this Contract, any right of recovery the County may have against the Contractor by any means it deems appropriate including, but not limited to, set-off, action at law or in equity, withholding, recoupment, or counterclaim. The rights and remedies of the County under this Contract are in addition to any right or remedy provided by California law.

6. Fair Labor Standards Act

Contractor shall comply with all applicable provisions of the Federal Fair Labor Standards Act, and shall indemnify, defend, and hold harmless County, its agents, officers, and employees from any and all liability including, but not limited to, wages, overtime pay, liquidated damages, penalties, court costs, and attorneys' fees arising under any wage and hour law including, but not limited to, the Federal Fair Labor Standards Act for services performed by Contractor's employees for which County may be found jointly or solely liable.

7. Prevailing Wage Requirements

a. Prevailing Wages

The services provided in this Contract constitute "public works" as defined in California Labor Code 1720, and are therefore subject to payment of prevailing wages, compliance monitoring and enforcement by the Department of Industrial Relations (DIR).

The Director of the DIR has established the general prevailing rate of per diem wages for each craft, classification, type of worker, or mechanic needed to execute public works and improvements. The current general prevailing wage rate determinations are available at www.dir.ca.gov/dlsr/pwd/index.htm. The Contractor is required to pay its agents and employees the applicable, current prevailing wage rate and is responsible for selecting the classification of workers required to perform this service.

The Contractor agrees to comply with the provisions of Section 1775 of the California Labor Code relating to the payment of prevailing wages, the utilization of apprentices in accordance to LC 1777.5, and the assessment of penalties determined by the California Labor Commissioner. Pursuant to Section 1773.2 of the California Labor Code, copies of the prevailing rate of per diem wages are on file at the Los Angeles County Public Works, Construction Division, and will be made available for inspection by request to the Contract Administrator. Future effective wage rates will be on file with the Department of Industrial Relations. The new wage rates shall become effective on the day following the expiration date of the current determinations and apply to the Contract in the same manner as if they had been included or referenced in the Contract.

b. Work Records

The Contractor shall comply with the requirements of Section 1812 of the Labor Code. The Contractor shall maintain an accurate written record of all employees working on the project each calendar day. The record shall include each employee's name, Social Security number, job classification, and the actual number of hours worked.

c. Posting of Notices

The Contractor shall comply with the provisions of Section 1773.2 of the Labor Code. The Contractor shall post a copy of the prevailing wage rates at the worksite and comply with applicable law including posting of jobsite notices required by 8 California Code Reg. §16451(d):

"This public works project is subject to monitoring and investigative activities by the Compliance Monitoring Unit (CMU) of the Division of Labor Standards

Enforcement, Department of Industrial Relations, State of California. This Notice is intended to provide information to all workers employed in the execution of the Contract for public work and to all contractors and other persons having access to the jobsite to enable the CMU to ensure compliance with and enforcement of prevailing wage laws on public works projects.

The prevailing wage laws require that all workers be paid at least the minimum hourly wage as determined by the Director of Industrial Relations for the specific classification (or type of work) performed by workers on the project. These rates are listed on a separate jobsite posting of minimum prevailing rates required to be maintained by the public entity, which awarded the public works Contract. Complaints concerning nonpayment of the required minimum wage rates to workers on this project may be filed with the CMU at any office of the Division of Labor Standards Enforcement (DLSE).

Local Office Telephone Number:

*Division of Labor Standards Enforcement Office
320 West Fourth Street, Suite 450
Los Angeles, CA 90013
(213) 620-6330*

Complaints should be filed in writing immediately upon discovery of any violations of the prevailing wage laws due to the short period of time following the completion of the project that the CMU may take legal action against those responsible.

Complaints should contain details about the violations alleged (for example, wrong rate paid, not all hours paid, overtime rate not paid for hours worked in excess of 8 hours per day or 40 hours per week, etc.) as well as the name of the employer, the public entity which awarded the public works Contract, and the location and name of the project.

For general information concerning the prevailing wage laws and how to file a complaint concerning any violation of these prevailing wage laws, you may contact any DLSE office. Complaint forms are also available at the Department of Industrial Relations website found at <http://www.dir.ca.gov/Public-Works/PublicWorks.html>."

d. Certified Payroll Records

The Contractor shall comply with the requirements of Section 1776 of the Labor Code. Contractor and Subcontractors, if any, must furnish certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement) in a format prescribed by the Labor Commissioner.

- e. When requested by the County, electronic certified payroll records must be submitted to the County, through an online system designated by the County.

8. Mental Health Services for Critical Incidents

In the event of a serious accident on the Project site, the Los Angeles County Department of Mental Health (DMH) will, if requested, respond. The response may be within a few hours or as long as a few days after the incident, depending on when the request was made. The services DMH will provide include crisis intervention, normalization of the stress response that survivors may be experiencing, stress management techniques and resources if the stress reactions increase in frequency or intensity. Requests for services may be made by calling the DMH Emergency Outreach Bureau Deputy Director, (213) 738-4924, during normal business hours or the ACCESS Center, (800) 854-7771, evenings, holidays, and weekends.

9. Employment Eligibility Verification

Contractor warrants that it fully complies with all Federal statutes and regulations regarding employment of aliens and others, and that all its employees performing services hereunder meet the citizenship or alien status requirements contained in Federal statutes and regulations. Contractor shall obtain, from all covered employees performing services hereunder, all verifications and other documentation of employment eligibility status required by Federal statutes and regulations as they currently exist and as they may be hereafter amended. Contractor shall retain such documentation for all covered employees for the period prescribed by law. Contractor shall indemnify, defend, and hold harmless County, its officers, and employees from employer sanctions and any other liability which may be assessed against Contractor or County in connection with any alleged violation of Federal statutes or regulations pertaining to the eligibility for employment of persons performing services under this Agreement.

10. Contractor Responsibility and Debarment

- a. A responsible Contractor is a Contractor who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity, and experience to satisfactorily perform the Contract. It is the County's policy to conduct business only with responsible contractors.

- b. The Contractor is hereby notified that, in accordance with Chapter 2.202 of the County Code, if the County acquires information concerning the performance of the Contractor on this or other Contracts which indicates that the Contractor is not responsible, the County may, in addition to other remedies provided in the Contract, debar the Contractor from bidding or proposing on, or being awarded, and/or performing work on County Contracts for a specified period of time, which generally will not exceed five years but may exceed five years or be permanent if warranted by the circumstances, and terminate any or all existing Contracts the Contractor may have with the County.
- c. The County may debar a Contractor if the Board of Supervisors finds, in its discretion, that the Contractor has done any of the following: (1) violated a term of a Contract with the County or a nonprofit corporation created by the County; (2) committed an act or omission which negatively reflects on the Contractor's quality, fitness or capacity to perform a Contract with the County, any other public entity, or a nonprofit corporation created by the County, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty, or (4) made or submitted a false claim against the County or any other public entity.
- d. If there is evidence that the Contractor may be subject to debarment, the Department will notify the Contractor in writing of the evidence which is the basis for the proposed debarment and will advise the Contractor of the scheduled date for a debarment hearing before the Contractor Hearing Board.
- e. The Contractor Hearing Board will conduct a hearing where evidence on the proposed debarment is presented. The Contractor and/or the Contractor's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the Contractor Hearing Board shall prepare a tentative proposed decision, which shall contain a recommendation regarding whether the Contractor should be debarred, and, if so, the appropriate length of time of the debarment. The Contractor and the Department shall be provided an opportunity to object to the tentative proposed decision prior to its presentation to the Board of Supervisors.
- f. After consideration of any objections, or if no objections are submitted, a record of the hearing, the proposed decision and any other recommendation of the Contractor Hearing Board shall be presented to the

Board of Supervisors. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the Hearing Board.

- g. If the Contractor has been debarred for a period longer than five years, that Contractor may, after the debarment has been in effect for at least five years, submit a written request for review of the debarment determination to reduce the period of debarment or terminate the debarment. The County may, in its discretion, reduce the period of debarment or terminate the debarment if it finds that the Contractor has adequately demonstrated one or more of the following: (1) elimination of the grounds for which the debarment was imposed; (2) a bona fide change in ownership or management; (3) material evidence discovered after debarment was imposed; or (4) any other reason that is in the best interests of the County.
- h. The Contractor Hearing Board will consider a request for review of a debarment determination only where (1) the Contractor has been debarred for a period longer than five years; (2) the debarment has been in effect for at least five years; and (3) the request is in writing, states one or more of the grounds for reduction of the debarment period or termination of the debarment and includes supporting documentation. Upon receiving an appropriate request, the Contractor Hearing Board will provide notice of the hearing on the request. At the hearing, the Contractor Hearing Board shall conduct a hearing where evidence on the proposed reduction of debarment period or termination of debarment is presented. This hearing shall be conducted and the request for review decided by the Contractor Hearing Board pursuant to the same procedures as for a debarment hearing. The Contractor Hearing Board's proposed decision shall contain a recommendation on the request to reduce the period of debarment or terminate the debarment. The Contractor Hearing Board shall present its proposed decision and recommendation to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny, or adopt the proposed decision and recommendation of the Contractor Hearing Board.
- i. These terms shall also apply to subcontractors of County Contractors.

11. Compliance with Jury Service Program

This Contract is subject to provisions of the County's ordinance entitled Contractor Employee Jury Service (Jury Service Program) as codified in Sections 2.203.010 through 2.203.090 of the Los Angeles County Code.

- a. Unless Contractor has demonstrated to the County's satisfaction either that

Contractor is not a Contractor as defined under the Jury Service Program (Section 2.203.020 of the County Code) or that Contractor qualifies for an exception to the Jury Service Program (Section 2.203.070 of the County Code), Contractor shall have and adhere to a written policy that provides that its employees shall receive from the Contractor, on an annual basis, no less than five days of regular pay for actual jury service. The policy may provide that Employees deposit any fees received for such jury service with the Contractor or that the Contractor deduct from the employee's regular pay the fees received for jury service.

- b. For purposes of this Section, Contractor means a person, partnership, corporation or other entity which has a Contract with the County or a subcontract with a County contractor and has received or will receive an aggregate sum of \$50,000 or more in any 12-month period under one or more County Contracts or Subcontracts. Employee means any California resident who is a full-time employee of Contractor. Full-time means 40 hours or more worked per week, or a lesser number of hours if: (1) the lesser number is a recognized industry standard as determined by the County, or (2) Contractor has a long-standing practice that defines the lesser number of hours as full-time. Full-time employees providing short-term, temporary services of 90 days or less within a 12-month period are not considered full-time for purposes of the Jury Service Program. If Contractor uses any subcontractor to perform services for the County under the Contract, the subcontractor shall also be subject to the provisions of this Section. The provisions of this Section shall be inserted into any such subcontract Agreement and a copy of the Jury Service Program shall be attached to the Agreement.
- c. If Contractor is not required to comply with the Jury Service Program when the Contract commences, Contractor shall have a continuing obligation to review the applicability of its exception status from the Jury Service Program, and Contractor shall immediately notify County if Contractor at any time either comes within the Jury Service Program's definition of Contractor or if Contractor no longer qualifies for an exception to the Program. In either event, Contractor shall immediately implement a written policy consistent with the Jury Service Program. The County may also require, at any time during the Contract and at its sole discretion, that Contractor demonstrate to the County's satisfaction that Contractor either continues to remain outside the Jury Service Program's definition of Contractor and/or that Contractor continues to qualify for an exception to the Program.
- d. Contractor's violation of this Section of the Contract may constitute a material breach of the Contract. In the event of such material breach, County may, in

its sole discretion, terminate the Contractor and/or bar Contractor from the award of future County Contracts for a period of time consistent with the seriousness of the breach.

12. No Payment for Services Provided Following Expiration/Termination of Agreement

Contractor shall have no claim against County for payment for any money or reimbursement, of any kind whatsoever, for any service provided by Contractor after the expiration or other termination of this Agreement. Should Contractor receive any such payment it shall immediately notify County and shall immediately repay all such funds to County. Payment by County for services rendered after expiration/termination of this Agreement shall not constitute a waiver of County's right to recover such payment from Contractor. This provision shall survive the expiration or other termination of this Agreement.

13. Notice to Employees Regarding the Safely Surrendered Baby Law

- a. The Contractor shall notify and provide to its employees and shall require each subcontractor to notify and provide to its employees, a fact sheet regarding the Safely Surrendered Baby Law, its implementation in the County of Los Angeles, and where and how to safely surrender a baby. The fact sheet is available on the Internet at www.babysafela.org for printing purposes.
- b. The Contractor acknowledges that the County places a high priority on the implementation of the Safely Surrendered Baby Law. The Contractor understands that it is the County's policy to encourage all County Contractors to voluntarily post the County's Safely Surrendered Baby Law in a prominent position at the Contractor's place of business. The Contractor will also encourage its Subcontractors, if any, to post this poster in a prominent position in the Subcontractor's place of business. The County's Department of Children and Family Services will supply the Contractor with the poster to be used.

14. Assignment by Contractor/Mergers or Acquisitions

- a. The Contractor shall notify the County of any pending acquisitions/mergers of its company unless otherwise legally prohibited from doing so. If the Contractor is restricted from legally notifying the County of pending acquisitions/mergers, then it should notify the County of the actual acquisitions/mergers as soon as the law allows and provide to the County the legal framework that restricted it from notifying the County prior to the actual acquisitions/mergers.

b. The Contractor shall not assign, exchange, transfer, or delegate its rights or duties under this Contract, whether in whole or in part, without the prior written consent of County, in its discretion, and any attempted assignment, delegation, or otherwise transfer of its rights or duties, without such consent shall be null and void. For purposes of this sub-paragraph, County consent shall require a written amendment to the Contract, which is formally approved and executed by the parties. Any payments by the County to any approved delegate or assignee on any claim under this Contract shall be deductible, at County's sole discretion, against the claims, which the Contractor may have against the County.

- c. Any assumption, assignment, delegation, or takeover of any of the Contractor's duties, responsibilities, obligations, or performance of same by any person or entity other than the Contractor, whether through assignment, subcontract, delegation, merger, buyout, or any other mechanism, with or without consideration for any reason whatsoever without County's express prior written approval, shall be a material breach of the Contract which may result in the termination of this Contract. In the event of such termination, County shall be entitled to pursue the same remedies against Contractor as it could pursue in the event of default by Contractor.

15. Contractor's Warranty of Compliance with County's Defaulted Property Tax Reduction Program

Contractor acknowledges that County has established a goal of ensuring that all individuals and businesses that benefit financially from County through contract are current in paying their property tax obligations (secured and unsecured roll) in order to mitigate the economic burden otherwise imposed upon County and its taxpayers.

Unless contractor qualifies for an exemption or exclusion, contractor warrants and certifies that to the best of its knowledge it is now in compliance, and during the term of this contract will maintain compliance, with Los Angeles County Code Chapter. 2.206.

16. Termination for Breach of Warranty to Maintain Compliance with County's Defaulted Property Tax Reduction Program

Failure of contractor to maintain compliance with the requirements set forth in Article X "Contractor's Warranty of Compliance with County's Defaulted Property Tax Reduction Program" shall constitute default under this contract. Without limiting the rights and remedies available to County under any other provision of this contract, failure of contractor to cure such default within 10 days of notice shall be grounds upon which County may terminate this contract and/or pursue debarment of contractor, pursuant to County Code Chapter 2.206.

17. Time Off for Voting

The Contractor shall notify its employees and shall require each subcontractor to notify and provide to its employees, information regarding the time off for voting law (Elections Code Section 14000). Not less than 10 days before every statewide election, every Contractor and Subcontractors shall keep posted conspicuously at the place of work, if practicable, or elsewhere where it can be seen as employees come or go to their place of work, a notice setting forth the provisions of Section 14000.

18. Contractor CARD Track/Monitoring Database

The County maintains the Contractor Alert Reporting Database (CARD), which is used to track/monitor poorly performing contractors. When a County department identifies a significant performance/non-compliance issue(s) with a contractor, the department will provide notice to the contractor and will give the contractor an opportunity to correct the issue(s). If the contractor does not take any appropriate steps to correct the issue(s), the County department will enter the contractor, along with any other relevant information pertaining to the contractor's performance issue(s), into CARD.

The information entered into CARD can be accessed by all County departments, and will be used, along with any other relevant information not included in CARD, in determining bidder responsibility. If a department reviews this information and determines that a finding of non-responsibility should be pursued, the department will adhere to the guidelines specified in the Los Angeles County Code Chapter 2.202, and the County's implementation Procedures for Determinations of Contractor Non-Responsibility and Contractor Debarment.

The County maintains databases that track/monitor contractor performance history. Information entered into such databases may be used for a variety of purposes, including determining whether a bidder is responsible for the purposes of a future County contract.

19. Contractor Independence/Prohibition from Participation in Future Solicitation(s)

The County Board of Supervisors has adopted a countywide policy that prohibits any person, or any firm [collectively "firm"] or any subsidiary of a firm from submitting a bid or proposal in any County solicitation process where the person or firm, assisted in the development of the solicitation document(s).

A Proposer, or a Contractor or its subsidiary or Subcontractor ("Proposer/Contractor"), is prohibited from submitting a bid or proposal in a County solicitation if the Proposer/Contractor has provided advice or consultation for the solicitation. A Proposer/Contractor is also prohibited from submitting a bid or proposal in a County solicitation if the Proposer/Contractor has developed or prepared any of the solicitation materials on behalf of the County. A violation of this provision shall result in the disqualification of the Contractor/Proposer from participation in the County solicitation or the termination or cancellation of any resultant County Contract. This provision shall survive the expiration, or other termination of this Agreement.

20. Background and Security Investigations

- 20.1 Each of Contractor's staff performing services under this Contract, who is in a designated sensitive position, as determined by County in County's sole discretion, shall undergo and pass a background investigation to the satisfaction of County as a condition of beginning and continuing to perform services under this Contract. Such background investigation must be obtained through fingerprints submitted to the California Department of Justice to include State, local, and federal-level review, which may include, but shall not be limited to, criminal conviction information. The fees associated with the background investigation shall be at the expense of the Contractor, regardless of whether the member of Contractor's staff passes or fails the background investigation.
- 20.2 If a member of Contractor's staff does not pass the background investigation, County may request that the member of Contractor's staff be removed immediately from performing services under the Contract. Contractor shall comply with County's request at any time during the term of the Contract. County will not provide to Contractor or to Contractor's staff any information obtained through the County's background investigation.
- 20.3 County, in its sole discretion, may immediately deny or terminate facility access to any member of Contractor's staff that does not pass such investigation to the satisfaction of the County or whose background or conduct is incompatible with County facility access.
- 20.4 Disqualification of any member of Contractor's staff pursuant to this Paragraph shall not relieve Contractor of its obligation to complete all work in accordance with the terms and conditions of this Contract.

21. Local Small Business Enterprise/Social Enterprise/Disabled Veterans Business Enterprise Utilization

Local Small Business Enterprise means a business that is certified by the County of Los Angeles as a Local Small Business Enterprise (Local SBE), consistent with Chapter 2.204 of the Los Angeles County Code.

21.1 When requested by the County, the contractor shall provide to the County via methods specified by the County, such as submission of electronic live (or dynamic) data on invoices for the prime and all Subcontractors using County-designated third party software system or to a County approved website, or other means of submitting expenditure information on Subcontractors, including but not limited to the following information: the name, business address, California Contractor License number and telephone number/email address of each subcontractor who will perform work or labor for the contractor on the Project in an amount in excess of one-half of 1 percent of the Contractor's total bid. In addition, the Contractor shall be required to provide each of the specified Subcontractors' Local SBE status (i.e., whether any of the listed Subcontractors are Local SBE's), Social Enterprise status, and Disabled Veterans Business Enterprise status and the proposed monetary amount of the work the subcontractor will perform on the Project. In addition, at the time of submittal of the final invoice, the Contractor shall indicate, via methods specified by the County, the actual dollar amounts paid to each listed Subcontractor who performed work on the project.

21.2 Contractor's failure to comply with the provisions of this Article is a material breach of the Agreement. The parties agree that it will be impracticable or extremely difficult to fix the extent of actual damages resulting from the failure to the Contractor to comply with this Article. The parties agree that under the current circumstances a reasonable estimate of such damages is specified in the Schedule for Liquidated Damages for Local Small Business Enterprise Utilization hereunder, and that the Contractor shall be liable to the County for said amounts.

If in the judgment of the Director, or his/her designee, the Contractor is deemed to be in non-compliance with the terms and obligations assumed hereby, the Director or his/her designee, at his/her option, in addition to, or in lieu of, other remedies provided herein in this Agreement, may deduct and withhold liquidated damages from County's final payment to the Contractor as follows:

SCHEDULE FOR LIQUIDATED DAMAGES FOR LOCAL SMALL BUSINESS
ENTERPRISE/SOCIAL ENTERPRISE/DISABLED VETERANS BUSINESS
ENTERPRISE UTILIZATION

<u>Final Invoice Price</u>	<u>Liquidated Damages</u>
Up to \$100,000	\$50.00 plus 0.1% of contract amount
\$100,001 to \$500,000	\$150.00 plus 0.07% of all over 100,000
Over \$500,000	\$430.00 plus 0.05% of all over \$500,000

22. Compliance with County's Zero Tolerance Human Trafficking

Contractor acknowledges that the County has established a Zero Tolerance Human Trafficking Policy prohibiting Contractors from engaging in human trafficking.

If a Contractor or member of Contractor's staff is convicted of a human trafficking offense, the County shall require that the Contractor or member of Contractor's staff be removed immediately from performing services under the Contract. County will not be under any obligation to disclose confidential information regarding the offenses other than those required by law.

Disqualification of any member of Contractor's staff pursuant to this paragraph shall not relieve Contractor of its obligation to complete all work in accordance with the terms and conditions of this Contract.

23. Claims

Notwithstanding Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, Section 9204 of the Public Contract Code shall apply to any claim by the Contractor in connection with the Project.

- a. Upon receipt of a claim pursuant to Section 9204 of the Public Contract Code, the County will conduct a reasonable review of the claim and, within a period not to exceed 45 Days, provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the Contractor and the County may, by mutual agreement, extend the aforementioned time period.
- b. The Contractor shall furnish reasonable documentation to support the claim.
- c. If Board approval is needed to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the Board does not meet within the 45 Days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the County will have up to 3 Days

following the next duly publicly noticed meeting of the Board after the 45-Day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

- d. Any payment due on an undisputed portion of the claim will be processed and made within 60 Days after the County issues its written statement. If the County fails to issue a written statement, paragraph (j) shall apply.
- e. If the Contractor disputes the County's written response, or if the County fails to respond to a claim issued pursuant to Section 9204 within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the County will schedule a meet and confer conference within 30 Days for settlement of the dispute.
- f. Within 10 business days (Monday-Thursday) following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the County will provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim will be processed and made within 60 Days after the County issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the County and the Contractor sharing the associated costs equally. The County and the Contractor shall mutually agree to a mediator within 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. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside those established in Section 9204.
- g. Mediation shall include any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in Section 9204.
- h. Unless otherwise agreed to by the County and the Contractor in writing, the mediation conducted pursuant to Section 9204 shall excuse any further

obligation under Section 20104.4 to mediate after litigation has been commenced.

- i. Section 9204 does not preclude the County from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under Section 9204 does not resolve the parties' dispute.
- j. Failure by the County to respond to a claim from the Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of Section 9204 shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the County's failure to have responded to a claim, or its failure to otherwise meet the time requirements of Section 9204, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.
- k. Amounts not paid in a timely manner as required by Section 9204 will bear interest at 7 percent per annum.
- l. If a Subcontractor or a lower tier Subcontractor lacks legal standing to assert a claim against the County because privity of the Contract does not exist, 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 its 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 by 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. Within 45 Days of receipt of this written request, the Contractor shall notify the Subcontractor in writing as to whether the Contractor presented the claim to the County and, if the original Contractor did not present the claim, provide the Subcontractor with a statement of the reasons for not having done so.
- m. A waiver of the rights granted by Section 9204 is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the Contractor and the County may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) the County may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of Section 9204, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in Section 9204.

24. Compliance with Fair Chance Employment Practices

Contractor, and its subcontractors, must comply with fair chance employment hiring practices set forth in California Government Code Section 12952. Contractor's violation of this paragraph of the Contract may constitute a material breach of the Contract. In the event of such material breach, County may, in its sole discretion, terminate the Contract.

25. Default Method of Payment: Direct Deposit or Electronic Funds Transfer

25.1 The County, at its sole discretion, has determined that the most efficient and secure default form of payment for goods and/or services provided under an agreement/ contract with the County shall be Electronic Funds Transfer (EFT) or direct deposit, unless an alternative method of payment is deemed appropriate by the Auditor-Controller (A-C).

25.2 The Contractor shall submit a direct deposit authorization request via the website <https://directdeposit.lacounty.gov> with banking and vendor information, and any other information that the A-C determines is reasonably necessary to process the payment and comply with all accounting, record keeping, and tax reporting requirements.

25.3 Any provision of law, grant, or funding agreement requiring a specific form or method of payment other than EFT or direct deposit shall supersede this requirement with respect to those payments.

25.4 At any time during the duration of the agreement/contract, a Contractor may submit a written request for an exemption to this requirement. Such request must be based on specific legal, business or operational needs and explain why the payment method designated by the A-C is not feasible and an alternative is necessary. The A-C, in consultation with the contracting department(s), shall decide whether to approve exemption requests.

26. Disallowed Cost

If Proposer's compliance with a County contract has been reviewed by the A-C within the last 10 years, Proposer must not have unresolved questioned costs identified by the A-C, in an amount over \$100,000.00, that are confirmed to be disallowed costs by the contracting County department, and remain unpaid for six months or more from the date of disallowance, unless such disallowed costs are the subject of current good faith negotiations to resolve the disallowed costs, in the opinion of the County.

27. Compliance with the County Policy of Equity

The consultant acknowledges that the County takes its commitment to preserving the dignity and professionalism of the workplace very seriously, as set forth in the County Policy of Equity (CPOE) (<https://ceop.lacounty.gov/>). The contractor further acknowledges that the County strives to provide a workplace free from discrimination, harassment, retaliation and inappropriate conduct based on a protected characteristic, and which may violate the CPOE. The contractor, its employees and subcontractors acknowledge and certify receipt and understanding of the CPOE. Failure of the Contractor, its employees or its Subcontractors to uphold the County's expectations of a workplace free from harassment and discrimination, including inappropriate conduct based on a protected characteristic, may subject the contractor to termination of contractual agreements as well as civil liability.

28. Integrated Pest Management Program Compliance

Contractor acknowledges that County has established an Integrated Pest Management Program (the Program) which aims to reduce or eliminate pollutants moved into surface water through storm water management systems and facilities. Contractor certifies compliance on Integrated Pest Management Program Compliance Certification in Required Forms, that contractor has reviewed, understands, and will adhere to the County's IPM Program requirements as set forth in Integrated Pest Management Program Compliance and at: www.lacountyipm.org

Contractor must ensure and certify that its employees who apply pesticides on County owned or maintained property are appropriately trained. The training, which must be conducted on an annual basis, but no later than June 30th of each calendar year, must meet the County's minimum requirements under the Program.

Employee training may be self-certified by Contractors, provided the County has the ability to audit the training, and must include, at a minimum, the following:

- The potential for pesticide-related surface water toxicity;
- Proper use, handling, and disposal of pesticides;
- Least toxic methods of pest prevention and control, including IPM; and
- Reduction of pesticide use.

All users of commercial pesticides are required by State law to provide a monthly pesticide report to the Los Angeles County Department of Agricultural Commissioner/ Weights and Measures (ACWM). In addition to the

mandatory monthly reporting requirement, Contractor shall provide to the Department, with a copy to the ACWM, an annual summary of the pesticides used outdoors on County-owned or maintained property by Fiscal Year (July 1 to June 30). For each pesticide, the summary shall include all of the following:

- Product trade name
- Active ingredient(s)
- EPA Registration Number
- Total amount used

The units reported shall be appropriate to the product (gallons, ounces, pounds, etc.).

29. Termination for Improper Consideration

County may, by written notice to Contractor, immediately terminate the right of Contractor to proceed under this Agreement if it is found that consideration, in any form, was offered or given by Contractor, either directly or through an intermediary, to any County officer, employee, or agent with the intent of securing the Agreement or securing favorable treatment with respect to the award, amendment, or extension of the Agreement or the making of any determinations with respect to Contractor's performance pursuant to the agreement. In the event of such termination, County shall be entitled to pursue the same remedies against Contractor as it could pursue in the event of default by Contractor.

Contractor shall immediately report any attempt by a County officer or employee to solicit such improper consideration. The report shall be made either to County manager charged with the supervision of the employee or to County A-C's Employee Fraud Hotline at (213) 974-0914 or (800) 544-6861.

Among other items, such improper consideration may take the form of cash, discounts, service, the provision of travel or entertainment, or tangible gifts.

30. Gratuities

Contractor is advised that it is improper for any County officer, employee, or agent to solicit consideration, in any form, from Contractor with the implication, suggestion, or statement that Contractor's provision of the consideration, or failure to provide consideration, may cause favorable or unfavorable treatment, respectively, for the Contractor relating to the amendment or extension of the Contract or the making of any determinations with respect to Contractor's performance under this Contract.

A Contractor shall not offer or give, either directly or through an intermediary, such

improper consideration, in any form, to a County officer, employee, or agent for the purpose of securing favorable treatment as described herein.

A Contractor shall immediately report any attempt by a County officer, employee, or agent to solicit such improper consideration. The report shall be made either to the County manager charged with the supervision of the employee or to the County Auditor-Controller's Employee Fraud Hotline at (800) 544-6861.

Among other items, such improper consideration may take the form of cash; discounts; services; and the provision of travel, entertainment, or tangible gifts.

Note that Contractor's failure to adhere to this requirement could subject this Contract to Termination for Improper Consideration paragraph in this Agreement.

31. Facsimile/Electronic Representations

The County and the Contractor hereby agree to regard facsimile/electronic representations of original signatures of authorized officers of each party, when appearing in appropriate places on the Agreement, Change Orders and amendments prepared, and received via communications facilities, as legally sufficient evidence that such original signatures have been affixed to amendments to this Contract, such that the parties need not follow up facsimile/electronic transmissions of such documents with subsequent (non-facsimile/electronic) transmission of "original" versions of such documents. Electronic signatures include facsimile or e-mail electronic signatures. Each executed counterpart shall be deemed an original. All counterparts, taken together, constitute the executed Agreement. The parties hereby acknowledge and agree that electronic records and electronic signatures, as well as facsimile signatures, used in connection with the execution of this Agreement and electronic signatures, facsimile signatures or signatures transmitted by electronic mail in so-called pdf format shall be legal and binding and shall have the same full force and effect as if a paper original of this Agreement had been delivered had been signed using a handwritten signature. Contractor and County (i) agree that an electronic signature, whether digital or encrypted, of a party to this Agreement is intended to authenticate this writing and to have the same force and effect as a manual signature, (ii) intend to be bound by the signatures (whether original, faxed or electronic) on any document sent or delivered by facsimile or, electronic mail, or other electronic means, (iii) are aware that the other party will rely on such signatures, and (iv) hereby waive any defenses to the enforcement of the terms of this Agreement based on the foregoing forms of signature. If this Agreement has been executed by electronic signature, all parties executing this document are expressly consenting under the United States Federal Electronic Signatures in Global and National Commerce Act of 2000 ("E-SIGN") and California Uniform Electronic Transactions Act ("UETA")(Cal. Civ. Code § 1633.1,

et seq.), that a signature by fax, e-mail or other electronic means shall constitute an Electronic Signature to an Electronic Record under both E-SIGN and UETA with respect to this specific transaction.

32. Advertising and Other External Communications About the Project

Consultant/Contractor shall obtain the County's prior written approval before disclosing or communicating any information concerning the award of the contract, the progress of the work, or the completion of the work, to any non-party, including but not limited to outside media and news organizations. This requirement includes, but is not limited to: (1) a Consultant/Contractor's, application for an award or any other recognition of the project; and (2) any advertising or promotion of the project and/or the Consultant/Contractor's role on the project. The County retains the sole discretion as to the release of such information, including the right to deny the request for disclosure, the right to direct the timing of the disclosure, and/or the right to direct Consultant/Contractor to make revisions to the information prior to disclosure.

33. COVID-19 Requirement for County Contractor Personnel

When applicable and required by the County, the Contractor shall comply with all other applicable local, departmental, State, and federal laws, regulations, and requirements for COVID-19.

35. Campaign Contribution Prohibition Following Final Decision in Contract Proceeding

Pursuant to Government Code Section 84308, Contractor and its Subcontractors, are prohibited from making a contribution of more than \$250 to a County officer for twelve (12) months after the date of the final decision in the proceeding involving this Contract. Failure to comply with the provisions of Government Code Section 84308 and of this paragraph, may be a material breach of this Contract as determined in the sole discretion of the County.

IN WITNESS WHEREOF, the County has, by order of its Board of Supervisors, caused these presents to be subscribed by the Director of the Los Angeles County Public Works, and the Contractor has hereunto subscribed its corporate name and affixed its corporate seal by its duly authorized officers the day, month, and year herein first above written.

COUNTY OF LOS ANGELES

NAME OF CONTRACTOR

By _____
Deputy Director
Los Angeles County Public Works

By _____
President

Type/Print Name

By _____
Secretary

Type/Print Name

CLASSIFICATION LICENSE NO.
Contractor

APPROVED AS TO FORM:

DAWYN R. HARRISON
County Counsel

By _____
Senior Deputy County Counsel

Type/Print Name

SECTION 00 05 00

BOND FOR FAITHFUL PERFORMANCE

KNOW ALL PERSONS BY THESE PRESENTS:

That we, Contractor, a California Corporation, as principal, and

(name and address)

as surety, are held and firmly bound unto the County of Los Angeles, State of California, in the sum of AMOUNT IN WORDS DOLLARS (\$ amount), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that whereas said principal has been awarded and is about to enter into the annexed Contract with the County of Los Angeles, State of California, for

PROJECT
PLACE
SPECS.

and is required by said County to give this bond in connection with the execution of said Contract.

NOW, THEREFORE, if the said principal shall well and truly do and perform all of the covenants and obligations of said Contract on its part to be done and performed at the times and in the manner specified therein, then this obligation shall be null and void, otherwise it shall be and remain in full force and effect. No premature payment by said County to said principal shall exonerate any surety unless the Board of Supervisors of said County shall have actual notice that such payment is premature at the time it is ordered by said Board, and then only to the extent that such payment shall result in loss to such surety, but in no event more than the amount of such premature payment. The surety hereby waives notice of any change, including changes of time, to said Contract or related subcontractors, purchase orders and other obligations.

BOND FOR FAITHFUL PERFORMANCE
Page 2

WITNESS our hands this _____ day of _____, 2XXX.

NAME OF Contractor

President

Type/Print Name

Secretary

Type/Print Name

APPROVED AS TO FORM:

DAWYN R. HARRISON
County Counsel

Surety

By _____
Senior Deputy County Counsel

Attorney-in-Fact

Type/Print Name

Type/Print Name

SECTION 00 05 00

PAYMENT BOND FOR LABOR AND MATERIALS

KNOW ALL PERSONS BY THESE PRESENTS:

That we, Contractor, a California corporation, as principal, and

(name and address)

as surety, are held firmly bound unto the County of Los Angeles, State of California, hereinafter referred to as the County, in the sum of AMOUNT IN WORDS DOLLARS (\$XXXXXXX) lawful money of the United States, for the payment of which sum, well and truly made, we bind ourselves, jointly and severally, firmly by these presents.

The condition of the above obligation is such that, whereas said principal has been awarded and is about to enter into a written Contract with the County for:

PROJECT
PLACE
SPECS. NO. XXXX

which is hereto attached, made a part hereof, and to which reference is hereby made for all, and is required by said County to give this bond in connection with the execution of said Contract.

NOW, THEREFORE, if said principal, as contractor in said Contract, or principal's Subcontractor, fails to pay any of the persons referred to in Section 9100 of the Civil Code of the State of California for labor performed, skills, or other necessary services bestowed, site improvement made, equipment leased, or appliances, equipment, implements, machinery, materials, power, provender, provisions, teams, or trucks furnished or used in, upon, or about the performance of this work contracted to be done, or for amounts due under the Unemployment Insurance Code with respect to work or labor performed by such claimant, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Contractor and Subcontractors pursuant to Section 13020 of the Unemployment Insurance Code, with Respect to such work and labor, said surety shall pay for the same in an amount not exceeding the sum specified above, and if suit is brought upon this bond, a reasonable attorney's fee to be fixed by the court. This bond is executed pursuant to Chapter 7 of Division 3, Part 4, Title 15 of the Civil Code of the State of California, and shall inure to the benefit of any of the persons referred to in said Civil Code Section 9100, as it now exists or

Specs. No. 7701

Agreement 00 05 00-25

PAYMENT FOR BOND FOR LABOR AND MATERIALS

Page 2

may hereafter be amended, so as to give a right of action to such persons or their assigns in any suit brought upon this bond. No premature payment by said County to said principal shall exonerate any surety unless the Board of Supervisors of said County shall have actual notice that such payment is premature at the time and it is ordered by said Board, and then only to the extent that such payment shall result in loss to such surety, but in no event more than the amount of such premature payment.

It is agreed that any alterations in the work to be done or increase or decrease of the materials to be furnished, which may be made pursuant to the terms of said Contract shall not in any way release either the principal or surety hereunder, nor shall any extensions of time granted under the provisions of said Contract release either the principal or surety, and notice of such alterations or extensions of this Contract is hereby waived by the surety.

WITNESS our hands this _____ day of _____, 2XXX

NAME OF Contractor

President

Type/Print Name

Secretary

Type/Print Name

APPROVED AS TO FORM:

DAWYN R. HARRISON
County Counsel

Surety

By _____
Senior Deputy County Counsel

Attorney-in-Fact

Type/Print Name

Type/Print Name

Specs. No. 7701

Agreement 00 05 00-26

CERTIFICATION

SUBJECT: PROJECT
ADDRESS
CITY, STATE
SPECS. NO.

I am aware of the provisions of Section 3700 of the 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 that Code, and I will comply with such provisions before commencing the performance of the work of this Contract.

NAME OF Contractor

Contractor's Signature

Print Name

Date

STATEMENT OF UNDERSTANDING

SUBJECT: PROJECT
ADDRESS
CITY, STATE
SPECS.

As the Contractor of the project, I have reviewed the Best Management Practices Handbooks, California Storm Water Quality Association, Menlo Park, CA and have proposed the implementation of the Best Management Practices (BMPs) applicable to effectively minimize the negative impacts of this Project's construction activities on the surrounding water quality. The selected BMPs will be installed, monitored, and maintained to ensure their effectiveness. The BMPs that I have not chosen for implementation are redundant or deemed not applicable to the proposed construction activities. If at any time, site conditions and/or the County official warrant re-evaluation and revisions of the chosen BMPs, the appropriate changes will be made without unnecessary delay. I am aware that failure to properly implement and maintain the BMPs necessary to prevent the discharge of pollutants from this project could result in significant penalties and/or delays.

NAME OF Contractor

Signature

Print Name

Date

SECTION 00 06 10
BOND FOR FAITHFUL PERFORMANCE

KNOW ALL PERSONS BY THESE PRESENTS:

That we, CONTRACTOR, a California Corporation, as principal, and _____, as surety, are held and firmly bound unto the COUNTY OF LOS ANGELES, State of California, in the sum of XXX DOLLARS (\$), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that whereas said principal has been awarded and is about to enter into the annexed contract with the County of Los Angeles, State of California, for

PROJECT
PLACE
SPECS. NO.

and is required by said County to give this bond in connection with the execution of said contract;

NOW, THEREFORE, if the said principal shall well and truly do and perform all of the covenants and obligations of said contract on its part to be done and performed at the times and in the manner specified therein, then this obligation shall be null and void, otherwise it shall be and remain in full force and effect. No premature payment by said County to said principal shall exonerate any surety unless the Board of Supervisors of said County shall have actual notice that such payment is premature at the time it is ordered by said Board, and then only to the extent that such payment shall result in loss to such surety, but in no event more than the amount of such premature payment. The surety hereby waives notice of any change, including changes of time, to said contract or related subcontracts, purchase orders and other obligations. The surety hereby waives notice of any change, including changes of time, to said contract or related subcontractors, purchase orders and other obligations.

WITNESS our hands this _____ day of _____, 20

CONTRACTOR

President

APPROVED AS TO FORM:

DAWYN R. HARRISON
County Counsel

Secretary

Surety

By _____
Senior Deputy County Counsel

Attorney-in-Fact

SECTION 00 06 20
PAYMENT BOND FOR LABOR AND MATERIALS

KNOW ALL PERSONS BY THESE PRESENTS:

That we, CONTRACTOR, a California corporation, as principal, and _____ as surety, are held firmly bound unto the COUNTY OF LOS ANGELES, State of California, hereinafter referred to as the County, in the sum of DOLLARS (\$) lawful money of the United States, for the payment of which sum, well and truly made, we bind ourselves, jointly and severally, firmly by these presents.

The condition of the above obligation is such that, whereas said principal has been awarded and is about to enter into a written contract with the County for:

NAME OF PROJECT
PLACE
SPECS. NO.

which is hereto attached, made a part hereof, and to which reference is hereby made for all particulars, and is required by said County to give this bond in connection with the execution of said contract.

NOW, THEREFORE, if said principal, as contractor in said contract, or principal's subcontractor, fails to pay any of the persons referred to in Section 9100 of the Civil Code of the State of California for labor performed, skills or other necessary services bestowed, site improvement made, equipment leased, or appliances, equipment, implements, machinery, materials, power, provender, provisions, teams, or trucks furnished or used in, upon, or about the performance of this work contracted to be done, or for amounts due under the Unemployment Insurance Code with respect to work or labor performed by such claimant, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code, with respect to such work and labor, said surety shall pay for the same in an amount not exceeding the sum specified above, and if suit is brought upon this bond, a reasonable attorney's fee to be fixed by the court. This bond is executed pursuant to Chapter 7 of Division 3, Part 4, Title 15 of the Civil Code of the State of California, and shall inure to the benefit of any of the persons referred to in said Civil Code Section 9100, as it now exists or may hereafter be amended, so as to give a right of action to such persons or their assigns in any suit brought upon this bond. No premature payment by said County to said principal shall exonerate any surety unless the Board of Supervisors of said County shall have actual notice that such payment is premature at the time and it is ordered by said Board, and then only to the extent that such payment shall result in loss to such surety, but in no event more than the amount of such premature payment.

It is agreed, that any alterations in the work to be done, or increase or decrease of the materials to be furnished, which may be made pursuant to the terms of said contract shall not in any way release either the principal or surety hereunder, nor shall any extensions of time granted under the provisions of said contract release either the principal or surety, and notice of such alterations or extensions of this contract is hereby waived by the surety.

WITNESS our hands this _____ day of _____, 20

CONTRACTOR

President

APPROVED AS TO FORM:

Secretary

DAWYN R. HARRISON
County Counsel

Surety

By _____
Senior Deputy County Counsel

Attorney-in-Fact

SECTION 00 07 00

GENERAL CONDITIONS

A. Bid Form, Equals, Use of Drawings & Manual

1. Bid Forms
2. Equals
3. Additional Sets of Drawings and Project Manual

B. Drawings & Specifications

4. Drawings and Specifications
5. Contract Documents and Order of Precedence
6. Interpretation of Drawings and Specifications
7. Project Manual
8. Standard Specifications
9. Substitutions Required Because of Federal Government Restrictions or Lack of Product Availability
10. As-Built Drawings
11. Reference Materials

C. Schedule, Changes in Work

12. Construction Schedule
13. County's Right to Delay Commencement of the Work
14. Updated Schedules
15. Changes in the Work
16. Provisions for Extras
17. Time Extensions and Compensation for Delay

D. Inspection/Permits, Tests, Quality, Warranties

18. Observation
19. Permits, Licenses, and Inspections
20. Tests

E. Substantial Completion, Occupancy by County

21. Substantial Completion
22. Occupancy by County

F. Employment Requirements

23. Workers
24. Hours of Work
25. Saturday, Sunday, Holidays, and Overtime Work
26. Prevailing Wage Scale
27. Employment of Indentured Apprentices
28. Affirmative Action Plan for Equal Employment Opportunity

G. Contractor Responsibilities, Restrictions

- 29. Payroll Records
- 30. Quality of Work and Material
- 31. Responsibility of Contractor and of Contractor's Representative on the Work
- 32. Repairing Damaged Work
- 33. List of Subcontractors and Subletting Work
- 34. Advertising
- 35. Certificate as to Compliance with Certain Regulations
- 36. Coordination with Others and Other Contracts
- 37. Contractor's Construction Equipment
- 38. Contractor Personnel
- 39. Audits and Records
- 40. Warranty and Corrections to Work
- 41. Hazardous Material
- 42. Contractor Safety Requirements

H. Indemnification and Insurance

- 43. Indemnification
- 44. General Insurance Requirements
- 45. Insurance Coverage Requirements--Types and Limits
- 46. Not used.
- 47. Not used.

I. Legal/Other

- 48. Assignment
- 49. Patents
- 50. Suspension and/or Termination of Work and/or Contract
- 51. Contractor's Warranty of Adherence to County's Child Support Compliance Program
- 52. Contractor's Acknowledgment of County's Commitment to Child Support Enforcement
- 53. Limitation of Liability
- 54. Forum Selection
- 55. Waiver
- 56. Prior Agreements
- 57. Progress Payments
- 58. Acceptance of Final Payment as Release
- 59. Substitution of Securities for Retention
- 60. Resolution of Construction Claims
- 61. Conflict of Interest
- 62. Anti-Trust Claims
- 63. County's Quality Assurance Plan
- 64. Laws, Codes and Regulations to Be Observed

SECTION 00 07 00

GENERAL CONDITIONS

1. **BID FORMS:**

One copy of the Bid Forms accompany this Project Manual for Bidder's use.

Should these specifications be issued without the Bid Forms, or should the copy be lost or damaged, the Bidder must notify the Department of Public Works, in order that he/she may receive the forms or he/she may copy the forms bound into the Project Manual. All bids must be submitted on these forms or a facsimile thereof.

The Bidder shall not attach his bid to the returned Project Manual, nor use the Bid Forms, which are bound therein.

2. **EQUALS:**

- A. Except as may be provided in the Proprietary Specification Section of these General Conditions, whenever any material, product, thing or service is specified or indicated in the Bid Documents by brand, trade, patent or proprietary name and/or by the name of the manufacturer, the item so specified or indicated shall be deemed to be followed by the words "or equal."
- B. While preparing the bid, the Bidder may, at its own risk, submit an item not specified in the Bid Documents as an "or equal" for consideration by the County. Failure to do so within the time frame described in Subparagraph D below shall bar the Bidder from proposing or substituting an "or equal" item for an item specified in the Bid Documents.
- C. If the Bidder includes an "or equal" item with the bid, the Bidder must submit sufficient data to the County to substantiate the specific characteristics and qualities which make the "or equal" item the equivalent in all respects of the item specified in the Bid Documents as described in Subparagraph D below. The Bidder shall furnish such substantiating data or arrange for any necessary tests to verify the equivalent qualities of the "or equal" item at the Bidder's sole expense.
- D. The first, second and third apparent low bidder will have two (2) calendar days after the bid opening to submit their list of Equals (Section 00 04 40)

and ten (10) calendar days after the bid opening to submit all substantiating data and test results. No list of Equals will be accepted after the close of business two (2) calendar days after bids are opened. Likewise, no substantiating data and test results will be accepted after the close of business ten (10) calendar days after bids are opened.

- E. The County, in its sole discretion, shall determine whether the substantiating data demonstrates that an "or equal" item is equal in all respects to the item specified in the Bid Documents. If the County determines that the "or equal" item has not been substantiated to be equal in all respects, the item specified in the Bid Documents shall be furnished and/or installed by Contractor without modification of the bid amount or Contract Documents.
- F. The Contract Time for completion of the Work specified in the Contract Documents shall not be affected by any circumstances whatsoever arising from the provisions of this article.
- G. The Contract Documents, Drawings, and Specifications have been prepared to complement and accommodate certain specified equipment, products, or systems and any modifications, adjustment, or redesign required to assimilate any County approved substitution or "or equal" equipment, products, or systems shall be at the Contractor's expense. Contractor shall provide a complete and workable application and shall satisfy design criteria and aesthetic values to the sole satisfaction of the County.

3. ADDITIONAL SETS OF DRAWINGS AND PROJECT MANUAL:

Upon award of contract, the Contractor will be furnished with eight (8) full-size sets of Drawings. Project Manuals will be issued with each set of Drawings for construction use.

4. DRAWINGS AND SPECIFICATIONS:

Specifications are intended to establish the standards for quality, performance, and technical requirements for all labor, workmanship, material, methods, and equipment necessary to complete the Work shown or reasonably implied on the Drawings and Specifications. The Drawings are intended to establish the scope, arrangement, graphic detail, and to illustrate the contract requirements. The Drawings and Specifications are intended to compliment and supplement one another, and any part of the Work that may be mentioned or indicated in the one and not represented in the other shall be done the same as if it had been mentioned or represented in both. Work, materials, or equipment of a minor nature which may

not be specifically mentioned in the specifications or indicated on the Drawings, but which may be reasonably assumed as necessary for the completeness of the Work, shall be performed and or supplied by the Contractor the same as if it were shown on the Drawings or described in the Specifications. In case of discrepancy either in the figures, on the drawings, or in the specifications, the matter shall be promptly submitted to the Director, or the Director's representative, who shall promptly make a determination in writing.

5. CONTRACT DOCUMENTS AND ORDER OF PRECEDENCE:

- A. In the event that any provision(s) in any component part of the Contract Documents conflicts with any provision(s) of any other component part, the following order of precedence among the Contract Documents' component parts shall govern:
 - 1. Written Amendments and Change Orders to the Contract in reverse chronological order
 - 2. Addenda and Notices to Bidders in reverse chronological order
 - 3. County-Contractor Agreement
 - 4. Project Manual and Drawings
 - 5. Performance Bond
 - 6. Labor and Material Payment Bond
- B. In the event there is a conflict between or among any provisions within one of the component parts of the Contract Documents, the higher standard or the more stringent requirement shall govern.

6. INTERPRETATION OF DRAWINGS AND SPECIFICATIONS:

- A. The Director, or his/her authorized representative, will interpret the meaning of any part of the Drawings and Specifications about which any misunderstanding may arise. Should there appear to be any inconsistency or discrepancy in or between the Drawings and Specifications, the Contractor shall refer the matter to the Director, and then proceed without delay to complete the Work under question after the matter has been resolved by the Director. Should the Contractor proceed with the Work without referring the matter to, or obtaining resolution from the Director, Contractor does so on Contractor's own responsibility and without recourse to the County or County's employees, agents, etc.
- B. If the Contractor disagrees with the interpretation of the Director, or his/her authorized representative, they shall promptly, and within ten (10) days after

receipt of the interpretation, file a written request for a hearing before the Disputes Review Board as provided herein. Such written request shall outline in detail areas and scope of the Contractor's disagreement with the interpretation. The Contractor shall continue with the Work in accordance with the Director's interpretation, maintaining accurate and complete records of all cost and time impacts related to the Work involved in the disputed interpretation. These records shall be filed with the Director in a timely manner as the Work progresses.

- C. The Disputes Review Board selected by the Director is composed of three County personnel having a grade of Section Head or higher. The Board will convene to hear all matters related to the dispute within forty-five (45) calendar days after receipt of an acceptable request to convene. An acceptable "request for hearing" is defined as a request that outlines in detail the following:

1. Areas and scope of disagreement with the interpretation.
2. All areas of inconsistency/discrepancy in the drawings and/or specifications related to the dispute. Cite the specific drawings, details, specification sections, and paragraphs.

The Director shall determine whether a hearing will be conducted and may reject the request for hearing on the basis of information presented in the request.

- D. The hearing will be informal and formal rules of evidence will not apply. The Board will submit its recommendation within a reasonable period of time following conclusion of the hearing. The Director will promptly render an interpretation notice to the Contractor.

7. PROJECT MANUAL:

- A. The Project Manual is divided for convenience into divisions and sections as set forth in the Table of Contents preceding these General Conditions. Format is based upon the CSI Master Format for Construction Specifications. Schedules of Work included in these sections are given for convenience and shall not be considered as a comprehensive list of items necessary to complete the Work of any section.

- B. Where devices or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items, or parts as are required to properly complete the Work.

8. STANDARD SPECIFICATIONS:

- A. Where these Specifications or the Building Code stipulate that a material shall conform to the American Society for Testing Materials (ASTM) specifications or other recognized standards, the Contractor shall, when so required, deliver to the Department an affidavit or certificate in triplicate, signed by the manufacturer or supplier that the material furnished conforms to specifications or standards mentioned. When tests are required, the results of such tests shall be delivered to the Department.
- B. References to the "Building Code" are to the edition of the applicable Building Code listed on the drawings, including any amendments thereto.

9. SUBSTITUTIONS REQUIRED BECAUSE OF FEDERAL GOVERNMENT RESTRICTIONS OR LACK OF PRODUCT AVAILABILITY:

- A. In the event that certain materials or equipment specified are entirely unobtainable or not obtainable in sufficient quantities or within a reasonable time, due to Federal Government restrictions or other causes growing out of the national defense or war programs, the awarding entity may permit the use of equal and equivalent materials of other type of manufacture in their place. Before such substitutions can be made, the Contractor shall submit a written statement to the awarding entity setting forth in full the reasons why the materials specified are unobtainable and describing in full the materials which he proposed to supply in their place. Substitutions shall not be made until the approval of the awarding entity, in writing, has first been obtained.
- B. Should a specified item not be obtainable due to product unavailability, the awarding entity may permit the use of equal and equivalent materials of other type of manufacture in their place. Contractor shall follow the procedure identified in Paragraph A above in order to obtain approval.

10. AS-BUILT DRAWINGS:

- A. The Contractor shall keep one (1) complete and up-to-date set of prints at all times on the job, reserved for use as a record set of changes from the bid set. Throughout the duration of the construction work, this set of prints shall be the responsibility of the Contractor to maintain as a record of all field changes including underground runs, which are installed in locations other than those indicated on the Contract Drawings and those that have been indicated as to be field run as located. The lines shall be located on the Drawing dimensionally from a fixed point, such as a street-curb line, or centerline, or a permanent structure. A copy of the updated as-built prints and as-built specifications shall be made available to the County Project Manager with the monthly progress payment requests.
- B. Contractor progress payment will be contingent upon the as-built drawings and specifications being maintained in current status, and the County Inspector will not approve progress payments unless these as-built drawings and specifications are current.
- C. As a condition to certifying the final payment under this Contract, within 30 calendar days after substantial completion, the Contractor will submit to the Project Manager the original set of as-built prints as well as the set of as-built specifications. If needed, a complete set of blue line prints of the Drawings will be furnished to the Contractor for which the as-built drawings are required. All variations from the Contract Drawings and any additional information required by the Specifications shall be entered on the as-built drawings and specifications as they occur, neatly and legibly, in ink of a contrasting color or otherwise marked as approved by the County. Each set of as-built drawings and specification shall be signed and dated before being accepted by the County representative at the completion of the Work.

11. REFERENCE MATERIALS:

The Contractor shall furnish and maintain on-site reference material including at least one copy of all applicable codes referenced in the Contract Documents as necessary for the performance of the Work specified.

12. CONSTRUCTION SCHEDULE:

- A. All time limits stated in the Contract Documents are of the essence of the Contract. The Contractor shall prosecute the Work at such time and in such manner that Substantial Completion of the Work shall occur in accordance

with the Contract and the Contract Time, including authorized adjustments thereto.

- B. The Contractor shall provide a Contract Schedule for the Work in accordance with the requirements of Section 01 32 00, Construction Schedule.
- C. The term "day" when used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

13. COUNTY'S RIGHT TO DELAY COMMENCEMENT OF THE WORK:

The Department, on behalf of the County, shall have the right to direct that the Contractor shall withhold actual commencement of the Work of construction until sufficient material, in the opinion of the Department, has been delivered to the site of the Work to insure completion of the Work without interruption, and the Contractor shall comply with such instructions when issued. The Contractor shall be granted an extension of the completion time of the contract equal to the number of working days delay caused to Contractor pursuant to Contractor's compliance with such instructions.

14. UPDATED SCHEDULES:

Updated schedules shall be attached with the Contractor's request for payment and shall be a condition required prior to payment. Each schedule shall include a narrative report defining problem areas, anticipated delays, and their impact on the schedule, and the corrective action that shall be taken by the Contractor and its affect.

15. CHANGES IN THE WORK:

A. Written Changes

- 1. The County may, at any time, without notice to the Surety, make changes in the Work within the general scope of the Contract, including changes:
 - a. in the Specifications and the Drawings;
 - b. in the method or manner of performance of the Work;
 - c. in the facilities, equipment, materials, services, or site to be furnished by the County;

- d. directing acceleration in the performance of the Work; or
 - e. directing the Contractor to suspend, delay, or interrupt all or any part of the Work for such period of time as the County may determine to be appropriate for the convenience of the County.
- 2. Such changes shall be made in accordance with either of the following methods:
 - a. By a written Supplemental Agreement ordered by the County (or awarding authority if other than the County) in the manner specified by Public Contract Code Sections 20136, 20137, 20138, or 20145, or other successor statutes.
 - b. By written Change Order, signed by the Director, in the manner and amounts specified by Public Contract Code Section 20142 or its successor statutes.
- 3. If any change or proposed change under this paragraph causes or would cause an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the Work, whether changed or not changed by any such order, the Contractor may request an equitable adjustment under the terms of this paragraph and under "Construction Schedule," Section 01 32 00. At County's option, the County may negotiate an equitable adjustment for the price and time impact for the proposed changed Work either prior to, or after, directing the Contractor to proceed.
- 4. In the event the County elects to evaluate a bid prior to directing the Contractor to proceed, the County will issue a notice describing the proposed Change Order in the form of a Request for "Quotations" (RFQ). If the Contractor does not respond within fourteen (14) days after receipt of the notice, or such other time as agreed upon, with an equitable adjustment requested in accordance with Paragraph B.5.(b) under "Equitable Adjustments," the County may issue a Change Order with no change in the Contract Amount or Contract Time. The Contractor shall not proceed with any aspect of the proposed changed Work, or delay, suspend, or interrupt any unchanged Work until the County issues the Change Order.

5. If, in the opinion of the Director, it is in the County's best interest and it is deemed necessary to proceed with a required change in the Contract Documents, and time precludes thorough analysis of the Contractor's proposal, or the parties fail to reach an agreement, the Director may order the Contractor to proceed (Proceed Order) on the basis of a tentative price based on the best estimate available at the time, with the firm price to be determined later. If a Proceed Order is issued, the Contractor shall submit his proposal for the changes in the Work within thirty (30) days after the Proceed Order or completion of the changed Work, whichever is later. All charges arising out of a Proceed Order are to be documented and verified in a manner acceptable to the Director.
6. In the event that the County requires certain Work to be accomplished and the Contractor fails in the discharge of any or all of his responsibilities described hereinbefore, the County may issue a Unilateral Change Order which is a change order issued by or at the direction of the County without the full and timely agreement of the Contractor.
 - a. A Unilateral Change Order may be issued before, during or after the changed Work is physically accomplished under the following conditions:
 1. The Contractor fails to submit price and/or time extension proposal for the changed Work within thirty (30) days of receipt of the request for "Quotations" or within a reasonable time thereafter as specified by the County.
 2. The Contractor fails or refuses to execute a Change Order by affixing his signature thereto within thirty (30) days of receipt or within a reasonable time thereafter as specified by the County.
 3. The County notifies the Contractor in writing that the Change Order is considered to be unilateral and is to be an effective change to the Contract. A notation will be made on the face of the Change Order that it is unilateral and the effective date thereof. Normal distribution of copies will then be made.

7. Any other written order including direction, instruction, interpretation, or determination from the County that causes a change in the Contractor's obligations may be treated as a proposed Change Order as provided in Part B of this Article, "Constructive Changes."
8. Except as provided in this Article, no order, statement, or conduct of the County shall be treated as a Change Order under this clause or entitle the Contractor to an equitable adjustment.
9. No equitable adjustment request by the Contractor shall be allowed if asserted after Final Payment of the Contract.

B. Constructive Changes

1. Notice: The primary purpose of this paragraph is to obtain prompt reporting of County conduct or changed conditions either caused by an act of God (Public Contract Code Section 7105) or digging trenches or other excavations that extend deeper than four feet below the surface (Public Contract Code Section 7104) that the Contractor considers to constitute a change to this Contract. Except for changes identified as such in writing and signed by the County or the Director, the Contractor shall notify the County in writing within fourteen (14) days from the date of County conduct (including actions, inactions, and written communications) that the Contractor regards as a change to the Contract. On the basis of the most accurate information available to the Contractor, the notice shall state:
 - a. The date, nature, and circumstances of the conduct regarded as a change;
 - b. The name, function, and activity of each Contractor official, agent, or employee involved in or knowledgeable about such conduct;
 - c. The identification of any documents and the substance of any communication involved in such conduct;
 - d. In the instance of alleged acceleration of scheduled performance or delivery, the basis upon which it arose;

- e. The particular elements of Contract performance for which the Contractor may seek an equitable adjustment under this clause, including:
 - 1. What specific Contract Drawings or specific sections of the Specifications have been, or may be, affected by the alleged change;
 - 2. What labor or materials or both have been, or may be, added, deleted, or wasted by the alleged change;
 - 3. To the extent practical, what delay and disruption in the manner and sequence of performance and effect on continued performance have been, or may be, caused by the alleged change in accordance with Section 01 32 00, "Construction Schedule;" and
 - 4. What adjustments to Contract Amount and other provisions affected by the alleged change are estimated;
 - f. The Contractor's estimate of the time by which the County must respond to the Contractor's notice to minimize cost, delay, or disruption of performance, in accordance with Section 01 32 00, "Construction Schedule."
- 2. Continued Performance: Following submission of the notice required by Paragraph B.1 of this Article above, the Contractor shall diligently continue performance of this Contract as though not changed by the conduct reported under Paragraph B.1 until notified of the County's response under Paragraph B.3 of this paragraph, below.
 - 3. Response: The County will, within fourteen (14) days after receipt of notice, respond to the notice in writing. In responding, the County will either:
 - a. Confirm that the conduct of which the Contractor gave notice constitutes a change and, when necessary, direct the mode of further performance in accordance with Part A of this Article, "Written Changes;"
 - b. Countermand any communication regarded as a change;

- c. Deny that the conduct of which the Contractor gave notice constitutes a change, and when necessary, direct the mode of further performance; or
 - d. In the event the Contractor's notice information is inadequate to make a decision under A, B, or C above, advise the Contractor what additional information is required, and establish the date by which it should be furnished and the date thereafter by which the County will respond.
- 4. Appeals: In the event the Contractor does not agree with the County's response under B.3 above, the Contractor may submit a request to the Disputes Review Board.
- 5. Equitable Adjustment:
 - a. If the County confirms that the County's conduct effected a change as alleged by the Contractor, the Contract will be modified in writing accordingly in conformance with Part A of this Article, "Written Changes". Except for a proposed change to the Drawings or Specifications, no request for equitable adjustment under this paragraph shall be allowed for any costs incurred more than fourteen (14) days before the Contractor gives written notice under Part B of this Article.
 - b. In the case of a necessary change to the Drawings or Specifications for which the County is responsible, the equitable adjustment shall include the cost and time extension for delay reasonably incurred by the Contractor in attempting to comply with the Drawings or Specifications before the necessary change is identified. When the cost of property made obsolete or in excess as a result of a change confirmed by the County under this paragraph is included in the equitable adjustment, the County will have the right to prescribe the manner of disposition of the property or its proceeds. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to continue performance as provided respectively in Paragraphs (1) and (2) above of this part.

C. Compensation for Changes in the Work

1. Changes in the Work issued and signed by the Contractor pursuant to the requirements of this Contract represent and constitute full and final settlement for all costs and time (hereinafter referred to as compensation) associated with the Work (or event) described therein.

Compensation is defined to include all direct and indirect labor costs, all material and equipment expenses, and all impact costs related to and/or occasioned by the Work described therein, as well as all taxes, insurance, and profit. It is agreed that the basis of compensation to the Contractor for Work either added or deleted by Changes in the Work shall be determined by one or more of the following methods below. All amounts for overhead, profit, insurance, and all other direct and indirect costs of the changes in the Work (except for bonds as provided in Paragraph C.2 shall be computed in accordance with percentages set forth in Paragraph C.1.c and C.8.c of this Article.

- a. Method A

By unit prices for items of Work scheduled to be done under the unit price provisions of the Contract. The cost or credit for such added or omitted Work shall be determined by multiplying the number of units added to or omitted from the Work by the applicable unit price.

- b. Method B

By agreed lump sum. All lump sum quotations prepared by the Contractor shall be supported by legible and itemized cost by trades. The itemized breakdown accompanying the quotation shall quantify all added and deleted labor, material, and construction equipment directly involved. The Contractor must also obtain and furnish with quotation, itemized breakdown(s) as described above, signed by each subcontractor or vendor participating in the change regardless of tier. All labor cost, including associated fringe benefits and insurance costs, shall be verified by certified payrolls and/or standard rates in accordance with the Prevailing Wage Scale.

- c. Method C

If neither Method A nor Method B are agreed upon before the changes to the Work are commenced, then the Contractor shall be paid as follows:

The actual cost, documented to the satisfaction of the County, of labor, materials, and equipment furnished by the Contractor and/or the actual cost of subcontractor Work incurred by the Contractor as provided in Paragraph C.8, plus the following percentages which are considered fair and reasonable compensation for overhead, profit, insurance, and all other direct and indirect costs of the Changes in the Work (except for bonds as provided in Paragraph C.2:

<u>18%</u>	of the cost of labor as provided in Paragraph C.3 where furnished by the Contractor;
<u>15%</u>	of the cost of materials as provided in Paragraph C.4 where furnished by the Contractor;
<u>10%</u>	of the actual cost of equipment as provided in Paragraph C.5; and
<u>5%</u>	of the actual cost of the first tier subcontract Work as provided in Paragraph C.8.

Overhead charges shall include those charges as specified in Paragraph C.3.c below.

d. Unilateral Change Order

1. The terms of a Unilateral Change Order, including the change in Contract price and/or completion date shall, in the County's judgment, be fair and reasonable.
2. When a Unilateral Change Order has been issued, it will have the full force and effect of a Contract modification. It will be included in schedules, payment applications, reports, and all official records of the Contract. The issuance of a Unilateral Change Order will not prejudice any of the Contractor's rights to make claims or appeal disputed matters under other provisions of the Contract.

3. If the Contractor objects to a Unilateral Change Order, Contractor shall state, in writing, specific objections to, or specific points of disagreement with, the Work described in the Unilateral Change Order within thirty (30) days of receipt of such Change Order.
2. To the total additional cost of the Work as computed by any of the three above methods, the Contractor may add, upon furnishing to the County satisfactory evidence of the cost thereof, the actual cost of additional bond premiums incurred by the Contractor as a result of the additional cost to the Work up to a sum not to exceed 1.5 percent (1.5%) of the additional cost to the Work.
3. Labor: The cost of labor used in performing the Work, whether the employer is the Contractor, Subcontractor, or other forces, will be the sum of the following:
 - a. The gross actual wages paid including income tax withholdings but not including any employer payments to or on behalf of the workmen for health and welfare, pension, vacation, insurance, and similar purposes.
 - b. To the actual gross wages, as defined above, a percentage will be applied based upon current applicable labor rates concerning payments made to or on behalf of workmen other than actual wages. This percentage shall constitute full compensation for all payments other than actual gross wages as specified below. The Contractor shall compute a separate percentage for each craft, or a composite percentage for all crafts if so approved by the County. All computed percentages shall be submitted to the County for approval within thirty (30) days after receipt of Notice to Proceed with the changes to the Work or as directed by the County prior to any changed Work being performed.
 - c. The charges for labor shall include all classifications through foremen when engaged in the actual and direct performance of the Work. They shall not include charges for such overhead personnel as superintendents, assistant superintendents, office personnel, timekeepers, and maintenance mechanics.

4. Materials: The cost of materials required for the accomplishment of the Work shall be the delivered cost to the purchaser, whether Contractor, subcontractor, or other forces, from the supplier thereof, except as the following are applicable:
 - a. If cash trade discount by the actual supplier is offered or available to the purchaser, it shall be credited to the County if such discount was taken.
 - b. If materials are procured by the purchaser by any method which is not a direct purchase from and a direct billing by the actual supplier, to such purchaser, the cost of such materials, including handling, shall be deemed to be the price to the actual supplier as determined by the County.
 - c. If the materials are obtained from a supply or source owned wholly or in part by the purchaser, payment therefore will not exceed the lesser of the price paid by the purchaser for similar materials furnished from said source on Contract items or the current wholesale price for such materials delivered to the worksite, whichever price is lower.
 - d. The cost of such materials shall not exceed the lowest current wholesale price at which such materials are available in the quantities concerned, delivered to the job site, less discounts as provided in Subparagraph 4.a.
 - e. If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof, the cost shall then be determined in accordance with Subparagraph 4.d.
5. Equipment: Equipment rented/leased by the Contractor or subcontractor and utilized on this project for the purposes of this Article shall be paid for on the basis of arms-length rental agreements entered into and invoices paid by the Contractor or subcontractor for that equipment. These invoices shall be submitted as evidence of the expense incurred.
 - a. The Contractor or subcontractor shall be paid for the use of owned equipment at prices for the use of machinery and equipment determined by using 80 percent (80%) of equipment

use costs published by the Associated Equipment Distributors, which edition is in effect at the time of the change. Contractor or subcontractor-owned equipment required to be on stand-by or to be present on the site, even though idle, shall be paid for at 50 percent (50%) of the owned equipment rate established above.

- b. The Contractor or subcontractor shall furnish all data which might assist the County in the establishment of such rates.
 - 1. Operators of equipment will be paid for as provided under Subparagraph C.3 above.
 - 2. All equipment shall be in good working condition and suitable for the purpose for which the equipment is to be used. Contractor is responsible for any necessary repairs and ongoing maintenance of said equipment.
 - 3. Unless otherwise specified, manufacturer's ratings and manufacturer modifications shall be used to classify equipment for the determination of applicable equipment rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
 - 4. Individual pieces of equipment or tools having a new value of five hundred dollars (\$500.00) or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.
- 6. Equipment Located at the Site: The time to be paid for equipment located at the site shall be the time the equipment is required for the changed Work being performed. Moving time, loading, unloading, and hauling will not be paid for if the equipment is already located at the Site.
- 7. Equipment Not Located at the Site: For the use of equipment moved to the Site and used exclusively for changed Work, the Contractor will be paid the rates hereinbefore specified, as follows:
 - a. The period shall begin at the time the equipment is unloaded at the site; shall include each day that the equipment is at the

site, excluding Saturdays, Sundays, and other legal holidays unless the changes to the Work are performed on such days; and shall terminate at the end of the day on which the County directs the Contractor to discontinue the use of such equipment. The maximum time to be paid per day will not exceed eight (8) hours without prior written approval from the Director.

- b. Payment for transporting, loading, and unloading equipment will be made only when such equipment has been moved to the site for the sole and express purpose of accomplishing the changed Work.

- 8. Subcontracts: The cost for Subcontract work will be the actual cost to the Contractor or subcontractor for Work performed by a Subcontractor as follows:

- a. The cost incurred by the first tier subcontractor for labor, materials, and equipment as limited by Paragraphs C.3, C.4, and C.5; plus
- b. The following percentages which are considered fair and reasonable compensation for overhead, profit, insurance and all other direct and indirect costs of the changes in the Work (except for bonds as provided in Paragraph C.2:

18% of the cost of labor as provided in Paragraph C.3;

15% of the cost of materials as provided in Paragraph C.4;

10% of the cost of equipment as provided in Paragraph C.5.

- c. To the total additional cost to the Work as computed in accordance with Paragraphs 8.a and 8.b above, the subcontractor, upon furnishing satisfactory evidence of the cost thereof, the actual cost of additional bond premiums incurred by the Subcontractor as a result of the additional cost to the Work up to a sum not to exceed 1.5 percent (1.5%) of the additional cost to the Work.

16. PROVISIONS FOR EXTRAS:

No new Work of any kind performed hereunder shall be considered as extra Work outside the scope of the Contract unless a separate estimate is given for said Work before it is commenced, the same is approved by the Department as reasonable and equitable, and it has been ordered under one of the three methods set forth in article, "CHANGES IN THE WORK," Paragraphs A, B, or C. Except for extra Work ordered by the Department according to unit prices or by changes or additions in the Work embraced in a Change Order issued by it, any extra Work performed will not be paid for by the County. The Contractor will prepare and submit change order requests as directed by the County Project Manager.

17. TIME EXTENSIONS AND COMPENSATION FOR DELAY:

- A. Adjustments in the Contract Time shall be governed by the principles of this Article and shall be made in accordance with the conditions stated in Specification Section 01 32 00, Construction Schedule.
- B. Actions or inactions of the County, or events for which the County has assumed contractual responsibility, which would independently delay the date of Substantial Completion beyond the current Contract Completion Date shall be designated as Compensable delays.
- C. Events which are outside the control of, and without the fault or negligence of either the County or the Contractor, which would independently delay the date of Substantial Completion beyond the current Contract Completion Date shall be designated as Excusable delays. Unless the County considers that extreme circumstances warrant consideration, extensions of time because of inclement weather will not be granted.
- D. Actions or inactions of the Contractor, or events for which the Contractor has assumed contractual responsibility, which would independently delay the date of Substantial Completion beyond the current Contract Completion Date shall be designated as non-excusable delays.
- E. Concurrent delay is any combination of the above three types of delay occurring on a calendar date, except in cases where the combination consists of two or more instances of the same type of delay occurring on a calendar date.
- F. Any event, action, inaction, or other cause which may give rise to a delay shall constitute a basis for adjustment in:

1. Contract Time, only if it can be demonstrated that the date of Substantial Completion will be delayed beyond the current Contract Completion Date and that the delay is classified as a Compensable or Excusable delay; and/or
2. Contract Amount, only if it can be demonstrated that the Contractor's time-related costs to complete the Work will be increased and the delay is classified as a Compensable delay.

18. OBSERVATION:

- A. All Work shall meet with the approval of the Department and shall be completed in conformity with the Drawings and Project Manual approved by, and on file with, the Los Angeles County Board of Supervisors, such Drawings and the Project Manual will be made part of the Contract to be entered into for the Work referred to herein. The County at its discretion may require the contractor to obtain approval/clearance from the Inspector of Record for certain items to ensure the quality of the work.
- B. The Department or its representative will have access to the Work at all times. The Contractor will furnish all facilities for inspection at the construction site, and at shops or yards, and shall not cover up any Work until the same has been approved by the Department. If Work should be covered up before being inspected, the Contractor will be required to remove such portions of the Work as may be necessary to disclose the part in question.
- C. The County of Los Angeles or its authorized representatives will be given access to the Work at all times. Such access will not be subject to restrictions which are not directly related to the provision and maintenance of health and safety.
- D. The Contractor will be issued a "Notice of Noncompliance" for any portion of the contract Work that does not satisfy the requirements of the Drawings and Specifications. No Work subject to a "Notice of Noncompliance" will be paid for by the County until such Work is brought into full compliance with the Drawings and Specifications to the satisfaction of the County. The Contractor must obtain the County's approval for all corrected deficiencies and/or non-compliant work prior to proceeding with work that may be affected by the deficient and/or non-compliant work. The Contractor shall not build on or conceal work that is deficient and/or non-compliant. Furthermore, work

that is built or dependent upon item(s) that are deficient and/or not-compliant will not be approved on the progress payment request.

- E. An Inspection Notice will be issued if the contract Work has not been executed in full compliance with the Drawings and Specifications. The Contractor is responsible for bringing all Work subject to an Inspection Notice into full compliance with the Drawings and Specifications at no additional cost to the County.
- F. Technical Reports may be generated for the purpose of evaluating the quality, correctness, functionality, etc., of the Contractor's Work or performance under this contract in accordance with the requirements of the Drawings and Specifications.

19. PERMITS, LICENSES, AND INSPECTIONS:

- A. The Contractor will obtain and pay for all permits required for the Work except the following "no-fee" permits: building, electrical, mechanical, plumbing, and sewer Work. Further, the Contractor will obtain and pay for all permits incidental to the Work or made necessary by Contractor's operation. This includes Contractor/Manufacturer designated structures such as prefabricated buildings, light poles, special shoring, and the like. The Contractor shall also pay for the plan check of prefabricated buildings.
- B. To comply with Section 3800 of the Labor Code of the State of California, the Contractor and all Subcontractors requiring a permit (building, plumbing, grading, electrical, etc.) shall file a Workers' Compensation Certificate with the Department of Public Works, Business Relations and Contracts Division, Contracts Administration Section.
- C. Exclusive of off-site inspection specified to be the County's responsibility, the Contractor will arrange and pay for all off-site inspection of the Work including certification thereof required by the specifications, drawings, or by governing authorities.
- D. The County will provide on-site inspection of the Work and will arrange for off-site inspection when noted on the drawings and/or when specified in the various technical sections of the Specifications as the responsibility of the County. All other required inspection will be the responsibility of the Contractor.

- E. The County will not pay any costs for licenses required in the performance of the Work. The Contractor shall assume this responsibility in total.

20. TESTS:

A. County's Responsibilities

- 1. The County reserves the right to test or require the Contractor to obtain "called tests" of any materials or performance over and above "required tests" as defined in the following Paragraph B.1, and provided such "called tests" show the Work meets the specified requirements, the County will pay for the cost of the tests. If the Contractor was required to obtain the test from a third party, the County will reimburse the Contractor on the basis of Contractor's certified statement of the results and costs, with appropriate supporting documentation.

B. Contractor's Responsibilities

- 1. The Contractor will arrange and pay for all tests of materials or performance as required by the Specifications or by ordinance or governing authority. These are defined as "required tests".
- 2. The Contractor shall pay for all "called tests" as defined in preceding subparagraph A.1, when the test results show the materials or performance fails to meet the specified requirements. Immediately thereafter, the Contractor, at Contractor's own expense, shall remove the improper Work and replace same with materials or performance meeting the specified requirements. The Contractor shall also bear the expense of any tests required of the replaced Work, and of any subsequent removal, replacement, and testing as may be necessary to obtain materials or performance meeting the specified requirements.

21. SUBSTANTIAL COMPLETION:

- A. The date of Substantial Completion of the Work, or designated portion thereof as set forth in the Contract Documents, is the date certified by the County when construction is sufficiently complete, in accordance with the Contract Documents, so the County may occupy or use the Work, or designated portion thereof, for the use for which it is intended.

- B. When the Contractor considers that the Work, or designated portion thereof as set forth in the Contract Documents, is substantially complete as defined above, the Contractor shall prepare for submission to the County a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the County determines that the Work or designated portion thereof is substantially complete, it will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion. The Certificate shall state the responsibilities of the County and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall list remaining items to be corrected or completed. The Work not fully completed or corrected shall be completed to the satisfaction of the County within thirty (30) calendar days after Substantial Completion, or within a period of time mutually agreed upon between the Contractor and the County. In the event the Contractor fails to complete or correct the remaining items within the allotted time, the County may complete or correct the items and deduct the cost thereof from the Contract amount.
- C. Warranties required by the Contract Documents, as discussed in Article 40 of the General Conditions, shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.
- D. Upon Substantial Completion of the Work or designated portions thereof, and upon application of the Contractor, the County, in County's sole discretion, may release and/or reduce the amounts retained subject to the limitations of Public Contract Code Section 9203.
- E. In accordance with the General Conditions, the County reserves the right to occupy substantially completed portions of the Work and any such portion shall be subject to the above provisions for Substantial Completion.

22. OCCUPANCY BY THE COUNTY:

- A. The Contractor, Contractor's employees, and representatives will be admitted by the County to the premises for the purpose of executing the Work to be performed under this contract, but they shall have no tenancy.
- B. It is further understood that the County shall have the right to take temporary possession of, or use any portion of, any substantially completed part of the Work. Before taking possession of any Work, the County shall furnish the Contractor a list of items of Work remaining to be performed or corrected on

those portions of the Work that the County intends to take possession of or use. However, a failure of the County to list any item of Work shall not relieve the Contractor of responsibility for complying with the terms of the Contract. The County's possession or use shall not be deemed an acceptance of any Work under the Contract.

- C. While the County has such possession or use, the Contractor shall be relieved of the responsibility for the loss of, or damage to, the Work in place resulting from the County's possession or use. If prior possession or use by the County delays the progress of the Work or causes additional expense to the Contractor, an adjustment may be made in the Contract Amount or the Contract Time, under the applicable scheduling and cost provisions of this Contract.

23. WORKERS:

None but workers skilled in the various trades required on this contract shall be employed upon the Work. Any mechanic or laborer employed upon the Work who, in the opinion of the Department, is non-cooperative or who shall prove careless or incompetent, shall be immediately removed from the Work by the Contractor, when notified to do so, and shall not be re-employed upon the Work.

24. HOURS OF WORK:

Work in excess of eight (8) hours per day will be permitted by employees of contractors under this Contract only so long as Section 1815 of the Labor Code of California is complied with by such contractors.

25. SATURDAY, SUNDAY, HOLIDAY, AND OVERTIME WORK:

- A. No construction Work shall be done on Saturdays, Sundays, or holidays recognized by the County government and no Work shall be performed outside of normal Working hours without the consent of the Department, unless required under these specifications. In any event, all Work shall be subject to approval of the Department. Prior to the start of such Work, the Contractor shall arrange with the Department for the continuous or periodical inspection of the Work and tests of materials, when necessary. If requests are made by contractors for permission to Work overtime, nights, Saturdays, Sundays, or holidays, and such requests are granted, the Contractor shall bear all extra expense to the County or the awarding entity for inspection and other incidental expenses caused by such overtime work. If Contractor is requested, in the interest of the awarding entity, to work overtime by the

Department; or if overtime Work is specifically required by these Specifications, all extra expense of inspection will be paid by the County. Should the Contractor find it necessary in order to complete the Work according to schedule to perform certain of Contractor's operations on Saturdays, Sundays, holidays or overtime, these operations shall be performed as part of the Work included in the contract price and shall not constitute a basis for additional payments. Refer to above paragraph for the obligations for the Contractor to assume the cost of inspections.

- B. The County reserves the right to order in writing Work outside of normal working hours to avoid inconvenience of occupants of existing facilities or to perform special operations that, in the judgment of the Department best serve the intent of the Contract Documents and the orderly prosecution of the Work. If the County elects to order Work outside of normal working hours, the Contractor shall make all arrangements to supply an adequate Work force for the task to be accomplished and will be compensated for the premium portion of the wages paid, plus labor burdens applicable to the premium portion only of the wages paid. Contractor shall submit copies of Contractor's payrolls indicating the premium wages actually paid, and the County will issue a Change Order to reimburse the Contractor for Contractor's actual costs only.

26. PREVAILING WAGE SCALE:

- A. The Contractor shall comply with all provisions of the Labor Code of the State of California.
- B. Under the provisions of said Labor Code, the State Department of Industrial Relations will ascertain the prevailing hourly rate in dollars and details pertinent thereto for each craft, classification or type of workers, or mechanic needed to execute any contract which may be awarded by the awarding entity.
- C. Particulars of the current Prevailing Wage Scale, which are applicable to the Work contemplated under these Specifications, are filed with the awarding entity and the Department and must be posted at the project site.

27. EMPLOYMENT OF INDENTURED APPRENTICES:

- A. Contractor shall comply with Section 1777.5 and 1777.7, Labor Code, State of California.

- B. All Contractors shall employ registered apprentices at a ratio of not less than one hour of apprentice's work for every five hours of labor performed by a journeyman. Contractors shall be responsible for the compliance of all Subcontractors.
- C. Contractor and Subcontractors shall keep an accurate record showing the name of the craft and wage rate of each apprentice and journeyman employed by each entity. Subcontractor shall provide, weekly, such records to the Contractor. Records shall be made available to the Division of Apprenticeship Standards and the County of Los Angeles or the awarding entity, for the purpose of determining compliance. Failure to comply may result in withholding payments and other penalties as provided by the Labor Code.

28. AFFIRMATIVE ACTION PLAN FOR EQUAL EMPLOYMENT OPPORTUNITY:

- A. The following provisions pertaining to equal employment opportunity are incorporated into this Contract. All references herein to "Contractor" shall be deemed to refer to the "general" Contractor.
- B. During the performance of any construction Contract in excess of \$10,000, the Contractor agrees as follows:
 - 1. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor certifies and agrees that all persons employed by such firm, Contractor's affiliates, subsidiaries, or holding companies are, and will be, treated equally by the firm without regard to or because of race, color, religion, sex, or national origin and in compliance with all anti-discrimination laws of the United States of America and the State of California.
 - 2. In all advertisements for labor or other personnel, or requests for employment of any nature, the Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
 - 3. The Contractor shall deal with Contractor's Subcontractors without regard to or because of race, color, religion, sex or national origin.
 - 4. The Contractor shall comply with current Federal employment and reporting requirements for County-funded construction contracts.

Specifically, the Contractor shall make a good faith effort to comply with federal employment goals for minority and female employment and shall report minority and female employment data in a timely manner on the federal form provided by the contract awarding authority.

5. The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract of understanding, a notice, to be provided by the contract awarding authority, advising the said labor union or workers' representative of the Contractor's commitments under this section.
6. The Contractor shall allow the County access to Contractor's employment records during regular business hours to verify compliance with these provisions when so requested by the County.
7. The Contractor agrees that if the County finds that any of the above provisions has been violated, the same shall constitute a material breach of contract upon which the County may determine to cancel, terminate, or suspend the Contract. While the County reserves the right to determine independently that the anti-discrimination provisions of the Contract have been violated, in addition, a determination by the Federal Equal Employment Opportunity Commission or the California Fair Employment and Housing Commission that the Contractor has violated federal or state anti-discrimination laws may constitute a finding by the County of Los Angeles that the Contractor has violated the anti-discrimination provisions of the Contract.
8. At County's option, and in lieu of canceling, terminating, or suspending the Contract, the County may impose damages for any violation of the anti-discrimination provisions of this paragraph, in the amount of two hundred dollars (\$200) for each violation found and determined. The County and Contractor specifically agree that the aforesaid amount shall be imposed as liquidated damages, and not as a forfeiture or penalty. It is further specifically agreed that the aforesaid amount is presumed to be the amount of damages sustained by reason of any such violation, because, from the circumstances and the nature of the violation, it is impracticable and extremely difficult to fix actual damages.
9. The Contractor shall include the provisions of the foregoing Paragraphs B.1. through B.8. in every subcontract, so that such

provisions will be binding upon each Subcontractor performing Work required by this contract.

29. PAYROLL RECORDS:

- A. The Contractor shall comply with the requirements of Section 1771.4 and Section 1776 of the Labor Code, State of California. The Contractor and its subcontractors shall furnish the records specified in Section 1776 directly to the Labor Commissioner in an electronic format, in the manner prescribed by the Labor Commissioner, on the Department of Industrial Relations website. The Contractor and its subcontractors shall maintain payroll records as enumerated in Labor Code Section 1776 (a). When requested by the County, the Contractor and its subcontractors shall submit to the County a copy of all weekly certified payrolls, indicating that the wage rates are not less than those determined by the State of California Department of Industrial Relations and the classifications set forth for each laborer or mechanic conform with the Work they performed. Contractor shall submit a weekly payroll report" (Form 347, A-1-131, or similar) shall accompanied by a written declaration, made under penalty of perjury. The Contractor shall be responsible for the submission of copies of payrolls for all subcontractors within ten (10) days after their payroll period. Failure of the Contractor to comply with the Labor Code requirements to pay prevailing wages and to maintain certified payroll records may result in withholding from progress payments amounts for underpaid wages and penalties as authorized by the Labor Code.
- B. When requested by the County, the Contractor, all subcontractors, and some subconsultants will be required to submit certain certified payrolls and labor compliance documentation electronically at the discretion of, and in the manner specified by the County.

Electronic submittal will be a web-based system, accessed on the World Wide Web by a web browser. The Contractor, its subcontractors, and certain subconsultants will be given a log on identification and password to access the web-based labor compliance reporting system.

Use of the web-based system will entail additional data entry of weekly payroll information including; employee identification, labor classification, total hours worked and hours worked on this project, wage and benefit rates paid, etc. In addition, the Contractor may use payroll and accounting software that is capable of interfacing with the web-based system. The payroll and accounting software must be capable of generating a 'comma delimited file'

or 'comma separated value (CSV) file' that will interface with the web-based system.

This requirement applies to all subcontractors, subconsultants, and vendors required to submit certified payrolls and provide labor compliance documentation. The information may be used to provide statistical informational data to public or jurisdictional agencies.

30. QUALITY OF WORK AND MATERIAL:

- A. All materials, parts, and equipment furnished by the Contractor shall be new, first quality, and free from defects and imperfections. Workmanship shall be in accordance with the best standard practices.
- B. Any item or Work installed by the Contractor, but not in conformance with the drawings and specifications, shall be removed by and at the Contractor's expense upon written request from the County.
- C. If such items or Work are not removed or satisfaction obtained by the County within thirty (30) calendar days of such request, then the County may have such items or Work removed and Work completed to conform to drawings and specifications at the Contractor's expense.

31. RESPONSIBILITY OF CONTRACTOR AND OF CONTRACTOR'S REPRESENTATIVE ON THE WORK:

The Contractor shall give personal attention and supervision to the Work until same is entirely completed. In the absence of the Contractor from the Work, he shall have a representative in charge who shall be competent to superintend and direct the progress of the Work and who shall be authorized to receive instructions and to act for the Contractor on all matters related to the Work. The name of this representative shall be sent by letter to the Department immediately after the awarding of the contract.

32. REPAIRING DAMAGED WORK:

- A. All portions of the Work that may be damaged by accident or in the course of or on account of building operations, or by reason of any other cause whatsoever during the progress of the Work, shall be carefully and neatly repaired or reconstructed and the whole left in first-class condition and turned over to the County ready for use.

- B. Should any part of the Work of this contract be cut into or damaged by other Contractors, the Contractor and party causing such damage shall make adjustments between themselves relative to reconstruction or repairs and payment for same.

33. LIST OF SUBCONTRACTORS AND SUBLETTING WORK:

- A. No part of the construction Work shall be done as piece Work, nor shall it be let to a Subcontractor after the execution of the original contract except as provided by law. In case part of the Work should be sublet, these General Conditions shall govern each trade insofar as they may apply to the Work of that trade.
- B. Where more than one Contractor or where Subcontractors are engaged upon the Work, they shall coordinate their efforts (in accordance with Article 36 of these General Conditions regarding other contractors, or under the control and guidance of the General Contractor), and shall be responsible, one to the other, for any damage or injury to the work.
- C. Bidders and Contractor shall be governed by the provisions of Sections 4100 to 4113, inclusive, of the Public Contract Code of the State of California. Bidders shall set forth in their Bids, on forms provided for same, the name and location of the mill, shop, or office of each Subcontractor who shall perform the Work or labor or render service to the Contractor in or about the construction of the Work, and the portion of the Work which shall be done by each Subcontractor.
- D. No subcontract shall be assigned or transferred except as provided in the above sections of the Public Contract Code of the State of California.
- E. In case any Work is let to a Subcontractor, the Contractor shall be at all times responsible for the Work so done to same extent as if the Contractor were doing or had done the Work.
- F. If a Subcontractor is named who shall perform the Work or labor or render service to the Contractor with respect to a material specified or indicated by patent or proprietary name and/or by the name of the manufacturer, and such Subcontractor cannot reasonably act with like respect to the material offered as an equal then, the Bidder shall, in his Bid Form, include with the pertinent data to be listed on the "Equals" page(s), the name and address of the Subcontractor who shall act with respect to the equal material.
- G. In accordance with Public Contract Code Sections 4100, et seq., the Bidder must list all subcontractors who shall perform in excess of one-half of one

percent of the Work. (See Subcontractors' Section of the Instructions to Bidders.)

34. ADVERTISING:

No advertising matter shall be attached or painted on surfaces of buildings, fences, or canopies, except that names of Contractors and Subcontractors, with their addresses and the designation of their particular branch, may be shown on signs of a removable type. Size and location of such signs shall be subject to approval of the Department. The Contractor shall provide a project identification signboard as specified.

35. CERTIFICATE AS TO COMPLIANCE WITH CERTAIN REGULATIONS:

- A. The Contractor shall file with the Department, prior to the acceptance of the Work, a certificate in form, substantially as follows:
- B. I (We) hereby certify that all Work has been performed and materials supplied in accordance with the drawings, specifications, and contract documents for the above Work, and that:
 - 1. Not less than the prevailing rates of wages as ascertained by the Department has been paid to laborers, workers, and mechanics employed on this Work.
 - 2. There have been no unauthorized substitution of Subcontractors; nor have any unauthorized subcontracts been entered into.
 - 3. No subcontract was assigned or transferred or performed by anyone other than the original Subcontractor; except as provided in Sections 4100-4113, inclusive, of the Public Contract Code.

(Signed) _____
Contractor

36. COORDINATION WITH OTHERS AND OTHER CONTRACTS:

- A. The County reserves the right to award other contracts for any Work on any portion of the project not included in this Contract.
- B. Where coordination with other Contractors is required, the Contractor shall make the appropriate provisions in Contractor's CPM schedule for the access to the site by those Contractors, the schedules of Work developed by them,

and any coordination required between any of those Contractors and between any of them and this Contractor.

- C. The Contractor shall perform the Work of the Contract so that it will properly coordinate and fit the Work performed by other Contractors. He shall give the other Contractors every reasonable opportunity to perform their Work, store materials, and place equipment thereof, and fit their Work to the Work of other Contractors. They shall furnish to the other Contractors all information necessary in order that they may properly connect and fit their Work to Contractor's in ample time, so that they may have reasonable opportunity to prepare their Work therefore. They shall make the Work of this Contract ready to receive the Work of the other Contractors at the time fixed thereof, and shall fit this Work to that of the other Contractors at the time fixed therefore.
- D. The Contractor shall cooperate with others in the prosecution of all Work and shall not interfere with material, equipment, or workers of the County or other Contractors engaged by the County at the site of the Work.
- E. All Contractors engaged in Work at the site shall have, insofar as practical, equal use of the premises and facilities. In case of disagreement regarding such use, the matter shall be referred to the Department, whose decision relative to said use shall govern.
- F. If any part of the Contractor's Work depends on proper execution or results upon the Work of any other separate Contractor, the Contractor shall inspect and promptly report to the Director any apparent discrepancies or defects in such Work that render it unsuitable for such proper execution and results. Failure of the Contractor to inspect and report shall constitute an acceptance of the other contractor's Work as fit and proper to receive the Contractor's Work, except as to defects which may develop in the other separate contractor's Work after the execution of the Contractor's Work.
- G. Should the Contractor cause damage to the Work or property of any separate Contractor on the project, the Contractor shall, upon due notice, settle with such other Contractor by agreement or arbitration if it will so settle. If such separate Contractor sues the County or initiates an arbitration proceeding on account of any damage alleged to have been so sustained, the County shall notify the Contractor who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the County arises therefrom, the Contractor shall pay or satisfy it and shall reimburse the County for all attorney's fees and court or arbitration costs which the County has incurred.

37. CONTRACTOR'S CONSTRUCTION EQUIPMENT:

The Contractor shall furnish and maintain all equipment such as stairs, ramps, runways, scaffolds, hoists, etc., required for the proper execution of the Work. All such equipment and construction shall meet all requirements of all ordinances and laws applicable thereto.

38. CONTRACTOR PERSONNEL:

A. The Contractor agrees to employ only orderly and competent workers, skillful in the performance of the type of Work required under this Contract, to do the Work and agrees that whenever the County informs the Contractor in writing that any workers on the Site are incompetent or disorderly, such Worker shall be discharged from the Work and shall not again be employed on the Work without the County's written consent.

B. The Contractor shall give adequate attention to the faithful prosecution and completion of this Contract and shall keep on the Site at all times during project's progress, competent personnel superintendent and any necessary assistants to supervise and direct the Work. Grounds for removal of Contractor personnel specifically include (but is not limited to) the failure or refusal of such personnel to adhere to the Contractor's planned Construction Schedule as developed by the Contractor under Section 01 32 00.

39. AUDITS AND RECORDS:

The Contractor shall maintain all data and records pertinent to the Work performed under this Contract, in accordance with generally accepted accounting principles, and shall preserve and make available all data and records until the expiration of four (4) years from the date of final payment under this Contract, or for such longer period, if any, as is required by applicable statute or by other articles of this Contract. The authorized representatives of the County shall have access to all such data and records for such time period to inspect, audit, and make copies thereof during normal business hours. Contractor covenants and agrees that it shall require that any subcontractor utilized in the performance of this Contract shall permit the authorized representatives of the Los Angeles County Department of Public Works to similarly inspect and audit all data and records of said Subcontractors relating to the performance of said Subcontractors under this Contract for the same time period.

40. WARRANTY AND CORRECTIONS TO WORK:

- A. In addition to any other warranties in the Contract Documents, the Contractor warrants that Work performed under this Contract conforms to the Contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any Subcontractor or supplier at any tier.
- B. Corrections to the Work may be required during construction or any applicable warranty period. At the County's option, the cost of such corrections may be withheld from progress payments.
- C. This warranty shall continue for a period of one (1) year from the date of Substantial Completion of the Work. If the County takes occupancy of any part of the Work before Substantial Completion, a warranty covering that specific portion of the Work shall begin for a period of one year from the date the County takes beneficial occupancy. The County will notify the Contractor in writing of the scope of any partial occupancy and the specific items under warranty.
- D. The Contractor shall remedy at the Contractor's expense any failure to conform to the requirements of the Contract Documents or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to County-owned or controlled real or personal property, when that damage is the result of:
 - 1. The Contractor's failure to conform to or comply with Contract requirements; or
 - 2. Any defect of Contractor-furnished equipment, material, workmanship, or design.
- E. The Contractor shall restore any Work damaged in fulfilling the terms and conditions of this Article. The Contractor's warranty with respect to Work repaired or replaced shall be extended for one (1) year from the date of repair or replacement.
- F. The Director shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.
- G. If the Contractor fails to remedy any failure, defect, or damage within ten (10) working days (or immediately in the case of an emergency where delay would cause serious risk of loss or damage) after receipt of notice, the County shall have the right to remove, replace, repair, or otherwise remedy the failure, defect, or damage, and all direct and indirect costs of such

removal, replacement, repair, and correction, including compensation for additional professional services, shall be paid by the Contractor.

- H. With respect to all warranties, express or implied, from Subcontractors, manufacturers, or suppliers for Work performed and materials furnished under this contract, the Contractor shall:
 - 1. Obtain all warranties that would be given in normal commercial practice;
 - 2. Require all warranties to be executed, in writing, for the benefit of the County, if directed by the Director; and
 - 3. Enforce all warranties for the benefit of the County, if directed by the Director.
- I. In the event the Contractor's warranty has expired, the County may bring suit at County's expense to enforce a Subcontractor's, manufacturer's or supplier's warranty.
- J. Unless a defect is caused by the Contractor or Subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the County, nor for the repair of any damage that results from any defect in County-furnished material or design.
- K. This warranty shall not limit the County's rights under other articles of this Contract or as provided by law with respect to latent defects, gross mistakes, or fraud.
- L. The terms of this Article do not relieve the Contractor of any legal liability for defects discovered after one year from the date of occupancy. The obligations imposed by this article shall survive termination of the Contract.

41. HAZARDOUS MATERIAL

- A. Hazardous Material is any product, substance, chemical, crude oil (or any products, by-products, or fractions thereof), whose nature, quantity, and/or intensity of existence, use, manufacture, disposal, transportation, spill, release or effect, either by itself or in combination with other material or materials in, on or about the project site: (a) is or becomes potentially injurious to the public health, safety or welfare, environment, or the project site; (b) is or becomes regulated or monitored by any governmental authority; or (c) may, according to statutory or common law theory, such as nuisance

(public or private), waste, trespass, negligence, strict liability, or tort, be a basis for liability in tort, or be a basis for liability to third parties.

- B. Contractor shall notify the County when the Contractor has reason to suspect the presence of any Hazardous Material on the project site, whether or not such material was generated by Contractor or the County.
- C. In the event the presence of hazardous material is suspected or discovered on the project site, the County shall retain an independent testing laboratory to determine the nature of the material encountered and whether corrective measures or remedial action is required.
- D. Except as may be otherwise provided herein, the Contractor shall not be obligated to commence or continue Work in the affected area until any known or suspected hazardous material discovered on the project site has been removed, or rendered or determined to be harmless by the County, as certified by an independent testing laboratory and approved by the appropriate government agency.
- E. In the event the presence of hazardous materials on the project site is not caused by the Contractor, the County shall pay for all costs of testing and remediation, if any, and shall compensate Contractor any additional costs incurred or project delay in accordance with the applicable provisions of changes in the work herein. In addition, the County shall defend indemnify and hold harmless the Contractor and its agents, officers, directors and employees from and against any and all claims, damages, losses, costs, and expenses incurred in connection with or arising out of relating to the performance of the Work in the area affected by the hazardous material.
- F. In the event the presence of hazardous materials on the project site is caused by the Contractor, the Contractor shall pay for all costs of testing and remediation, if any, and shall compensate the County for any additional costs incurred as a result of Contractor's generation of hazardous material on the project site. In addition, the Contractor shall defend, indemnify, and hold harmless the County and its Special Districts and agents, officers, and employees from and against any and all claims, damages, losses, costs, and expenses incurred in connection with, or arising out of, or relating to, the presence of hazardous material on the project site.
- G. The terms of this hazardous material provision shall survive the completion of the Work and/or any termination of this Contract.

42. CONTRACTOR SAFETY REQUIREMENTS:

In the performance of this Contract, the Contractor shall comply with all applicable federal, state, and local laws governing safety, health, and sanitation.

- A. **Jobsite Safety:** The Contractor shall be solely responsible for ensuring that all work performed under the Contract is performed in strict compliance with all applicable Federal, State and local occupational safety regulations. The Contractor shall provide at its expense all safeguards, safety devices, and protective equipment, and shall take any and all actions appropriate to providing a safe jobsite.
- B. **Project Safety Official:** The Contractor shall designate in writing a Project Safety Official who shall be at the jobsite at all times, and who shall be thoroughly familiar with the Contractor's Injury and Illness Prevention Program (IIPP) and Code of Safe Practices (CSP). The Project Safety Official shall be available at all times to abate any potential safety hazards and shall have the authority and responsibility to shut down an operation, if necessary. Failure by the Contractor to provide the required Project Safety Official shall be grounds for the County to direct the cessation of all work activities and operations at no cost to the County until such time as the Contract is in compliance.
- C. **Safety Indemnification:** To the extent allowed by law, the Contractor agrees to defend, indemnify and hold harmless the County and its officers, employees, and agents from and against any and all investigations, complaints, citations, liability, expense (including defense costs and legal fees), claims and/or causes of action for damages of any nature whatsoever, including but not limited to injury or death to employees of the Contractor, its subcontractors or County attributable to any alleged act or omission of the Contractor or its subcontractor which is in violation of any CAL/OSHA regulation. The obligation to defend, indemnify and hold harmless includes all investigations and proceedings associated with purported violations of Section 336.10 of Title 8 of the California Code of Regulations pertaining to multi-employer work sites. The County may deduct from any payment otherwise due the Contractor any costs incurred or anticipated to be incurred by the County, including legal fees and staff costs, associated with any investigation or enforcement proceeding brought by CAL/OSHA arising out of the Project.

43. INDEMNIFICATION:

- A. Until the Work is completed and accepted by the awarding entity, the Contractor shall indemnify, defend, and hold harmless the County, its Special Districts, elected and appointed officials, officers, employees, agents, and trustees (the indemnified parties) from and against any and all liability, loss, injury, or damage including (but not limited to) demands, claims, actions, fees, costs and expenses (including attorney and expert witness fees) arising from or connected with the Contractor's acts and/or errors and omissions arising from and/or relating to the Project. This indemnification does not apply to liability caused by the active negligence of the County.
- B. The Contractor shall assume all risks and bear all cost for loss of, damage to, or missing or stolen equipment, tools, vehicles, and materials owned, hired, leased, or used by the Contractor for this Project.

44. GENERAL INSURANCE REQUIREMENTS:

Without limiting the Contractor's indemnification, the Contractor shall provide and maintain, during the term of this Agreement, the insurance specified in this Agreement. Such insurance shall be primary to, and not contributing with, any insurance or self-insurance programs maintained by the County and such coverage shall be provided and maintained at the Contractor's own expense.

- A. Evidence of Insurance: Certificate(s) or other evidence of coverage satisfactory to the County shall be delivered to the project contract administrator (as identified in the Invitation for Bids) at Los Angeles County Department of Public Works, Business Relations and Contracts Division, Contracts Administration Section, P.O. Box 1460, Alhambra, CA 91802-1460, prior to commencing services under this Agreement. Such certificate(s) or other evidence shall:
 - 1. Specifically identify this Agreement, including the project name and specification number.
 - 2. Clearly evidence all insurance required in this Agreement.
 - 3. Contain the express condition that the County is to be given written notice by the issuing insurance company by mail at least 30 days in advance of cancellation for all policies evidenced on the certificate of insurance.
 - 4. Include a copy of the additional insured endorsement to the commercial general liability policy, adding the indemnified parties (the

County of Los Angeles and its Special Districts) as insureds for all activities arising from this Agreement.

5. Show the Contractor's insurance as primary to the County's insurance and self-insurance programs. This may be evidenced by adding the following statement to the additional insured endorsement, "It is further agreed that the insurance afforded by this policy is primary to any insurance or self-insurance programs maintained by the additional insureds, and the additional insureds insurance and self-insurance programs are excess and non-contributing to the named insureds insurance."
 6. Confirm deductibles or self-insured retentions shall not exceed \$25,000, and the deductibles/retentions apply on a "per occurrence" or "per loss" basis. The County retains the right to require the Contractor to provide a bond guaranteeing payment of all such retained losses and costs attributable to the Contractor's retention, or, withhold payment to Contractor in the amount of all or any deductibles/retentions as the County deems appropriate.
- B. Insurer Financial Ratings: Insurance is to be provided by an insurance company authorized to do business in California and acceptable to the County, with an A.M. Best rating of not less than A:IX, unless otherwise approved by the County.
- C. Waiver of Subrogation: The Contractor agrees to release the indemnified parties and waive its rights of recovery against the indemnified parties under the insurance policies specified in this Agreement.
- D. Cancellation of or Changes in Insurance: Contractor shall provide County with, or Contractor's insurance policies shall contain a provision that County shall receive, written notice of cancellation or any change in Required Insurance, including insurer, limits of coverage, term of coverage or policy period. The written notice shall be provided to County at least ten (10) days in advance of cancellation for non-payment of premium and thirty (30) days in advance for any other cancellation or policy change. Failure to provide written notice of cancellation or any change in Required Insurance may constitute a material breach of the Contract, in the sole discretion of the County, upon which the County may suspend or terminate this Contract.
- E. Failure to Maintain Insurance: Contractor's failure to maintain or to provide acceptable evidence that it maintains the Required Insurance shall constitute a material breach of the Contract, upon which County immediately may withhold payments due to Contractor, and/or suspend or terminate this Contract. County, at its sole discretion, may obtain damages from Contractor

resulting from said breach. Alternatively, the County may purchase the Required Insurance, and without further notice to Contractor, deduct the premium cost from sums due to Contractor or pursue Contractor reimbursement.

- F. Sub-Contractor Insurance Coverage Requirements: Contractor shall include all Sub-Contractors as insureds under Contractor's own policies, or shall provide County with each Sub-Contractor's separate evidence of insurance coverage. Contractor shall be responsible for verifying each Sub-Contractor complies with the Required Insurance provisions herein, and shall require that each Sub-Contractor name the County and Contractor as additional insureds on the Sub-Contractor's General Liability policy. Contractor shall obtain County's prior review and approval of any Sub-Contractor request for modification of the Required Insurance.

45. INSURANCE COVERAGE REQUIREMENTS--TYPES AND LIMITS:

The County's insurance requirements specify that Contractors should obtain coverage from insurance companies acceptable to the County who have a current A.M. Best rating of not less than A:IX. A Best rating of A:IX indicates that the company evidences strong financial strength and ability to meet their ongoing financial obligations to policyholders.

- A. Builders Risk Course of Construction Insurance: Such coverage shall:
1. Insure against damage from perils covered by the Causes-of-Loss Special Form (ISO form CP 10 30), and be endorsed to include earthquake, flood, ordinance or law coverage, coverage for temporary offsite storage, debris removal, pollutant cleanup and removal, testing, preservation of property, excavation costs, landscaping, shrubs and plants and full collapse coverage during construction (without restricting collapse coverage to specified perils).
 2. If Contractor's work involves testing air conditioning systems, boilers, pressure vessels, major machinery or major electrical panels, policy shall include coverage for such testing.
 3. Be written on a completed-value basis and cover the entire value of the construction Project, including County-furnished materials and equipment, against loss or damage until completion and acceptance by the County. See Supplementary Conditions, Section 00 08 00, Article 7, Insurance Coverage Requirements—Types and Limits, for additional information regarding replacement value of County-furnished materials and equipment.

- B. General Liability Insurance: Such coverage shall be written on ISO policy form CG 00 01 or its equivalent. See Supplementary Conditions, Section 00 08 00, Article 7, Insurance Coverage Requirements—Types and Limits, for additional information regarding limits, occurrence, policy aggregate, and products/completed operations aggregate.
- C. Automobile Liability Insurance: Such coverage shall be written on ISO form CA 00 01 or its equivalent. Such insurance shall include coverage for all “owned,” “hired,” and “non-owned” automobiles, or coverage for “any auto.” See Supplementary Conditions, Section 00 08 00, Article 7, Insurance Coverage Requirements—Types and Limits, for additional information regarding liability limits.
- D. Workers Compensation and Employers Liability Insurance: Such coverage shall provide workers compensation benefits, as required by the Labor Code of the State of California. Such policy shall be endorsed to waive subrogation against the County for injury to the Contractor’s employees. If the Contractor’s employees will be engaged in maritime employment, the coverage shall provide the benefits required by the U.S. Longshore and Harbor Workers Compensation Act, Jones Act, or any other Federal law to which the Contractor is subject.
1. In all cases, the above insurance shall include Employers Liability coverage with limits not less than:
- | | | |
|----|--------------------------|-------------|
| a. | Each accident: | \$1 million |
| b. | Disease – policy limit: | \$1 million |
| c. | Disease – each employee: | \$1 million |
- E. Performance Security Requirements:

Prior to execution of the Contract, the Contractor shall file surety bonds with the County in the amounts and for the purposes noted below, and on bond forms provided by the County. All bonds issued in compliance with the Contract shall be duly executed by a solvent surety company that is authorized by the State of California, is listed in the U.S. Department of Treasury’s Listing of Approved Sureties (Annual Circular 570) and is satisfactory to the County, and it shall pay all premiums and costs thereof and incidental thereto (see <http://www.fms.treas.gov/c570/>).

1. Materials and Labor Bond (Payment Bond): Shall be in the sum of not less than 100% of the Contract price to assure the payment of claims

of material men supplying materials to the Contractor, subcontractors, mechanics, and laborers employed by the Contractor on the Work. This bond shall be so conditioned as to inure to the benefit of persons furnishing materials for or performing labor upon the Work. This bond shall be maintained by the Contractor in full force and effect until the Work is completed and accepted by the County, and until all claims for materials, labor, and subcontracts are paid.

2. Bond for Faithful Performance: Shall be in the sum of not less than 100% of the Contract price to assure the faithful performance of the Contract. This bond shall be so conditioned as to assure the faithful performance by the Contractor of all Work under said Contract, within the time limits prescribed, including any maintenance and warranty provisions, in a manner that is satisfactory and acceptable to the County, that all materials and workmanship supplied by the Contractor will be free from original or developed defects, and that should original or developed defects or failures appear within a period of one year from the date of acceptance of the Work by the County, the Contractor shall, at Contractor's own expense, make good such defects and failures and make all replacements and adjustments required, within a reasonable time after being notified by the County to do so, and to the approval of the Department of Public Works. This bond shall be maintained by the Contractor in full force and effect during the performance of the Work of the Contract and for a period of one year after acceptance of the Work by the County.

Each bond shall be signed by both the Contractor (as Principal) and the surety.

Should any surety or sureties upon said bonds or any of them become insufficient or be deemed unsatisfactory by the County, the Contractor shall replace said bond or bonds with good and sufficient sureties within ten days after receiving notice from the County that the surety or sureties are insufficient or unsatisfactory. Should any surety or sureties be deemed insufficient or unsatisfactory, no payment(s) shall be deemed due or will be made under this Contract until the new sureties shall qualify and be accepted by the County.

46. Not used.

47. Not used.

48. ASSIGNMENT:

- A. The Contractor shall not assign this Contract without the consent of the County. The Contractor shall be bound by and comply with all applicable provisions of the Labor Code of the State of California and shall keep informed of and observe and comply with and cause all of Contractor's agents and employees to observe and comply with all federal, state, and local laws which in any way affect the conduct of the Work of this Contract.
- B. Work performed on County-owned property, irrespective of political subdivision location, shall be governed by the County Building Laws, and Work performed outside the property lines of County-owned property shall be governed by the local laws of the County, city, or other municipal government having jurisdiction.

49. PATENTS:

In the event that any patented article, material, or process is to be installed or used in the performance of the Work as shown on the drawings or particular specifications therefore, the Contractor shall pay the royalty chargeable and shall save, keep, and bear the County harmless from all damage, costs, and expenses by reason of any infringement of the patent therefor, or by reason of the failure to pay the royalty chargeable for use thereof, and any loss to the County or the awarding entity in the event that the County is enjoined from using such patented article or material and the incidental damage caused by the loss of use and damage to County property or awarding entity in removing same, and cost of replacing the article or material the use of which is enjoined. Provided further the Bond for Faithful Performance shall be deemed to expressly apply to this provision of the specifications.

50. SUSPENSION AND/OR TERMINATION OF WORK AND/OR CONTRACT:

A. Suspension of Work

- 1. The Director may order the Contractor in writing to suspend, delay or interrupt all or any part of the Work for such period of time as he may determine to be appropriate for the convenience of the County.
- 2. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize incurring costs allocable to the Work covered by the order during the period of Work stoppage.

3. If the performance of all or any part of the Work is, for an unreasonable period of time, suspended, delayed, or interrupted by (a) an act of the County in the administration of this Contract, or (b) by the County's failure to act within the time specified in this Contract (or, if no time is specified, within a reasonable time), an adjustment shall be made for any increase in cost of performance of this Contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption, and the Contract modified in writing accordingly. However, no adjustment shall be made under this Article for any suspension, delay, or interruption to the extent (a) that performance would have been suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or (b) for which an adjustment is provided for or excluded under any other provision of this Contract.
4. No claim under this paragraph shall be allowed (a) for any costs incurred more than fourteen (14) calendar days before the Contractor shall have notified the County in writing of the act or failure to act involved, (but this requirement shall not apply as to a claim resulting from a suspension order), and (b) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment. No part of any claim based on the provisions of this clause shall be allowed if not supported by adequate evidence showing that the cost would not have been incurred but for a delay within the provisions of this Article.

B. Termination for Convenience

1. The Director may, whenever the interests of the County so require, terminate this Contract, in whole or in part, for the convenience of the County. The County shall give written notice of the termination to the Contractor specifying the part of the Contract terminated and the date termination becomes effective.
 - a. The Contractor shall incur no further obligations in connection with the terminated Work, and, on the date set in the notice of termination, the Contractor shall stop Work to the extent specified. The Contractor shall also terminate outstanding orders and subcontracts as they relate to the terminated Work. The Contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders connected with the terminated Work. The County may direct the Contractor to

assign the Contractor's right, title, and interest under the terminated orders or subcontracts to the County. The Contractor must still complete the Work not terminated by the notice of termination and may incur obligations as are necessary to do so.

- b. The County may require the Contractor to transfer title and deliver to the County in the manner and to the extent directed by the County: (a) the fabricated or unfabricated parts, Work in process, completed Work, supplies, and other material produced or acquired for the Work terminated; and (b) the completed or partially completed plans, drawings, information, and other property that, if the Contract had been completed, would be required to be furnished to the County. The Contractor shall, upon direction of the County, protect and preserve property in the possession of the Contractor in which the County has an interest. If the County does not exercise this right, the Contractor shall use its best efforts to sell such supplies and manufacturing materials for the benefit of the County.
- c. If the parties are unable to agree on the amount of a termination settlement, the County shall pay the Contractor the following amounts:
 - 1. For Contract Work performed before the effective date of termination, the total (without duplication of any items) of:
 - (a) The percentage of the Contract price which equals the percentage (%) of Work completed in accordance with the schedule of values, less prior progress payments, and any applicable Liquidated Damages. The amounts of outstanding Stop Notices shall be withheld until the Stop Notices are resolved as provided by law.
 - (b) The cost of settling and paying terminated subcontracts and orders that are properly chargeable to the terminated portion of the Work;

2. The reasonable costs of effectuating the settlement of the Work terminated, including:
 - (a) Accounting, clerical, and other expenses reasonably necessary for the preparation of termination settlement bids and supporting data;
 - (b) The termination and settlement of subcontracts (excluding the amounts of such settlements); and
 - (c) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

C. Termination for Default

1. If the Contractor refuses or fails (a) to commence the Work within the time required by this Contract, (b) to prosecute the Work or any separable part with the diligence that will ensure completion within the time specified in this Contract, including any authorized extension, (c) to provide sufficient and properly skilled workers or proper materials or equipment to complete the Work in an acceptable manner and without delay, (d) to promptly pay its subcontractors, laborers, and materialmen, (e) to perform any of Contractor's other obligations under this Contract, or (f) to complete the Work within the time specified in this Contract ("events of default"), the County may, by written notice to the Contractor, terminate the right to proceed with the Work (or the separable part of the Work). In this event, the County may take over the Work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the site necessary for completing the Work. The Contractor and Contractor's sureties shall be liable for any damage to the County resulting from events of the default, whether or not the Contractor's right to proceed with the Work is terminated. This liability includes any increased costs incurred by the County in completing the Work.
2. The Contractor's right to proceed shall not be terminated because of delays, nor will the Contractor be charged with damages under this article, if:
 - a. The delay in completing the Work arises from unforeseeable causes beyond the control and without the fault or negligence

of the Contractor (examples of such causes include: (i) acts of God, (ii) acts of the public enemy, (iii) acts of the County in either its public or contractual capacity, (iv) acts of another Contractor in the performance of a contract with the County, (v) fires, (vi) floods, (vii) epidemics, (viii) quarantine restrictions, (ix) strikes, (x) freight embargoes, (xi) unusually severe weather, or (xii) delays of Subcontractors or Suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the Subcontractors or Suppliers); and,

b. The Contractor, within fourteen (14) calendar days from the beginning of any delay (unless extended by the County), notifies the County in writing of the causes of the delay in accordance with Specification Section 001310, Construction Schedule. The County shall ascertain the facts and the extent of the delay. If, in the judgment of the County, the findings warrant such action, the time for completing the Work shall be extended by Change Order. The findings of the County will be final and conclusive on the parties.

3. If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the County.

4. The rights and remedies of the County in this article are in addition to any other rights and remedies provided by law or under this Contract. Time is of the essence for all delivery, performance, submittal, and completion dates in this Contract.

D. Termination for Improper Consideration

1. County may, by written notice to Contractor, immediately terminate the right of Contractor to proceed under this Contract if it is found that consideration, in any form, was offered or given by Contractor, either directly or through an intermediary, to any County officer, employee, or agent with the intent of securing the Contract or securing favorable treatment with respect to the award, amendment, or extension of the Contract or the making of any determinations with respect to the Contractor's performance pursuant to the Contract. In the event of such termination, County shall be entitled to pursue the same

remedies against Contractor as it could pursue in the event of default by the Contractor.

2. Contractor shall immediately report any attempt by a County officer or employee to solicit such improper consideration. The report shall be made either to the County manager charged with the supervision of the employee or to the County Auditor-Controller's Employee Fraud Hotline at (213) 974-0914 or (800) 544-6861.
3. Among other items, such improper consideration may take the form of cash, discounts, services, the provision of travel or entertainment, or tangible gifts.

- E. Notice of suspension or termination for any reason shall be given in writing and shall be complete one day after deposit in the United States mail in a sealed envelope with postage prepaid and directed to the Contractor at Contractor's address as filed with the County, or upon personal delivery to any person whose actual knowledge of such suspension or termination would be sufficient notice to the Contractor. Actual knowledge of such suspension or termination by an individual Contractor or by a copartner, if the Contractor be a partnership or by the president, vice-president, secretary or general manager, if the Contractor be a corporation, or by the managing agent regularly in charge of the Work on behalf of said Contractor, shall in any case be sufficient notice.

51. CONTRACTOR'S WARRANTY OF ADHERENCE TO COUNTY'S CHILD SUPPORT COMPLIANCE PROGRAM:

- A. Contractor acknowledges that County has established a goal of ensuring that all individuals who benefit financially from County through Contract are in compliance with their court-ordered child, family, and spousal support obligations in order to mitigate the economic burden otherwise imposed upon County and its taxpayers.
- B. As required by County's Child Support Compliance Program (County Code Chapter 2.200) and without limiting Contractor's duty under this Contract to comply with all applicable provisions of law, Contractor warrants that it is now in compliance and shall, during the term of this Contract, maintain compliance with employment and wage reporting requirements as required by the Federal Social Security Act (42 USC Section 653a) and California Unemployment Insurance Code Section 1088.5, and shall implement all lawfully serviced Wage and Earnings Withholding Orders or District Attorney Notices of Wage and Earnings Assignment for Child or Spousal Support,

pursuant to Code of Civil Procedure Section 706.031 and Family Code Section 5246(b).

- C. Failure of Contractor to maintain compliance with these requirements shall constitute a default by Contractor under this Contract. Without limiting the rights and remedies available to County under any other provision of this Contract, failure to cure such default within ninety (90) days of notice by the Los Angeles County District Attorney shall be grounds upon which the County Board of Supervisors may terminate this Contract.

52. CONTRACTOR'S ACKNOWLEDGMENT OF COUNTY'S COMMITMENT TO CHILD SUPPORT ENFORCEMENT:

Contractor acknowledges that County places a high priority on the enforcement of child support laws and the apprehension of child support evaders. Contractor understands that it is County's policy to encourage all County Contractors to voluntarily post County's L.A.'s Most Wanted: Delinquent Parents poster in a prominent position at Contractor's place of business. County's District Attorney will supply Contractor with the poster to be used.

53. LIMITATION OF LIABILITY:

- A. This project may be awarded by or the Contract may be assigned to a joint powers authority or a nonprofit corporation established by the awarding entity. Bonds, certificates of participation, or other evidences of indebtedness will be issued by a joint powers authority or nonprofit corporation or the awarding entity or the County, for the purpose of constructing the Work contemplated by these Drawings and Specifications. The proceeds of said sale shall be the sole source of funds for payment of all Work to be done and all claims of any kind that may be made under the provisions of this Contract. Neither the awarding entity, nor (if different) the issuing entity, nor any individual parties thereto, nor the County, nor the County's agents and Special Districts, shall have any liability whatsoever to the Contractor or others arising out of, or in any way connected with, Work to be performed hereunder, save and except as such liability may be paid and discharged out of said proceeds, and except as specifically provided for in these specifications. Contractor shall look solely to said proceeds for payment of Work to be done or any claims whatsoever that may be asserted hereunder. Contractor expressly releases and discharges the awarding entity, the issuing entity, and the County and each of them from any and all liability, cost, or expenses save and except such liability, cost, and expense as may be paid for out of said proceeds.

- B. The issuing entity will adopt a policy to sell and issue bonds, certificates of participation, or other evidences of indebtedness at such times and in sufficient amounts to ensure that funds are provided for the prompt payment, as installments become due, for Work performed hereunder.

54. FORUM SELECTION:

Contractor hereby agrees to submit to the jurisdiction of the courts of the State of California. The exclusive venue of any action brought by Contractor, on Contractor's behalf or on the behalf of any Subcontractor, which arises from this agreement or is concerning or connected with services performed pursuant to this agreement, shall be deemed to be in the courts of the State of California located in Los Angeles County, California.

55. WAIVER:

The waiver by the County of any term, covenant, or condition herein contained shall not be deemed to be a waiver of such term, covenant, or condition on any subsequent breach of the same or any other term, covenant, or condition herein contained.

56. PRIOR AGREEMENTS:

This Contract contains all of the agreements of the parties hereto with respect to any matter covered or mentioned in this agreement and no prior agreements or understanding pertaining to any such matter shall be effective for any purpose. No provision of this Contract may be amended or added to except by an agreement in writing signed by the parties hereto or their respective successor-in-interest.

57. PROGRESS PAYMENTS:

In accordance with Public Contract Code Section 20104.50, the County shall make progress payments within thirty (30) days after receipt of an undisputed and properly submitted payment request from a Contractor on a construction contract. Interest shall be paid to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure if the County fails to make payment within the thirty (30) days. If the payment request is determined not to be a proper payment request suitable for payment, it shall be returned to the Contractor as soon as practicable, but not later than seven (7) days after receipt accompanied by a document setting forth in writing the reasons why the payment request is not proper. The Contractor will prepare and submit progress payments as directed by the County Project Manager.

58. ACCEPTANCE OF FINAL PAYMENT AS RELEASE:

The acceptance by the Contractor of the final payment shall be and shall operate as a release to the County and the awarding entity of all claims and all liability to the Contractor for all things done or furnished in connection with this Work and for every act and neglect of the County, awarding entity, and others relating to or arising out of this Work. No payment, however final or otherwise, shall operate to release the Contractor or his sureties from any obligation under this contract or the Performance and Payment Bond.

59. SUBSTITUTION OF SECURITIES FOR RETENTION:

In accordance with Public Contracts Code Section 22300 et seq., the Contractor may substitute securities for retention monies to be withheld to ensure performance under this Contract. At the request and expense of the Contractor, securities equivalent to the amount withheld may be deposited with the County, or with an approved State or Federally chartered bank as the escrow agent. The County will then pay such retention moneys to the Contractor. It is the Contractor's obligation to secure the services of a state or federally chartered bank to act as escrow agent. Securities eligible for investment include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit. The Contractor shall be the beneficial owner of any securities substituted for retention monies withheld and shall receive any interest earned by the securities. The standard form of the County's Escrow Agreement is on file at the Business Relations and Contracts Division of the Department of Public Works. The terms of that Agreement are incorporated by reference.

60. RESOLUTION OF CONSTRUCTION CLAIMS:

The provision of Public Contract Code 20104 et seq. relating to the resolution of construction claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a Contractor and a local agency are hereby incorporated in this Contract.

61. CONFLICT OF INTEREST:

No County employee whose position in County enables him to influence the award of this agreement or any competing agreement, and no spouse or economic dependent of such employee, shall be employed in any capacity by Contractor herein, or have any other direct or indirect financial interest in this Agreement.

62. ANTI-TRUST CLAIMS:

In entering into a public works Contract or a Subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or 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 44 Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2, Division 7, of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works Contract or Subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

63. COUNTY'S QUALITY ASSURANCE PLAN:

The County or its agent will evaluate Contractor's performance under this agreement on not less than an annual basis. Such evaluation will include assessing Contractor's compliance with all contract terms and performance standards. Contractor deficiencies which County determines are severe or continuing, and that may place performance of the agreement in jeopardy if not corrected, will be reported to the Board of Supervisors. The report will include improvement/corrective action measures taken by the County and Contractor. If improvement does not occur consistent with the corrective action measures, County may terminate this agreement or impose other penalties as specified in this agreement.

64. LAWS, CODES AND REGULATIONS TO BE OBSERVED:

- A. The Contractor shall become familiar and comply with all Federal, State, County and City laws, ordinances or regulations controlling the action or operation of those engaged in the work, or affecting materials used, and operate in accordance therewith.
- B. In accordance with this requirement, it has not been considered necessary to enumerate all wiring, plumbing and other requirements covered by the codes. The Contractor, in making a bid, agrees that the requirements of such ordinances will be as carefully adhered to as if they were specifically set forth in the specifications.
- C. The Contractor shall hold harmless the County and all of its officers, agents and servants against any claims or liability arising from, or based upon the violation of such laws, by-laws, ordinances, regulations, orders or decrees, whether by the Contractor or the Contractor's employees, except where the instance of violation is done in accordance with the specifications.

- D. Work performed on County-owned property, irrespective of political subdivision location, shall be governed by the County Building Laws; and work performed outside the property lines of County-owned property shall be governed by the local laws of the County, City, or other municipal government having jurisdiction.

* * *

(00700.REV 5/2008)

SECTION 00 08 00

SUPPLEMENTARY CONDITIONS

1. **DEFINITIONS:**

Whenever the following words appear in the Contract Documents, they will be construed to have the following meanings:

- a. "County" means the County of Los Angeles.
- b. "Awarding Entity/County" means either the County; the County, as agent for such joint powers authority or nonprofit corporation as may be involved in the issuance of bonds, certificates of participation or other evidences of indebtedness to finance the work contemplated herein; or said joint powers authority or nonprofit corporation.
- c. "Board of Supervisors" means the Board of Supervisors, County of Los Angeles, California.
- d. "Department" means the Department of Public Works.
- e. "Owner" means the County of Los Angeles, represented by the Department of Public Works.
- f. "Director" means the Director of the Department of Public Works or his authorized representative.
- g. "Architect" means Huitt-Zollars, Inc., or their authorized representative.
- h. "Project Manual" means the manual prepared for the project, consisting of the Bid and Contract Requirements, Conditions of the Contract, and Technical Specifications.
- i. "Contract" means the agreement which has been executed by the Contractor and the County.
- j. "Contract Documents" means those documents identified in Paragraph 5 of the General Conditions.
- k. "Contractor" means the Prime Contractor awarded the Contract by the Board of Supervisors.

- l. "Award of Contract" means the date the Board of Supervisors awards the construction Contract to the Contractor.
- m. "Notice to Proceed" means the date the Director authorizes the Contractor to proceed with the Contract work.
- n. "Acceptance of the Project" means Los Angeles County Board of Supervisors or Director's acceptance of the work.
- o. "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The work may constitute the whole or a part of the project.
- p. "The Project" is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include Work by the County or others.
- q. "Substantial Completion" means the Date of Substantial Completion of the Work, or designated portion thereof as set forth in the Contract Documents, certified by the County when construction is sufficiently complete, in accordance with the Contract Documents, so the County may occupy or use the Work, or designated portion thereof, for the use for which it is intended.
- r. "Disputes Review Panel" reviews all matters related to disputes over the interpretation of the Drawings and Specifications.
- s. "Notice to Bidders" means any written modification to the Contract Documents issued prior to the bid date.
- t. "Day" means calendar day unless otherwise specified.
- u. "Drawings" means the graphical and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the work, generally including plans, elevations, sections, details, schedules, and diagrams.
- v. "Specifications" means that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the work, and performance of related services.

- w. "Inspection Notice": A sequentially numbered written notice issued to the Contractor for the purpose of, but not limited to, the following:
- 1) Define items/installations that deviate from the Contract Documents and which payment may be withheld.
 - 2) Alert as to problem areas prior to issuing Noncompliance.
 - 3) Void previously issued Inspection or Noncompliance Notice when corrections have been made.
 - 4) Give notice of approval.
 - 5) Provide general project information.
 - 6) Define delinquent submittals.
 - 7) Advise Contractor of not complying with safety requirements.
- x. "Noncompliance Notice": A sequentially numbered written notice issued to the Contractor that defines materials, installations, and/or situations that do not comply with codes or the Contract Documents and which payment cannot be made. The statement "remove and replace" will be included when required.

2. PAYMENTS:

Payments on account of the Work comprising the original Contract shall be made upon demand of the Contractor as follows:

- a. A working day of the month shall be selected by the County and the Contractor, which day shall remain constant throughout the life of the project, and vary only as needed to fall on a working day. A payment request equal to ninety-five percent (95%) of the labor performed and material actually installed in the work during the previous thirty (30) days or since the last payment request shall be submitted by the Contractor and presented to the County for payment.
- b. A payment request for the 5% withheld from the monthly progress payments shall be submitted by the Contractor to the County upon completion and acceptance by the County of all the work called for under the original Contract.

- c. In the event of payment on account of additional work for a Change Order, supplemental agreement, or unit price authorization, the retention shall be as stipulated by the original Contract.
- d. When progress payments are to be made, no payment on account of the work and at any time while there is work in progress, will be considered an acknowledgment that any or certain portions of the work have been done in accordance with the Drawings and Specifications. Should there be any balance due the Contractor at the time of the acceptance of the work such balance shall be paid upon said acceptance.
- e. All demands for payment shall be itemized and rendered in six (6) copies by the Contractor and shall be certified by the Director when found by him to be correct. Payment will be made to the Contractor within thirty (30) days after the approval by the Director.
- f. Cost of bonds or liability insurance shall not be included as an item in the demands for monthly progress payments. In the compilation of demands for progress payments, neither stipulated nor bid unit prices for deductions shall be used as the basis for computing prices for the work completed.
- g. When the Contractor has requested payments that would bring his total payment to fifty percent (50%) of the Contract, all subcontractors and material suppliers on record with the Contract Administrator will be notified by U. S. Mail regarding the status of such payment.

Subcontractors and material suppliers of record will be advised to refer to their rights under the Civil Code relating to the "Stop Notices" and other means or methods of securing payment for their work or materials.

3. PAYMENT FOR STORED MATERIAL:

The Department, at its discretion, may authorize "Progress Payments" at the invoiced price, minus retention specified under "Payments", for:

- a. Material and equipment delivered to the site but not incorporated in the Work.
- b. Material and equipment delivered and stored off the site in a bonded warehouse or other location within Los Angeles County, which warehouse or other location is satisfactory to and has been approved by the Department.

- c. The provisions allowing prepayment for materials will be applied to large items of equipment and construction materials of special manufacture or order for the job, such as:
1. Electrical switchgear, generators, and transformers over 15 KVA.
 2. Mechanical items including air handlers over 15 horsepower, boilers, chillers, and fabricated ductwork.
 3. Reinforcing steel and structural steel when fabricated to job requirements.
 4. Carpeting, floor tile or ceiling tiles.
 5. Electrical fixtures (less lamps) and light standards.
 6. Door and security hardware.
 7. Window wall assemblies.
 8. Precast concrete members such as wall panels, "tees" or girders.

Contractor must furnish with his Request for Payment acceptable evidence showing such material and/or equipment has been paid for in full, together with a verified statement that same is/are free from all liens and encumbrances and will be utilized in the Work covered by this Contract and a material list sufficient for physical inventory at the storage location. All shop drawings and material submittals must be approved prior to authorizing payments.

All storage, handling and rehandling costs, insurance and responsibility for protection and proper installation of such material and equipment, is the obligation of the Contractor. No payment, pursuant to this provision for material or equipment, shall in any way relieve the Contractor of its responsibility to obtain or provide, at its expense, any such material or equipment, or release the Contractor from any of its obligations under this Contract.

Department may enter upon the premises where the material and/or equipment is stored for inspection, checking, or any other purpose it deems necessary. The Contractor will be reimbursed for any Los Angeles County taxes levied against such material or equipment while so stored, upon presentation of a receipted tax bill for same.

4. EQUIPMENT LAYOUT DRAWINGS:

When any section of the specifications requires the submittal of an "Equipment Layout Drawing", the Contractor shall coordinate all work under various sections of the Specifications to assure that no interferences occur in the rooms or areas for which such drawings have been required and that necessary clearances are provided.

Installation of affected equipment shall not proceed until required drawings have been approved by the Department.

5. AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS:

The following forms and reports are required to be completed by the Contractor and/or Subcontractors according to the instructions furnished for each and at the time shown below for each:

- a. Within ten (10) working days of subcontract award:
 - Contractor's Notification of Subcontracts Awarded
- b. Prior to commencement of work:
 - Notice of EEO Commitment
- c. During the construction period:
 - Monthly Employment Utilization Report (form CC257)

6. SURVEY OPERATIONS:

The Contractor shall be responsible for all survey and layout operations and shall be responsible for the following:

- a. Locate elevations of all improvements, establish control points and bench marks adequate for the use of all trades so that all parts of the work are within the specified and indicated tolerances.
- b. As the work proceeds, verify all grades, lines, and dimensions indicated on the drawings, and report errors and inconsistencies to the Architect in writing. Do not proceed until errors and inconsistencies are corrected.

- c. Maintain staking as required by construction progress and maintain construction progress and maintain control points and benchmarks until final completion of the project.

7. INSURANCE COVERAGE REQUIREMENTS—TYPES AND LIMITS:

A. Installation Floater: Such coverage is required for this Project and shall supercede Section 00 07 00, Builder's Risk Course of Construction Insurance, Article 45, and shall:

- 1. Insure against damage from perils covered by the Causes-of-Loss Special Form (ISO form CP 10 30), and the perils of earthquake, flood, risk of transit loss, loss during storage (both onsite and offsite), and collapse during construction (without restricting collapse coverage to specified perils). If Project involves testing air conditioning systems, boilers, pressure vessels, major machinery or major electrical panels, policy shall include coverage for such testing.
- 2. Cover all property to be installed (including labor) for the full Contract value (without coinsurance) against loss or damage until completion and acceptance by the County.
- 3. Such coverage shall be equal to the total Contract cost.

B. General Liability Insurance:

Minimum coverage requirements shall provide limits of not less than \$1,000,000 per occurrence, \$2,000,000 policy aggregate, and \$2,000,000 products/completed operations aggregate.

C. Automobile Liability Insurance:

Minimum coverage requirements shall provide a limit of liability not less than \$1,000,000 per accident.

D. Workers Compensation and Employers Liability Insurance: Such coverage shall provide workers compensation benefits, as required by the Labor Code of the State of California. Such policy shall be endorsed to waive subrogation against the County for injury to the Contractor's employees. If the Contractor's employees will be engaged in maritime employment, the coverage shall provide the benefits required by the U.S. Longshore and Harbor Workers

Compensation Act, Jones Act, or any other Federal law to which the Contractor is subject.

1. In all cases, the above insurance shall include Employers Liability coverage with limits not less than:

- i. Each accident: \$1 million
- ii. Disease – policy limit: \$1 million
- iii. Disease – each employee: \$1 million

8. CERTIFICATE OF INSURANCE:

- a. Refer to General Conditions, Articles 43, 44, and 45, regarding insurance.

- b. Certificate of Insurance shall include the following statement:

"It is further understood and agreed that these insurance policies comply with the Contract requirements of this project."

- c. The cancellation clause shall be modified to read as follows:

"Should any of the above-described policies be canceled before the expiration date thereof, the issuing company will mail 30 days written notice to the below-named certificate holder.

- d. The Certificate of Insurance shall clearly state that the County of Los Angeles and its Special Districts are named as Additional Insured.

- e. Include the name of the project and specification number on all insurance certificates.

9. CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT:

The Contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act of 1970 (42 U.S.C. 1857 et seq.) and the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.) as amended. Violations shall be reported to the County and the Regional Office of the Environmental Protection Agency.

10. LOBBYING OF COUNTY OFFICIALS:

Contractor and each County lobbyist or County lobbying firm as defined in Los Angeles County Code Section 2.160.010, retained by Contractor, shall fully comply with the County Lobbyist Ordinance, Los Angeles County Code Chapter 2.160. Failure on the part of Contractor or any County lobbyist or County lobbying firm retained by Contractor to fully comply with the County Lobbyist Ordinance shall constitute a material breach of this Contract upon which County may immediately terminate or suspend this Contract.

11. CORRESPONDENCE:

All correspondence shall be addressed to the County of Los Angeles, Department of Public Works, P.O. Box 1460, Alhambra, California 91802-1460, Attention: Project Management Division. This address shall be included in all contracts with subcontractors and suppliers.

12. EMPLOYMENT OF LAID-OFF COUNTY EMPLOYEES - SKILLED TRADES AND OTHERS:

- a. Should Contractor, or any Subcontractor performing more than \$250,000 of the Contract value, require additional or replacement personnel to perform services under this Contract, other than the performance of a skilled trade, Contractor shall give first consideration for such employment openings to qualified former County employees who are on a re-employment list.
- b. Should Contractor, or any Subcontractor performing more than \$250,000 of the Contract value, require additional or replacement personnel to perform a skilled trade not covered by an existing union hiring agreement under this Contract, Contractor is encouraged to consider for such employment openings qualified County employees who are targeted for layoff or qualified former County employees who are on a re-employment list. In no event shall the County be liable for any cost, delay, or impact claims arising out of efforts to hire such present and former County employees.

* * *

00800.MAS
10/2009

SECTION 01 00 00

PROJECT GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of the Contract (1.02)
- B. Permanent Utility Services (1.03)
- C. Work not Included (1.04)
- D. Drawings (1.05)
- E. Time of Completion (1.06)
- F. Long Lead Time Materials and Equipment (1.07)
- G. Liquidated Damages (1.08)
- H. Examination of Site and Work (1.09)
- I. Cooperation (1.10)
- J. Restrictions to the Work (1.11)
- K. Cutting and Patching (1.12)
- L. Shop Drawings (1.14)
- M. Cleaning (1.15)
- N. Existing Utility Lines (1.16)
- O. Protective Measures (1.17)
- P. Project Administration (1.18)
- Q. Best Management Practices (BMP) Requirements (1.19)
- R. Work In Progress Under Other Contracts (1.20)

1.02 SCOPE OF THE CONTRACT

- A. Work to be done under the Contract consists of furnishing all materials, all equipment, and performing the Work required by these Specifications and the Drawings hereinafter, described and necessary, to complete the construction according to the contract documents, not limited to stamped bid set, project manual, any addenda and baseline schedule of the Camp Afflerbaugh CCTV Project.
- B. The work includes but is not limited to the following: Procure and Install an operable, new, dedicated, FLIR enterprise CCTV camera monitoring and storage system, utilizing multicast methodology including but not limited to the installation of dedicated fiber-optic backbone network, fiber patch panels, CAT 6 cables, switches, servers, and multiple monitoring stations, a duplicate redundant server system for backup video and audio storage, software applications to support and secure the system. Including configuration, testing and commissioning of the security system, software applications and

assist with connection to existing low voltage network system managed by the Los Angeles County Internal Services Department. The project also consists of procuring and installing two new cooling units to mitigate new heat loads, necessary electrical system work and plumbing condensate lines.

1.03 PERMANENT UTILITY SERVICES

The Work shall include all operations necessary to place required utility services in operating condition, including service lines from points of connection shown on Drawings, permanent meters, connections, and inspections. The work (when so scheduled) includes installation of telephone conduit, backboards, and terminal cabinets as shown, and cooperation with the serving utility company for the installation of other telephone equipment and cables. The County will arrange and pay for telephone switchboards, instruments, and cables.

All other expenses in connection with utility service installations shall be borne by the Contractor; however, upon receipt of certified cost statements, the County will reimburse Contractor for all charges made by serving companies in connection with permanent utility service installations.

Drawing notes and/or specification provisions of trade sections concerning utilities shall take precedence over the foregoing provisions.

1.04 WORK NOT INCLUDED

All items indicated on the Drawings as "N.I.C." (not in contract).

1.05 DRAWINGS

The Work shall conform to the contract documents entitled Camp Afflerbaugh CCTV.

1.06 TIME OF COMPLETION

- A. The work to be performed under the contract shall be completed within 243 calendar days, beginning with the date stipulated in the written notice to proceed issued by the Director.
- B. Failure to complete the work by the identified completion date will be subject to the Liquidated Damages identified in Paragraph 1.08.
- C. Final Payment Request shall be submitted within twenty (20) days after completion of the contract work, including all punch list items.

1.07 LONG LEAD TIME MATERIALS AND EQUIPMENT

- A. The Contractor shall make every effort to demand of his Subcontractors and suppliers, relative to long lead time items, that they order such items well in advance of the scheduled time of installation. Time extensions for late ordering of such materials will not be allowed.

1.08 LIQUIDATED DAMAGES

- A. All time limits stated in the Contract Documents are of the essence of the Contract and should the Contractor fail to complete the work required to be done on or before the time of completion as set forth in these specifications, including any authorized extension of time, it is mutually understood and agreed by and between the awarding entity and the Contractor that the use by the public of the Contract Work will be correspondingly delayed, and that by reason thereof, the awarding entity and the public will necessarily suffer great damages; that such damages from the nature of the case will be extremely difficult and impractical to fix; and that the awarding entity and the Contractor have endeavored to fix the amount of said damages in advance as follows:
 - 1. The sum of \$1000 a day for each day's delay in the completion of the work beyond the time limit stipulated in Paragraph 1.06.
- B. It is further mutually understood and agreed by and between the awarding entity and the Contractor that the sum of liquidated damages set forth above will be additive to a total of \$1000 a day for each and every day's delay in the event that the time limits, as hereinbefore specified, are concurrently exceeded. Any authorized extensions of time will be added to the time limits stipulated.
- C. The Extended Overhead Daily Rate is not applicable when it is determined that liquidated damages apply due to a Contractor's delay.

1.09 EXAMINATION OF SITE AND WORK

- A. Bidders must examine the location, physical conditions, and surroundings of the proposed Work and judge for themselves the extent to which these factors will influence the performance of the Contract Work.
- B. The plans for the Work show conditions as they are supposed or believed by the Department to exist, but it is not intended, or to be inferred, that the

conditions as shown thereon constitute a representation, express or implied by the County or its officers, that such conditions are actually existent, nor shall the Contractor be relieved of the liability under his Contract, nor the County, or any of its officers, be liable for any loss sustained by the Contractor as a result of any variance between conditions as shown on the plans or referred to in the Specifications and the actual conditions revealed during the progress of the Work.

- C. The County will conduct a prebid conference and job walk of the project site on December 18, 2024, at 10:00 a.m.

1.10 COOPERATION

In the entrance and exit of all workers and in bringing in, storing, or removing of materials and the erection and maintenance of equipment and in the manner and time of prosecuting the work, the Contractor shall cooperate with those in authority on the premises to prevent the entrance of those whose presence is forbidden or undesirable, and he shall observe all rules and regulations in force on the premises and avoid undue interference with the convenience, sanitation, and routine of County departments occupying the premises.

- Plan and coordinate material and labor access to site by providing sufficient notice to the County at a minimum of 48 hours.
- Tool check at entry and exit including any break. Maintain a daily inventory of tools and materials stored at site.
- Coordinate Contractor's schedule to minimize impacts to County daily operations.

1.11 RESTRICTIONS TO THE WORK

- A. The Department reserves the right to determine which of the Contractor's operations are noise, dust, or dirt producing, or which disrupt utility service, or which constitute blocking of passageways, exits, entrances, etc., or which in any way constitute an interference in the proper function of the building.
- B. Contractor shall maintain clear access to all protection equipment at all times, including access to fire hydrants.
- C. Control of Tools: During the progress of the work, all hand tools, including power driven hand tools, cables, ropes, and other implements shall be transported and retained, except when in use in an approved locked toolbox. Care shall be taken that no tool or equipment is left unguarded or left where it might be taken by an unauthorized person.

- D. All work by the Contractor is subject to inspection at any time and without notice by the County.
- E. The working hours are Monday through Friday between 7:00 a.m. to 4:00 p.m. unless otherwise specified by the County.

1.12 CUTTING AND PATCHING

The Contractor shall perform all cutting, patching, and finishing operations occasioned by the Work under the Contract, whether or not such operations are indicated on the Drawings or specifically mentioned in the various sections of the Specifications. All such operations shall be performed in the best practices of the various trades involved and to the satisfaction of the Department. All patching and finishing materials shall match existing adjacent surfaces in every respect, including design, type and quality of materials, finish, and color. Cutting, patching, and finishing shall include all such operations in existing areas required by the Work under the Contract.

1.14 SHOP DRAWINGS

Furnish all shop drawings as required in the various sections of the Specifications or as requested by the Department. Unless otherwise specified, submit one digital copy of shop drawings to the Department for review. If changes are required, one digital copy of corrected shop drawings shall be delivered to the Department. Shop drawings shall be of sufficient size and scale to clearly show all details; shop drawings of millwork and cabinet work shall show molding full size. No materials shall be furnished or Work done on items requiring shop drawings prior to acceptance. Acceptance of shop drawings shall not relieve the Contractor from responsibility for deviations from the Contract Documents, nor from responsibility for errors or omissions of any sort in the shop drawings. Neither does such acceptance relieve the Contractor from his responsibility for the correct installation, or for the proper operation in service, of items requiring shop drawings.

1.15 CLEANING

During progress of Work and upon completion of each part of the Work as defined by the sections into which these Specifications are divided or as separated by the various trades involved in the Work, each area shall be cleaned of debris emanating from the Work. The Contractor shall remove excess materials, waste, rubbish, and debris, and his construction and installation equipment from the premises to prevent any stock piling or tripping hazards. Any dirt and stains caused by the Work under the Contract shall be removed from the surfaces of the structures and from

equipment and fixtures. Final acceptance of the Work done under these Specifications will not be given until the cleaning has been inspected and approved by the Department.

1.16 EXISTING UTILITY LINES

Except as indicated on the Drawings or in the Specifications, the Contractor will not be liable for the rerouting of existing active underground lines, which may be discovered during the progress of the Work.

1.17 PROTECTIVE MEASURES

The Contractor shall provide and maintain substantial and adequate protection as may be required to protect new and existing Work and all items of equipment and furnishings for the entire duration of Work.

The Contractor shall repair or make good any and all damage or loss he may cause to the building or other County property to the full satisfaction of the Department.

1.18 PROJECT ADMINISTRATION

All materials supplied and all Work done by the Contractor shall be under the general administration of the Department and in accordance with the Drawings and Specifications.

1.19 BEST MANAGEMENT PRACTICES (BMP) REQUIREMENTS

A. The Contractor shall comply with Section 01 57 00 (for projects less than one acre), Section 01 57 00 (for projects greater than one acre), the Los Angeles County Department of Public Works Construction Site Best Management Practices (BMP's) Manual, latest edition. A copy of the BMP Manual can be obtained at the Los Angeles County Department of Public Works Cashier's Office, 900 South Fremont Avenue, Alhambra, CA 91803, (626) 458-6959.

B. Related Work: Cleaning; Section 01 74 23.

1.20 WORK IN PROGRESS UNDER OTHER CONTRACTS

It is anticipated that the work of the County may be concurrently in progress with the work of this contract. Refer to General Conditions articles, "Other Contracts" and Cooperation with Others."

* * * *

SECTION 01 12 16

PHASING OF THE WORK

PART 1-GENERAL

1.1 SUMMARY

- A. The Camp Afflerbaugh Probation facility will remain open and operational during the Work under contract. The Work must be undertaken such that the Camp Afflerbaugh Probation facility can maintain a safe, secure, healthy, comfortable and reasonably convenient environment for its normal operations. The Work shall be completed in the best possible manner such that the User may occupy and use portions of the newly completed Work and vacate other portions of the facility for Builder's access prior to substantial completion of the entire project. The Builder shall prepare and submit a construction phasing and sequencing plan for approval by the Professional, Project Manager, and User which minimizes the impacts of construction on normal operations in accordance with this Section and the Phasing Plans or an approved alternative plan. The Construction Phasing and Sequencing Plan shall be updated as required during the course of the Work. Updates and revisions must be submitted for approval by the Professional, the Project Manager and User.

1.2 REQUIREMENTS INCLUDED

- A. Summary of Work
- B. Life Safety Plans
- C. Safety and Staging Plan
- D. Phasing Plans

1.3 COMPLIANCE REQUIREMENTS

- A. The various portions of the work shall be complete, functional and operational prior to performing work which disrupts the operations that are to be moved to the new area.
- B. The scheduling requirements of the contract may include proposed alternatives to the phasing included herein, which shall be prominently indicated as deviations. Such deviations do not alter the phasing requirements except as specifically approved. Criteria for acceptance include no increase to disruptions to operations and no extension to the opening dates of the project elements.

- C. Builder shall prepare and submit a construction phasing and sequencing plan for approval by the Professional, the Project Manager and User within 10 days of Award and prior to beginning the Work activities.
- D. Performance criteria for review and acceptance is defined in Section 1.4 below.
- E. The various portions of the work shall be functional and operational prior to performing work which disrupts the operations that are to be moved to the newly completed areas.

1.4 CONSTRUCTION PHASING PERFORMANCE CRITERIA

A. Safety

- 1. Builder must maintain a safe environment for Occupants and Visitors to work around. Clear and protected access and egress routes shall be maintained around construction areas and activities for people, equipment, and vehicles. Provide professionally prepared temporary signage to direct people and traffic along routes not used under normal conditions.
- 2. Provide temporary barriers, barricades, and walls as necessary to separate construction areas and activities from Occupants and Visitors.

B. Health

- 1. Contractor must maintain a healthy environment for Occupants and Visitors at all times.
- 2. Protect the occupied areas of the Camp Afflerbaugh Probation facility from dust, fumes, and other airborne pollutants. Provide separation walls between construction / renovation areas and occupied areas to protect the occupants. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MEREV) of 8 shall be used at each return air grille. Replace the filters as needed and at the conclusion of the project.
- 3. Protect Occupants and Visitors from excessive or harmful noise exposure.
- 4. Maintain occupant access and use of restroom facilities at all times during normal business hours.
- 5. Maintain all utility services during the utility relocation or new service work. Maintain utility services throughout the project. If a brief service interruption is required to accomplish the Work, the Professional, the Project Manager and User

must be notified in advance. A coordination meeting must be held with the Professional, the Project Manager and User to review service interruption procedures prior to the service interruption.

C. Comfort

1. Provide reasonably finished spaces for use by Occupants and Visitors during the progress of the Work. Temporary construction separation walls shall be paint finished or equivalent on public sides.
2. The HVAC system improvements shall be implemented such that the occupied spaces of the building maintain comfort conditions for its occupants. The comfort conditions must be maintained as directed by the County. The temperature requirements are 72 to 77 degrees F.
3. Restrict noisy activities to hours as directed by the County unless approved sound mitigating separation is provided.

D. Convenience

1. Maintain Occupants and Visitors access to building amenities, such as vending, seating, and restroom facilities. Relocate moveable amenities as required to maintain access. Provide temporary electrical power to amenities with power requirements at temporarily relocated positions.
2. Protect the User's existing equipment during construction activities to prevent damage or contamination due to the progress of the Work.
3. Daily clean-up activities must be included in the Phasing and Sequencing Plan for Work in occupied areas performed outside normal business hours.

1.5 PROJECT SEQUENCE

- A. Sequencing – Coordinate sequencing priorities with the facility and the Project Manager.
1. Durations – Contractor may work in multiple areas and duration as agreed with the facility and as approved by the Project Manager.
 2. Access Limitations - Maintain all utility services during work.

- a. Sequence work in the school buildings outside of school hours.
- b. Sequence work in the dining and kitchen buildings outside of food preparation and meal service hours.
- c. Sequence work in the gymnasium building outside of recreational hours.
- d. Sequence work in the dormitory building outside of youth occupied hours.

PART 2 PRODUCTS (Not Applicable)

PART 3. EXECUTION (Not Applicable)

END OF SECTION

* * *

SECTION 01 14 00

ALTERATION PROJECT PROCEDURES

1.00 GENERAL

1.01 CONTRACTOR' S USE OF THE PREMISES

- A. The Contractor will be restricted in the use of the site to that area designated by the County. If the allotted space is too restrictive, provide a written request to the County, identifying the amount of additional area required, the reason why the existing area is inadequate, and any incentives for the County to provide the additional space.
- B. Obtain and pay for the use of additional storage or work areas if required for operations.

1.02 INTERRUPTION OF EXISTING SERVICES

- A. The facility is in continuous operation.
- B. If an interruption of any existing utilities and/or equipment operations to the existing building will be required provide the County a minimum of 7 days notice for minor interruption and 14 days advance notice for major interruption, obtain County' s permission and if required by the County, interrupt service only during non-business hours unless otherwise noted in the Contract Documents. Interruptions affecting areas outside the Work under the Contract space constitutes a major interruption.

1.03 PROTECTION OF EXISTING IMPROVEMENTS

- A. Take all precautions necessary to protect existing building, utilities and other site improvements from damage due to the work of this Project, and be responsible for their restoration of any damaged property to its original condition if damage is a result of the Contractor' s construction activities.
- B. Cooperate and coordinate construction activities with County to sequence the work so as not to unnecessarily interfere with operation of occupied facilities. Prior to demolition or construction work, consult with County to determine a construction schedule which will permit the existing facilities to function without interruption. Thereafter, Contractor shall provide County' s Representative with a minimum of fourteen days advance notice, in writing, of anticipated portion of the Work which may, because of noise or otherwise, require advance operational planning.
- C. In planning and performing the Work, make every effort to maintain all pollutants, including noise, dirt and dust levels at the absolute minimum possible.

- D. Continuously maintain ingress and egress to and from existing building for purposes of fire and emergency entrance and escape, loading and delivery, and building maintenance, to the satisfaction of the County and authorities having jurisdiction.
- E. Protect all utilities against interruption, damage or contamination during construction; if necessary, provide temporary utilities to maintain services continuously. Such utilities shall include, but shall not be limited to, electricity, water, gas, sewerage, telephone, data, heating, ventilation, and air conditioning (HVAC).
- F. Provide temporary barriers to separate occupied areas from work areas. Seal all joints to create dust-proof enclosures.
- G. Limit equipment and vehicles in ingress and egress and use of service areas to the minimum essential to operations. If there is unavoidable conflict with Contractor's equipment in such areas, upon request of County, remove such equipment immediately to facilitate emergency services, and within a reasonable time, for all other services.

1.04 DAMAGE AND RESTORATION

- A. Damage to existing or new work caused by equipment or other operations, whether accidental or made necessary by reason of Contract requirements, shall be restored or replaced as specified or directed by the County, at Contractor's sole expense.
- B. Restoration shall be equal to the original work, and finishes shall match the appearance of, as nearly as possible, like existing adjacent work. Restoration shall be subject to acceptance by the County and shall be made as necessary at Contractor's sole expense.
- C. Work not properly restored or where not capable of being restored as intended under these specifications shall be removed and replaced as directed by County, at Contractor's sole expense.

2.00 PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New materials: As specified in product Sections; match existing products and work for patching and extending work.
- B. Type and quality of existing products: Determine by inspection and testing products where necessary, referring to existing work as a standard.

3.00 EXECUTION

3.01 EXAMINATION

- A. Verify that demolition is complete and areas are ready for installation of new work.
- B. If actual conditions differ from conditions shown on the Contract Documents, immediately report the differing conditions to the Director and wait for written instructions.
- C. Beginning of work means acceptance of existing conditions.

3.02 PREPARATION

- A. Cut, move or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage. Replace materials as specified for finish work.
- C. Remove debris and abandoned items from area.
- D. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
- E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity.

3.03 INSTALLATION

- A. Coordinate work of alterations and renovation to expedite completion.
- B. Designated areas: Complete in all respects.
- C. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.
- D. Install products as specified in each Section.

3.04 TRANSITIONS

- A. Where new work abuts or aligns with existing, perform a smooth and even transition. Patch work to match existing adjacent work in texture and appearance.

- B. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along with a straight line at a natural line of division and make recommendations to Director.

3.05 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces which become damaged, lifted, discolored or showing other imperfections.
- B. Repair substrate prior to patching finish.

3.06 FINISHES

- A. Finish surfaces as specified in each Section.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

* * *

SECTION 01 26 13

CONTRACTOR'S REQUEST FOR INFORMATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers general requirements for Contractor's Requests for Information (RFI).
- B. The Contractor will prepare and submit RFIs as directed by the County Project Manager.
- C. Related Sections:
 - 1. General and Supplementary Conditions for changes in the Work.
 - 2. Section 01 31 19: Progress Meetings
 - 3. Section 01 33 00: Submittals

1.02 SUBMITTALS

- A. Submit a Request for Information to the County when:
 - 1. An unforeseen condition or constructability question occurs.
 - 2. Questions regarding information in the Contract Documents arise.
 - 3. Information not found in the Contract Documents is required.
- B. When possible, request such clarification either verbally or in writing at the next scheduled Project meeting. When the RFI is answered at the Project meeting, number the RFI and enter the response into the meeting minutes.
 - 1. When the urgency of the need or the complexity of the item makes clarification at the next scheduled Project meeting impractical, prepare and submit a formal written RFI to the County.
- C. RFIs shall be submitted within a reasonable time frame so as not to interfere with or impede the progress of the Work. The Contractor shall make every effort to keep the number of RFIs to a minimum. If the number of RFIs becomes unwieldy, the County may require the Contractor to abandon the RFI process and submit requests as either submittals, substitutions, or requests for change.

- D. When the response to an RFI effects the cost or time duration of the project, notify the County in accordance with the General Conditions at the time of the submittal. Notification shall occur prior to commencing such work, so that the change order process can be initiated.
1. At time of the time of submittal of the RFI, notify the County to the time available before the response will cause a time or cost impact to the Project.
 2. An answered RFI shall not be construed as approval to perform extra work.
- E. Form of Submittal:
1. Submit legible written RFIs on a standard CSI or AIA preprinted form or other such form as approved in advance by the County. Each request shall include the following information:
 - a. Project name, as listed on the Contract Documents, and County Specs. Number;
 - b. Date;
 - c. RFI number;
 - d. Name, address, telephone and e-mail address of the Contractor;
 - e. Number and title of affected Specification Section(s);
 - f. Drawing numbers and detail numbers as appropriate;
 - g. Indicate if the RFI will result in a time or cost impact;
 - h. Clear, concise explanation of information or clarification requested;
 - i. Blank, lined spaces for Architect's response;
 - j. Signature block for County to acknowledge review of Architect's response;
 - k. Mark each page of each RFI attachment in the lower right corner with the RFI number;
 - l. Number submitted RFIs consecutively; and
 - m. Sign and stamp all RFI forms. RFIs from subcontractor or material suppliers shall be submitted through the Contractor. Contractor shall review all such information request prior to submitting to the County.
- F. RFIs not meeting the requirements of this Section will not be answered and any consequential impact on the project shall be the sole responsibility of the Contractor. Unanswered RFIs will be returned with a stamp or notification "Not Reviewed."
- G. RFI Log: Contractor shall maintain and update the log weekly and furnish to the County when requested. The log shall contain the following minimum information:

- a. RFI number
 - b. Date submitted
 - c. Brief description of content or subject
 - d. Date answered
- H. Allow a minimum of five (5) working days for review and response. The response time will be increased if more information is required, when the RFI is submitted out of sequence, or if in the opinion of the County, more time is required to answer the RFI.

1.03 QUALITY ASSURANCE

1. Carefully review the Contract Documents before submitting a RFI to the County. Verify that the information requested is not indicated in the Contract Documents or cannot be determined from a careful review.
 1. The County may not answer RFIs for information that is readily available in the Contract Documents.
2. RFIs requesting clarification of coordination issues, shall include the Contractor's suggested solution as an attachment to the RFI.
 1. Such coordination issues include, but are not limited to, pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items.
 2. Provide scale drawings or sketches indicating the proposed solution.
 3. RFIs which do not include a suggested solution will not be answered.
3. Do not use RFIs for the following:
 1. To request approval of submittals.
 2. To request approval of substitutions.
 3. To request changes to the Contract Documents and to confirm action taken by the Contractor for requested changes/substitutions to the Contract Documents.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

* * *

SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Submit to the Department, one digital PDF copy of an accurate, detailed, and realistic Schedule of Values allocated to the various portions of the work, ten (10) calendar days from issuance of Notice to Proceed under the Consultant Services Agreement.
- B. The Contractor will prepare and submit the Schedule of Values as directed by the County Project Manager.
- C. The Schedule of Values, unless objected to by the Department, shall become the basis for the Contractor's applications for payment.
 - 1. Upon request by the Department, support values given with data that will substantiate their correctness.
- D. Related requirements specified elsewhere.
 - 1. Section 01 00 00, "Project General Requirements".

1.02 FORM OF SUBMITTAL

- A. Type schedule on 8-1/2" x 11" white bond paper. Identify schedule with:
 - 1. Title of project and location.
 - 2. Specification number.
 - 3. Name and address of Contractor.
 - 4. Date of submission.
- B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress

payments during construction.

- C. Use the Table of Contents of the project specifications as a basis for the format for listing component items.
 - 1. Identify each line item with the number and title of the respective section of the specifications.
- D. List sub-values of major products or operations for each line item. Additional sub-values may be requested by the Department.
- E. Costs for the various portions of the work:
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested, list the total installed value, including Contractor's overhead and profit.
- F. A similar detailed schedule, itemizing costs and/or credits in a form satisfactory to the Department, shall accompany all quotations for changes in the work or for extra work. Refer to article entitled "Provisions for Extras" in the General Conditions of the project specifications.
- G. Round off figures to nearest ten (\$10) dollars wherever possible.
- H. The sum of all values listed in the schedule shall equal the total contract sum.

1.03 REVIEW AND RESUBMITTAL

- A. After review by the Department, revise and resubmit Schedule as required. Resubmit revised Schedule in same manner.
- B. Progress payments will not be made until Schedule has been approved.

* * *

SECTION 01 29 76

PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 4. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule. Cost-loaded CPM Schedule may serve to satisfy requirements for the Schedule of Values.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

- a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 2. Submit the Schedule of Values to Architect through Project Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Submit draft of Payment Application for County review and approval.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and Project Manager and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Project Manager by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Payment Application Forms: Use form provided by the owner as form for Applications for Payment.

- E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect and Project Manager will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- G. Transmittal: Submit one (1) signed and notarized copy of Application for Payment to Architect and Project Manager by a method ensuring receipt within 24 hours. The copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit the copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. "Contractor's Affidavit of Payment of Debts and Claims."
 5. "Contractor's Affidavit of Release of Liens."
 6. "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took

possession of and assumed responsibility for corresponding elements of the Work.

9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SAMPLE APPLICATION AND CERTIFICATE FOR PAYMENT ATTACHED.

* * *

SAMPLE

APPLICATION AND CERTIFICATE FOR PAYMENT

TO: LACDPW - PROJECT MANAGEMENT DIVISION II
PUBLIC WORKS HEADQUARTERS BLDG.
900 SOUTH FREMONT AVENUE, 5TH FLOOR
ALHAMBRA, CA 91803

Project:
Contract No:
CP No.:

Application No: #REF!
Invoice No: #REF!
Period To: #REF!

From: Contractor

Project No: #REF!
Invoice Date: #REF!
Contract Date: #REF!

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment as, shown below, in connection with the contract.

Continuation sheet is attached.

1 ORIGINAL CONTRACT SUM

\$ -

2 Net change by Change Orders

\$ -

3 CONTRACT SUM TO DATE

\$ -

4 TOTAL COMPLETED & STORED TO DATE

\$ -

(Column G on Continuation Sheet)

5 RETAINAGE

a 0.00% of Completed Work

\$ -

(Column D+E on Continuation Sheet)

b 0.00% of Stored Material

\$ -

(Column F on Continuation Sheet)

Total Retainage (Line 5a+5b or

\$ -

Total in Column I on Continuation Sheet)

6 TOTAL EARNED LESS RETAINAGE

\$ -

(Line 4 less Line 5 Total)

7 LESS PREVIOUS CERTIFICATES FROM PAYMENT

(Line 6 from prior Certificate)

8 CURRENT PAYMENT DUE

\$ -

9 BALANCE TO FINISH, INCLUDING RETAINAGE

(Line 3 less Line 6)

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Previously approved Change Orders	\$ -	\$ -
Change Orders approved this period	\$ -	\$ -
TOTALS	\$ -	\$ -
Net Change Order Total	\$ -	\$ -

To the best of my knowledge and belief, I certify that all items, units, quantities, and prices of work shown on this application for payment are corrects; that all the work has been performed and material supplied in full accordance with the terms and conditions of this Contract on this projects; that this application for payment is a true and correct statement of the contract account up to and including the last day of period covered by this application and that no part 'Current Payment Due' has been received.

CONTRACTOR:

BY: _____ Date: _____

CERTIFIED AND APPROVED AS PER TERMS OF CONTRACT

To the best of my knowledge and belief, I certify that this application for payment does not exceed ()% of the value of the work completed since the previous application for payment, if any plus ()% of the value acceptable or stored materials for incorporation into work, but not installed, if any.

I further certify that this application for payment covers full payment for work completed since the previous application for payment and that any payment for prefabricated stored materials does not exceed ()% of the value of the materials.

AMOUNT CERTIFIED..... \$ -

BY: _____ Date: _____

Inspector

BY: _____ Date: _____

Architect/Engineer

BY: _____ Date: _____

County Project Manager

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptable of payment are without prejudice to any rights of the Owner or Contractor under this Contract except as set forth in the Contract.



Document G703™ – 1992

Continuation Sheet

AIA Document G702™-1992, Application and Certificate for Payment, or G732™-2009, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

[illegible]

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

AIA Document G703™ – 1992. Copyright © 1963, 1965, 1966, 1967, 1970, 1978, 1983 and 1992 by The American Institute of Architects. All rights reserved. WARNING: This AIA® Document is protected by U.S. Copyright Law and International Treaties. Unauthorized reproduction or distribution of this AIA® Document, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law. Purchasers are permitted to reproduce ten (10) copies of this document when completed. To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.

101210ACD44

101210ACD44

SECTION 01 31 00

COORDINATION AND MEETINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Coordination
- B. Preconstruction Meeting
- C. Progress Meetings
- D. Preinstallation Meetings

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various Sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later and for accommodating items to be installed by the County.
- B. Coordinate sequence of work to accommodate County occupancy as specified in Section 01 00 00.

1.03 PRECONSTRUCTION MEETING

- A. County Project Manager will schedule a meeting after Notice of Award.
- B. Attendance Required: Architect, Project Coordinator, Prime Contractors, Major Subcontractors, Project Inspector and key County personnel.
- C. Agenda:
 - 1. Contract Agreement
 - a. Transmit Performance and Material Bonds to Architect
 - b. Review General/Supplementary Conditions
 - c. Deferred Approvals
 - 2. Receive documentation from Contractor
 - a. Construction Schedule
 - b. Schedule of Values

- c. List of Subcontractors with Addresses and Phone Numbers
 - d. List of Submittals and Estimated Date of Submittal
- 3. Project Administration
 - a. Application for Payment, Project Schedule, Lien Release, As-built Documents, Contract Administration
 - b. Change Orders and Proposal Requests
 - c. Submittals and Substitutions, Deferred Approvals
 - d. Site Meetings
 - e. Testing Lab
 - f. Verified Reports
- 4. Special County Conditions
 - a. Temporary Facilities
 - b. County Occupancy
 - c. Work by County
 - d. Access to Site – County Contract
- 5. Construction Process
 - a. Contractor to give Overview of Construction
 - b. Contractor to identify items to be selected by Architect/County and date selections must be made.
 - c. Contractor to review special requirements for equipment, safety, and noise.
- 6. Project Close-Out
 - a. Close-out Binder
 - b. As-Built Documents
 - c. Final Verified Reports
- D. Architect or County Project Manager to record minutes and distribute copies within three days after meeting to participants, Architect and those affected by decisions made.

1.05 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work as needed.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

- C. Attendance Required: Project Coordinator, Prime Contractors, major Subcontractors and suppliers, Project Inspector, key County personnel and Architect as appropriate to agenda topics for each meeting.
- D. Agenda
 - 1. Review Minutes of Previous Meetings
 - 2. Review of Work Progress
 - 3. Field Observations, Problems, and Decisions
 - 4. Identification of problems which impede planned progress.
 - 5. Review of Submittals Schedule or Status of Submittals.
 - 6. Review of Off-site Fabrication and Delivery Schedules
 - 7. Maintenance of Progress Schedule
 - 8. Corrective Measures to Regain Project Schedules
 - 9. Planned Progress During Succeeding Work Period
 - 10. Coordination of Projected Progress
 - 11. Maintenance of Quality and Work Standards.
 - 12. Effect of Proposed Changes on Progress Schedule and Coordination
 - 13. Other Business Relating to Work
- E. Architect or County Project Manager to record minutes and distribute copies within three days after meeting to participants, Architect, and those affected by decisions made.

1.06 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a preinstallation meeting prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Contractor to record minutes and distribute copies within three days to participants, Architect and those affected by decisions made.

1.07 COORDINATION OF SUBMITTALS

- A. Schedule and coordinate submittals specified in Section 01 33 00.
- B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate request for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

1.08 COORDINATION OF SPACE

- A. Coordinate use of project space and sequence of installation of mechanical and electrical work which is indicated diagrammatically on drawings. Follow routings shown for pipes, ducts, and conduits as closely as practical, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximum accessibility for other installations, for maintenance and for repairs.
- B. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.09 COORDINATION WITH WORK BY COUNTY

- A. Coordinate any work by County.

1.10 COORDINATION OF CONTRACT CLOSE-OUT

- A. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.
- B. After County occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents to minimize disruption of County's activities.
- C. Assemble and coordinate close-out submittals specified in Section 01 77 00.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

* * * * *

SECTION 01 31 19

PROGRESS MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scheduling and administration of progress meetings.

1.02 RELATED REQUIREMENTS

- A. Instructions to bidders.
- B. Project general requirements.
- C. Construction schedules.
- D. Shop drawings, product data and samples.
- E. Quality control.
- F. Temporary Facilities.

1.03 PROGRESS MEETINGS

- A. The County will schedule and administer progress meetings throughout the construction of the work.
- B. The County will make physical arrangements, prepare agenda and distribute notice for the meetings to participants in advance of meeting date.
- C. The Project Manager will preside at meetings. Meeting minutes will be recorded and copies will be distributed to participants prior to next meeting.
- D. Location of meetings: Project's field office or Project Manager's office.
- E. Attendance: Project Manager, Inspector, Contractor, job superintendent, subcontractors, suppliers and others as appropriate to agenda; Architect/Engineer and others shall attend when appropriate.
- F. Minimum Agenda:
 - 1. Approval of minutes of previous meetings.
 - 2. Review of work progress.
 - 3. Field observations, problems and decisions.

4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

* * *

SECTION 01 32 00

CONSTRUCTION SCHEDULES

Critical Path Method Schedule Integration System

1. GENERAL

DESCRIPTION – The work specified in this section consists of developing and maintaining a Critical Path Method (CPM) schedule integration system for the contract. Planning, scheduling, management, and execution of work in accordance with contract documents are the sole responsibility of the Contractor.

1.1 Related General Conditions/General Requirements Articles, and Specifications Sections

a.	General Conditions Articles	12.A, 12.B, 12.C
b.	General Conditions Articles	14
c.	General Conditions Articles	15.B.e.3
d.	General Requirements Articles	1.02
e.	General Requirements Articles	1.06

1.2 Generate a CPM schedule integration system using commercially available CPM scheduling software program containing direct file interchange capability with the software program used by the Los Angeles County Department of Public Works. Prepare as directed by the County Project Manager.

1.3 For scheduling submittals produce Precedence Diagram Method (PDM) and time scaled network diagram submittals on D-Size (22-inch by 34-inch) or E-Size (34-inch by 44-inch) medium suitable for reproduction. Print schedule submittal tabular reports on A-Size (8 ½-inch by 11-inch) paper. For scheduling submittals, the Contractor shall include backup diskettes. The backup diskettes shall be made directly from the CPM scheduling software and shall contain all files of the project that can be restored by the County for its evaluation and analysis.

1.4 Contract milestone dates, County furnished goods, availability dates, and real estate availability dates, are unique zero duration activities as a “start no earlier than” or “finish no later than” milestone. Each milestone activity will constrain its dependent work. Assume Notice to Proceed (NTP) is given at day zero for calculation of constraint dates for milestones.

- 1.5 Float is not for exclusive use or benefit of either the County or Contractor but is an expiring resource available to both parties on a nondiscriminatory basis. Float is used by either party, as needed to meet contract milestones and contract completion dates. Contract time extensions for contract performance will be granted only to extent that delays or disruptions to affected work paths exceed total float along those paths of current contract schedule (update schedule) in effect at time of delay or disruption. These delays or disruptions must also cause end date of work to exceed current contract date or milestone date and be beyond control and without fault or negligence of Contractor or any subcontractor at any tier. If delays or disruptions impact an already negative float path, Contractor will not receive a time extension unless and until activity with highest float is driven even further negative.
- 1.6 Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times or durations should be submitted with written justification to obtain the County's acceptance. Use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to proportionate benefit of the County and Contractor. Use of any technique solely for purposes of suppressing float will be cause for rejection of schedule submittal.
- 1.7 Planning units – Scheduling software supports schedule Planning Units of hours, days, weeks or months. The standard time unit applied to the schedule integration system is defined as days.
- 1.8 Schedule network – Use Retained Logic CPM Precedence Diagram Method of scheduling.
- 1.9 Analyze in detail, activities included in contract schedule to determine activity time durations in units of working days. Base durations on engineering and design resources, drawing production, submittal review periods, procurement lead time and duration, manufacturing times, labor (crafts), equipment, and materials required to perform each activity on a normal workday basis. No on-site activity shall have a duration over 10 working days except non-construction activities such as submittals, submittal reviews, procurement and delivery of materials or equipment, and concrete curing.

2. PRODUCTS

SUBMITTALS – Submit one original and four copies of schedule unless specified otherwise. Provide submittals specified in this section to the County for review and acceptance.

2.1 Baseline CPM Contract Schedule

Provide the County with a means to monitor and follow progress of all phases of work, with contractually specified interim milestones and completion dates, and with constraints, restraints or sequences included in the contract. Degree of schedule detail required shall include factors to the satisfaction of the County, including but not limited to the following:

- 2.1.1 Master list of submittals and all other requirement as referenced in Section 01 33 00 Submittals.
- 2.1.2 Contract interim milestones and contract completion date, substantial completion dates, constraints, restraints, sequence of work indicated.
- 2.1.3 Type of work to be performed, sequences, and labor trades involved.
- 2.1.4 Purchases, manufacture, tests, delivery, and installation activities for major materials and equipment.
- 2.1.5 Deliveries of County furnished goods and/or materials in accordance with dates or schedule windows of such times set forth in the contract or furnished by the County.
- 2.1.6 Preparation, submittal, and acceptance of shop and/or working drawings and material samples showing a 30-day minimum time specified for the County and third party reviews of normal or routine submittals, so identified in the specifications, and the same time frame shall be allowed for at least one re-submittal or submittals so identified in the contract documents.
- 2.1.7 Approvals and permits required by regulatory agencies or other third parties.
- 2.1.8 Schedules for subcontract work.
- 2.1.9 Assignment of responsibility for performing specific activities.
- 2.1.10 Access and availability to work areas.

- 2.1.11 Identification of interfaces and dependencies with preceding, concurrent and follow-on construction or contractors and utilities.
 - 2.1.12 Actual tests, submissions of test reports, and acceptance of test results.
 - 2.1.13 Start up, testing, training, and assistance required under the contract.
 - 2.1.14 Planning for phased or total takeover by the County.
 - 2.1.15 Punch-list and final clean up.
 - 2.1.16 Identification of construction restrictions as well as any activity requiring unusual shift work, such as two shifts, six day weeks, specified overtime, or work at times other than a standard work day.
- 2.2 The schedule of values shall be prepared and submitted together with the construction schedule.
 - 2.3 Failure to meet these requirements may result in a determination and recommendation that the Board of Supervisors determine that the successful bidder as non-responsible because such failure reflects the bidder's ability to manage the work.
- 3. Current CPM Contract Schedule Updates
 - 3.1 Initially, upon approval of the baseline CPM contract schedule, establish the current CPM contract schedule from the baseline CPM contract schedule. Thereafter, update the current contract schedule monthly with data date designated by the County. Use updated current contract schedule for subsequent planning, scheduling, and execution of work to be accomplished. Obtain County prior acceptance before making deviations in logic and activity durations in the current CPM contract schedule.
 - 3.2 Participate with the County in periodic meetings, at least monthly, on dates directed by the County and seven days prior to monthly status. At meeting held seven days prior to the data date, provide preliminary updated current CPM contract schedule that forecasts project status on the data date and contains actual start and actual finish dates for activities in progress or completed, remaining durations of activities already in progress, percent completed, logic changes, new or deleted activities, and new change order/modifications.

- 3.3 Submit a stand alone portion of the network (fragnet), if current progress reflects negative float of minus 10 days or more for a milestone activity, as indicated by most recent CPM contract schedule, allowed by contract as amended by approved change orders/modifications. Show activities affected, date delay or disruption occurred or how productivity was impacted, and unmitigated impacts to schedule caused delay or disruption. Submit similar fragnet showing Contractor's plan to mitigate delay or disruption and subsequent impacts to schedule at the County's request. Provide written narrative describing circumstances that caused delay or disruption and methodology used to determine extent of delay or disruption. Submission of such fragnets does not constitute permission to proceed with plan. Execute some or all of the following remedial actions, and submit a recovery schedule that may include:
 - 3.3.1 Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 - 3.3.2 Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or combination of the foregoing to eliminate the backlog of work.
 - 3.3.3 Reschedule the work in conformance with the specifications requirements.
4. Before implementing any of the above actions, notify and obtain acceptance from the County. If such actions are accepted, incorporate current CPM contract schedule revisions before next update.
5. Addition of equipment or construction forces, increasing working hours or other methods, manner, or procedure to return to contractually required completion date will not be considered justification for a change order/modification, nor be treated as acceleration where the need for a recovery schedule has been caused by the Contractor and/or its subcontractors or suppliers at any tier.
6. When the Contractor experiences change order/modifications or delays and a time extension is requested, submit to the County a written time impact analysis illustrating the influence of each change or delay on current contract schedule completion date utilizing current CPM contract schedule. Include in each time impact analysis a fragnet demonstrating how the Contractor proposes to incorporate the change order/modification or delay into the current CPM contract schedule. The fragnet shall contain a sequence of new and/or activity revisions that are proposed to be added

to the current CPM contract schedule in effect at the time change or delay is encountered to demonstrate influence of delay and method of incorporating the delay and its impact into the schedule as they are encountered.

- 6.1 Each time impact analysis shall demonstrate estimated time impact based on events of delay, date of change order/modifications, proceed order, or unilateral change order/modification given to the Contractor, status of construction at that point in time, and event time computation of activities affected by change or delay. Event times used in analysis shall be those included in latest version of the current CPM contract schedule, in effect at time change or delay was encountered.
- 6.2 Submit each time impact analysis in triplicate, within ten days after a delay occurs. If the Contractor does not submit a time impact analysis for a specific change order/modification or delay within specified period of time, the Contractor will be deemed to have irrevocably waived rights to additional time and cost.
- 6.3 Because float time within current CPM contract schedule is jointly owned, it is acknowledged and agreed by the Contractor that the County caused delays on the project may be offset by County caused time savings (including, but not limited to: critical path submittals returned in less time than allowed for the contract, acceptance of substitution requests which result in a savings of time along the critical path for the Contractor, etc.). In such an event, the Contractor will not be entitled to receive an extension of time or delay damages until the County caused time savings are exceeded and contract completion data also exceeded.
- 6.4 The County will accept or reject each time impact analysis. Upon acceptance, a copy of a time impact analysis signed by the County will be returned to the Contractor for incorporation into the schedule.
- 6.5 Upon mutual agreement by both parties, incorporate fragnets illustrating the influence of change orders/modifications and delays into the current CPM contract schedule during first update after agreement is reached.
- 6.6 In the event the Contractor does not agree with the decision of the County regarding impact of a change or delay, the County's determination shall govern.

7. The Contractor shall resolve out-of-sequence progress, if any, to provide the actual construction sequence to calculate the current critical path(s) and identify any deviations of interim milestones and/or project completion.
8. As-built schedule – Submit as-built schedule covering work performed under the Contract within 30 days after final completion. As-built schedule – Certified by a planner/scheduler and Contractor's project manager as being the manner in which Contract was executed. Submittal and acceptance of the schedule will be a condition precedent to reduction/release of retainage at the end of the contract.
9. Schedule reviews – The County will review and respond to scheduling submittals within 14 days after submittal, unless a different review period is specified in this section. Submit a revised schedule within seven days after receipt of the County's response if the County requires changes or additional information.
10. Early completion schedule – If the schedule duration proposed by the Contractor is less than the completion date in the NTP, the proposed schedule will not nullify the Contractor's right to the NTP duration. The Contractor agrees that in the event a proposed early completion schedule (or any subsequent update) which is found to be acceptable by the County, indicating a duration which is less than time allowed by Contract for completion of work or of interim milestone, Contract completion time shall only be shortened by a change order/modification to equal Contractor's proposed baseline CPM contract schedule duration.

If the schedule duration proposed by the Contractor is less than the completion date in the NTP, the proposed schedule will not nullify the Contractor's right to the NTP duration.

11. Three week rolling bar chart schedule – Once a week, on a day mutually agreed to by the County and the Contractor, a meeting will be held to assess the progress achieved by the Contractor during previous work week. Submit a project schedule listing activities completed and in progress for the previous week and the activities scheduled for the succeeding two weeks based on the current CPM contract schedule. The three week rolling bar chart schedule shall be provided from the current CPM contract schedule and include all activities scheduled including: activity ID, description, early start and early finish, total float, original duration, remaining duration, percent complete, performance of the activity, and pertinent remarks as to activity status. The schedule shall be submitted to the County before the weekly meeting for review. Submit copies of schedule on 11-inch by 17-inch paper.

12. Monthly Updated Current Contract Schedule
 - a. One computer generated backup copy of monthly updated current CPM contract schedule file.
 - b. Written narrative for updated current CPM contract schedule.
13. Fragnets
 - a. One computer generated backup copy of fragnet files.
 - b. Written narrative of fragnet assumptions.
14. Contract Time Scaled Network Diagrams – Submit computer generated time-scaled network diagram entitled “Current Time Scaled Network Diagram” with submittal of items referenced below.
 - a. Submit with initial early work schedule submittal.
 - b. Submit every month with updated current CPM contract schedule.
15. Written Narrative Reports – Include a stand alone narrative of sufficient detail to explain basis of Contractor’s submittal with each schedule submittal.
 - 15.1 CPM Contract Schedule Submittals – Explain determination of activity durations and describe Contractor’s approach for meeting required interim and final completion milestone dates, as specified in the Contract. Include as a minimum basis and assumptions used in preparing the submittal, including crew sizes, equipment requirements, and anticipated delivery dates; restraints; critical path activities; production rates; activities requiring overtime or additional shifts; activities that contain time contingencies for impacts to be expected from normal rainfall; holidays and other non-work days; potential problem areas; permits; coordination required with the County; utilities and other parties; and long lead delivery items requiring more than 30 days from order to delivery. Identify work items that may be expedited by use of overtime or additional shifts. Identify and explain sequencing and other constraints such as manpower, material, and equipment. Include listing of holidays and special non-work days.
 - 15.2 Current CPM Contract Schedule Submittals – State in narrative, work actually completed and reflect progress along critical path in terms of days ahead of or behind allowable dates. Specific requirements of narrative are as follows:

- 15.2.1 If updated current CPM contract schedule indicates an actual or potential delay to contract completion date or interim milestone dates as specified under the contract documents or modified by change order/modification, identify causes of delays, disruptions and interruptions and provide explanation of work affected and proposed corrective action to meet milestone dates involved or to mitigate potential delays or disruptions. Document and log in a matrix format activities with non-mitigated negative float until the negative float is mitigated. Identify deviations from previous month's critical path. The matrix will include applicable activity number, description, planned start and finish dates, current start and finish dates, and float quantity.
- 15.2.2 Identify by activity number and description, activities in progress and which activities are scheduled to complete during the next period.
- 15.2.3 Identify by activity number and description, activities to be started during the month following the report period. Show Contractor's forecast early and late start, and finish dates.
- 15.2.4 Discuss added change order/modification work items.

3. EXECUTION

3.1 Baseline CPM Contract Schedule

- 3.1.1 Provide Contractor's detailed activities and sequencing for work included in the contract. Assign unique activity identification for each detailed activity.
- 3.1.2 Indicate Contractor's best estimate for original durations, early dates, late dates, logic ties, constraint dates, and total float. Schedule activities in the sequence which Contractor intends to perform work.
- 3.1.3 Include following activity sequence for major material and equipment procurement:
 - 3.1.3.1 Submittal preparation; review for acceptance; and fabricate/deliver – Divide procurement items that may contain multiple submittals occurring at different time intervals into separate sequences that can be tracked

on individual basis. Include a maximum original duration of 20 working days for re-review. Resubmittal activities shall contain submittal preparation activities for other material and equipment procurement (non-major) to schedule.

3.1.4 Baseline CPM contract schedule activity requirement are as follows:

- 3.1.4.1 Activity descriptions – Briefly convey scope and location of work indicated.
- 3.1.4.2 Activities – Discrete items of work accomplished under contract that provide measurable and recognizable parts of work.
- 3.1.4.3 Include as contract deliverables, submittal and approval of permit applications and variances, samples of materials, shop drawings, working drawings, inspection and test plans, safety and security plans, and site traffic control plans. Include activities of the County that may affect progress as well as those of affected utility companies and other similarly involved third parties. Include activities in the baseline CPM contract schedule as stipulated in general requirements.
- 3.1.4.4 Work activities – Show duration in work days.
- 3.1.4.5 Work activities – Durations of 10 working days or less except for non-construction activities such as procurement of materials, or fabrication of equipment. Should a work activity require more than 10 working days, subdivide work activity to define appropriate work items.
- 3.1.4.6 Critical path is defined as the sequence(s) of activities with the least amount of float.
- 3.1.4.7 Failure to include any element of work required for performance of the contract in baseline CPM contract schedule will not excuse Contractor from completing work required to achieve milestone completion, notwithstanding acceptance of baseline CPM contract schedule submittals.

Activities that are susceptible to weather delays caused by rain shall contain time contingencies for those potential delays. The time contingencies shall be described in the appropriate activity log windows of scheduling software. In scheduling the work, Contractor shall plan for normal rainfall (including its subsequent effects on days following extremely heavy rain).

3.2 Baseline CPM Contract Schedule Changes

When commencing new work associated with a change order/modification, incorporate work into the current baseline CPM contract schedule submittal as new activities after discussion with the County concerning how changes will be placed into the revised baseline CPM contract schedule. After an official change order/modification has been issued for work, add it to the schedule.

3.3 Fragnets

3.3.1 Submit revised current CPM contract schedule within 14 days of request. If Contractor falls behind in prosecution of work, as indicated by negative critical path, or submittal of current CPM contract schedule no longer appears to represent actual prosecution of work.

3.3.2 Properly connect to and constrain by, previously existing predecessor and successor activities, as applicable, activities of revised portion(s) of schedule. Band impacted activities in separate networks (fragnets); indicating specific delay or impact issues and submit to the County for review. Combine approved fragnets into current CPM contract schedule.

3.3.3 Time extensions will be granted only to the extent that equitable time adjustments for activity or activities affected exceed total or remaining float along critical path of activities at time of actual delay, or at time a change order/modification was issued. Float or slack time is not for the exclusive use or benefit of the Contractor but is an expiring resource available to all parties as needed to meet contract milestones and contract completion date. Time extensions will not be granted nor delay damages paid until delay occurs:

3.3.3.1 Which is beyond the control and without the fault or negligence of the Contractor and its subcontractors or suppliers, at any tier; and

3.3.3.2 Which extends actual performance of work beyond applicable current Contract completion date and most

recent date predicted for completion of project on approved schedule update, current as of time of the delay or as of time of issuance of a change order/modification.

3.4 Submittal of Schedule

- 3.4.1 Contractor shall submit the construction schedule within ten (10) calendar days, per Section 00 01 00, Paragraph 1.14e, after receipt of the Notice to Proceed (NTP) on hard copies and CD that is compatible with P6. The Contractor shall provide to the County for review four (4) copies of the construction schedule indicating the sequence of operations, description of the work, calendar definition and duration showing entire job performed within the specified contract time.
- 3.4.2 If the schedule duration proposed by the Contractor is less than the completion date in the NTP, the proposed schedule will not nullify the Contractor's right to the NTP duration.
- 3.4.3 The County shall review the Contractor's construction schedule. The Contractor shall incorporate all the revisions requested by the County and submit the final schedule within seven (7) calendar days of its receipt from the County.
- 3.4.4 The schedule of values shall be prepared and submitted together with the construction schedule.
- 3.4.5 Failure to meet these requirements may result in a determination and recommendation that the Board of Supervisors determine that the successful bidder as non-responsible because such failure reflects the bidder's ability to manage the work.
- 3.4.6 The schedule shall be revised at no additional cost to the County and resubmitted for review when:
 - 3.4.6.1 Changes to contract affect contract completion time.
 - 3.4.6.2 "Slippage" occurs because of procurement delays, rain, strikes and other delays.
 - 3.4.6.3 Any activities are modified from previous submittal.
 - 3.4.6.4 Delay on initial non-critical items is of such magnitude as to change the critical path.

3.5 Responsibility for Completion

The Contractor shall furnish sufficient forces, offices, facilities and equipment, and shall work such hours including night shift and overtime operations, as necessary to ensue the prosecution of the work in accordance with the current monthly construction schedule update. If, in the opinion of the County, the Contractor falls behind in meeting the construction schedule as presented in the current monthly schedule update, the Contractor shall take such steps as may be necessary to improve its progress, and the County may require it to increase the hours of work, the number of shifts, overtime operations and/or the amount of construction plant and equipment without additional cost to the County.

END OF SECTION

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. Related Sections include the following:
 - 1. Division 1 Section, Submittal Procedures, for submitting photographic documentation.
 - 2. Division 1 Section, Closeout Procedures, for submitting digital media as Project Record Documents at project closeout.

PART 2 – PRODUCTS

2.01 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 – EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
1. Date and Time: Include date and time in file name for each image.
 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at project site, available at all times for reference. Identify images same as for those submitted to Architect and Construction Manager.
- C. Preconstruction Photographs: Before commencement of demolition, or commencement of construction, take digital photographs of project site and surrounding properties, including existing items to remain during construction, from different vantage points.
- D. Periodic Construction Photographs: Take digital photographs weekly, with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Architect or Construction Manager Directed Construction Photographs: From time to time, Architect or Construction Manager may instruct photographer about number and frequency of photographs and subject, general directions or vantage points for photographs. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Submittal Procedures
- B. Construction Progress Schedules
- C. Shop Drawings
- D. Product Data
- E. Samples
- F. Manufacturers' Instructions
- G. Manufacturers' Certificates
- H. Coordinated Drawings
- I. Request for Information
- J. Contractor's Photographs

1.02 SUBMITTALS LIST AND SCHEDULE

- A. Submittal: Within 30 days of submission of List of Submittals, whichever is later, after award of contract, and before submitting items for review, submit two copies of submittals list and schedule.
- B. The Contractor will submit and document all submittals as directed by the County Project Manager.
- C. Schedule: Compile complete schedule of submittals anticipated to be made during progress of work.
 - 1. Include list of each type item for which Contractor's drawings, shop drawings, coordination drawings, product data, samples, certificates of compliance, manufacturer's certificates, warranties, and other types of submittals are required. Include number of Contractor's drawings, shop drawings, and coordination drawings anticipated within each submittal.
 - 2. Sequentially number each submittal. Use original submittal number with sequentially numbered suffix for resubmittals.
 - 3. Allow at least 10 working days, average, for Architect's review of submittals following receipt of submittal, including return to Contractor.

4. Indicate date of submittal by Contractor to Architect and date of receipt of reviewed submittals by Contractor from Architect.
 5. Coordinate schedule with subcontractors and materials suppliers.
 6. On acceptance by Architect, adhere to schedule except when specifically otherwise permitted. Accurately maintain submittal log for duration of contract.
- D. Revisions: Revisions to original submittal list and schedule will only be accepted by the County Project Manager when revisions are required by circumstances not reasonably anticipated by Contractor during preparation of original schedule.

1.03 SUBMITTAL PROCEDURES

- A. Transmit each submittal directly to Architect and copy the County Project Manager on the transmittal.
1. Bind submittals sturdily, neatly label covers.
 2. Include job number as it appears on Contract Documents.
 3. Include state agency application or approval number.
 4. When requested by the County, all submittals shall be submitted by pdf. File.
- B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.
- C. Identify Project, Architect, Contractor, Subcontractor or supplier, manufacturer; pertinent Drawing Sheet and detail number(s) and specification Section number, as appropriate.
1. Provide name and telephone number of individual who may be contacted for further information.
- D. Apply Contractor's stamp with Contractor's original signature or initials affixed thereto, certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents. Stamped signatures or initials are acceptable.

- E. Schedule submittals to expedite the project. Coordinate submission of related items.
 - 1. Make all submittals in accordance with the progress schedule and far enough in advance of scheduled dates of installation to provide required time for reviews for securing necessary approvals for possible revision and submittal and for placing orders and securing delivery.
- F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed work.
 - 1. Requests for deviations from Contract Documents shall be submitted for consideration before submittal of affected items. Submit in accordance with substitution requirements of Section 01 65 00 Transport, Handling and Storage. Only deviations which have been previously accepted in writing shall be included in submittals.
- G. Provide space for Contractor and Architect review stamps.
- H. Revise and resubmit submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- I. Determine and verify all field dimensions and conditions, materials, catalog numbers and similar data.
- J. Coordinate as required with all trades and all public agencies involved.
- K. Unless otherwise specifically authorized by Architect, make all submittals in groups containing all associated items. Architect may reject partial submittals as not comply with the provisions of this Section.
- L. Resubmittals:
 - 1. Subject to same terms and conditions as original submittal.
 - 2. The County Project Manager will accept not more than one resubmittal.
 - a. Should additional resubmittals be required, Contractor shall reimburse County for Architect's account for time spent in processing additional resubmittals at rate of

2.5 times rate of Direct Personnel Expense (DPE). Direct Personnel Expense is defined as direct salaries of Architect's personnel engaged or Project and portion of costs of mandatory, and customary contributions and benefits related thereto, including employment taxes and other statutory employee benefits, insurance sick leave, holidays, vacations, pensions, and similar contributions and benefits.

1.04 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit as required in Section 01 32 00.

1.05 SHOP DRAWINGS

- A. Submit a schedule of the shop drawings, listing their required submission and review dates to the County Project Manager for approval. The submission time shall be in accordance with the requirements set forth in Section 1.02, Submittals List and Schedule, Paragraph A. The schedule shall allow sufficient time for checking by the Architect. In addition, the shop drawing submission and review dates shall be incorporated into the progress schedule required in the General Conditions.
 - 1. "Elapsed time due to 'Revise and Resubmit' or 'Not Approved' action, indicated, on submittal review (due to inaccurate data or incomplete definition), shall not adversely affect equipment delivery and/or installation schedules".
 - 2. "Allotted time for review/approval process shall be a minimum of ten (10) working days from the date individual submittals are received by the Architect.
- B. Submit newly prepared information, drawn to accurate scale. Highlight, encircle or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as to the basis of Shop Drawings. Standard information prepared without specific reference to the Project will not be approved as Shop Drawings.
- C. Shop Drawings shall include fabrications and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 - 1. Dimensions
 - 2. Identification of products and materials included.

3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
- D. Sheet Size: Except for templates, patterns and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 inch x 11 inch, but not larger than 30 inch x 42 inch.
- E. The Contractor shall review, stamp with his approval as herein required, and submit with reasonable promptness and in orderly sequences, in accordance with the submittal schedule. All shop drawings required by the Contract Documents or subsequently by the Architect as covered by modifications shall be properly identified. At the time of submission the Contractor shall inform the Architect in writing of any deviation in the shop drawings.
- F. Stamp: Each page of shop drawings shall bear the Contractor's stamp, which shall signify the Contractor's representation that he has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained in the shop drawings, all in accordance with the requirements of Section 01 33 00 Submittals. Each stamp shall be accompanied by a wet signature or initial of an employee of the Contractor who may be contacted for information. Stamped signatures or initials are not acceptable.
- G. Submittals not certified by being stamped and signed will be returned without action as well as those, in the Architect's opinion, that have not been adequately reviewed or coordinated by the Contractor.
- H. Method of Review: Submit shop drawings, electronically as a pdf file using Primavera Contract Manager Version 11, unless otherwise instructed by the Director. Comments or corrections will be noted on the shop drawings and returned to the Contractor, who shall identify all changes made since the previous submittal and resubmit in the same manner. After it is reviewed by the Architect, the shop drawings will be stamped and returned to the Contractor who shall make distribution of copies as required.
- I. The Architect will review and approve shop drawings with reasonable promptness so as not to cause any delay, but only for conformance with the design concept of the project and with the information given in the Contract Documents. The Architect's

approval of a separate item shall not indicate approval of an assembly in which the item functions.

1. Contractor shall allow additional time if processing must be delayed to permit coordination with subsequent submittals.
- J. Submittal of shop drawings to the Architect shall be made by the Contractor with a dated transmittal form or letter, and not by subcontractors or suppliers.
- K. The Architect's approval of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's approval relieve the Contractor from responsibility for errors or omissions in the shop drawings.
 1. Notations by the Architect which increase contract or time of completion shall be brought to County Project Manager's attention and authorization by the County shall be obtained before proceeding with work.
- L. No portion of work requiring shop drawings shall be commenced until the shop drawings have been approved by the Architect.
- M. SHOP DRAWING PROCESSING
 1. Requirements for Submittal of Shop Drawings
 - a. Shop drawings shall be submitted directly to the Architect and copy of transmittal to the County Project Manager.
 2. Each shop drawing submitted for review shall have the following information:
 - a. Project Name
 - b. Specs. No.
 - c. Contract No.
 - d. Technical Specifications Section No.
 3. Each item of the submittal must be referenced to the proper item of the specification or drawings.

4. A signed statement from the General Contractor stating that the submittal has been reviewed by him and that it conforms with the drawings and specifications.
5. Provide a copy of each transmittal to the County Project Manager and Inspector.
6. Types of Approvals
 - a. "No Exception Taken" (Approved). This stamp will be used by the Architect for accepted shop drawings and will qualify the submittal for shop drawing number.
 - b. "Exception Noted" (Approved as Noted). This stamp will be used by the Architect when minor correction will make the submittal acceptable. These corrections will be shown in red on each of the submittals or on a correction list. This approval will qualify the submittal for a shop drawing number.
 - c. "Resubmit" (Rejected). Submittals which do not conform to the drawings and specifications will be returned without stamping or issuance of a shop drawing number. The rejection transmittal will state why the submittal was not acceptable and request that it be resubmitted.

N. Assignment of Shop Drawings Numbers

Each accepted submittal shall be stamped by the Architect and assigned a shop drawing number using either of the following systems. The shop drawing number will be shown on each sheet that is stamped by Architect.

1. A simple numerical sequence may be used whereby each submittal is assigned a number in order of approval (SD-1, SD 2...).
2. A numerical sequence by classification may be used such as SD-S-1 for a Structural Submittal; SD-AC-1 for an Air Conditioning Submittal; SD-C-1 for a Civil Submittal, SD-L-1 for a Landscape Submittal; SD-A-1 for an Architectural Submittal; and SD-X-1 for Miscellaneous Submittals.
3. Material submittals and paint color chips should be assigned a shop drawing number for identification purposes.

O. Transmittal of Submittals

The General Contractor shall submit to the Architect a set of shop drawings which comply with this Exhibit. Upon receipt of the submittal, the Architect will review or have his consultants review the submittal for compliance with the drawings and specifications.

P. Processing

1. Procedure

- a. Shop drawings will be stamped or returned as per Section M of this Exhibit. Accepted and numbered shop drawings shall be returned to the General Contractor. The Architect will provide a pdf copy of approved shop drawings to the County Project Manager, Building Inspector, and Contractor.
- b. The County Project Manager is to check shop drawings for any deviation from the drawings or specifications prior to releasing them to the Contractor. If there are discrepancies in the shop drawings, they should be sent back to the Architect for correction.

1.06 PRODUCT DATA

- A. Submit pdf copy of product data using Primavera Contract Manager Version 11, unless otherwise instructed by the Director.
- B. Product data shall identify applicable products, models, options and other available data specific to the project requirements.
- C. After review and approval by the Architect, copies will be distributed to the County Project Manager, Building Inspector, and General Contractor. The approved product data sheets shall be retained at the site by the General Contractor to be used for reference.

1.07 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the product with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

- B. Unless precisely specified, submit samples of finishes from the full range of manufacturers' standard colors, textures and patterns for Architect selection, or in custom colors selected.
- C. Include identification on each sample with full Project information, as required for Shop Drawings, Item, 1.04 above.
- D. Submit a minimum of three (3) samples or as specified in individual sections of the specifications, two of which will be retained by the Architect.
- E. Reviewed samples which may be used in the work are indicated in individual specification sections.
- F. Approval or rejection of samples will be made by the Architect in writing.

1.08 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.09 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification sections, submit manufacturers' certificate to Architect for review in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.10 COORDINATED DRAWINGS

- A. Submit drawings which indicate routing, locations, sizes, types and numbers of components in concealed spaces where potential conflict may occur between structures, mechanical, electrical, fire sprinklers, communications and ceiling suspension systems.
- B. Indicate locations of all ceiling penetrations and surface-mounted items. Provide cross sections at all areas to indicate proper support of ceilings and non-interference with work of other sections of the specifications. Cross sections shall indicate coordination required and proposed solutions for routing of elements where potential conflict exists. A reproduction of Architect's reflected ceiling plan is not acceptable.
- C. Drawings shall be based on field measurements, shop drawings and product data.
- D. Conflicts shall be brought to the County Project Manager's attention immediately.
- E. Submit to the Architect, in writing, requests for clarification or interpretations that will affect the intent of the Contract Documents.
- F. The coordinated drawings shall indicate each class of work in the affected area. The drawing or written submittal shall include Contractor's recommendations for the solution of any potential conflicts as well as recommendations tendered by any work of any section of the specifications which may be affected thereby.
- G. Submit the coordinated drawings in a scale of not less than 1/8" – 1' – 0" with necessary sections and profiles at an appropriate, clearly readable enlarged scale. Submit the coordinated drawings as one reproducible and two blue-line prints as a pdf file using Primavera Contract Manager Version 11, unless otherwise instructed by the Director.
- H. The Architect will review the submittals, make appropriate notations and comments to ensure the solution meets the intent of the Contract Documents and then return to Contractor for implementation.
- I. The Contractor shall be responsible for the proper coordination of the work of all sections of the specifications in the execution of coordinated drawing. Any installation of materials, components or equipment under one section of the specifications without full and

complete agreement, knowledge and consent by fabricators of adjacent or otherwise related or affected work will not be approved.

- J. It shall be incumbent upon the Contractor that all fabricators of work involved in the execution of coordinated drawings be informed, consulted and advised in sufficient advance time to arrive at solutions where no extension of contract time or extra cost to the County will be approved due to Contractor's negligence in the expeditious, timely submittal of coordinated drawings.

1.11 REQUEST FOR INFORMATION

- A. Submit Request for Information (RFI) or interpretation in writing to the County.
- B. Response will be in writing, by the County, either in the construction field meeting notes or on the RFI itself, within 5 working days of receipt of RFI.
 - 1. No change in cost interpretations or clarifications will be accepted as such.
 - 2. Change in cost interpretation or clarifications will institute a Change Order procedure.

1.12 CONSTRUCTION PHOTOGRAPHS

- A. Submit with payment request monthly. See Section 01 32 33.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

* * * * *

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Submittals
 - 1. Shop drawings.
 - 2. Product or catalog data.
 - 3. Samples.
- B. The Contractor will prepare and submit shop drawings as directed by the County Project Manager.
- C. Related work specified elsewhere.
 - 1. Operating and maintenance manuals.
 - 2. Spare parts or hardware lists.
 - 3. Tests and certificates.

1.02 DEFINITIONS

- A. Shop Drawings
 - 1. Original drawings prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate some portion of the work; showing fabrication, layout, setting or erection details.
 - 2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
- B. Product or Catalog Data
 - 1. Manufacturers standard drawings modified to delete nonapplicable data or include applicable data.
 - 2. Manufacturers catalog sheets, brochures, diagrams, schedules, charts, illustrations or other descriptive data. Mark each copy to identify pertinent dimensions, materials, products or models.

C. Samples

1. Physical examples to illustrate materials, equipment or workmanship.
2. Office samples to show functional characteristics of product or material. Submit with full range of colors available.
3. Field samples and mock-up; erect at site in location acceptable to Project Manager.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Prior to Submittal

1. Review and approve Shop Drawings, Product Data and Samples prior to submission to the Department.
2. Coordinate each submittal with work of the project and Contract Documents so as to cause no delays in the work.
3. By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the work and of the Contract Documents.
4. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Department's acceptance unless the Contractor has specifically informed the Department in writing of such deviation at the time of submission and the Department has given written acceptance to the specific deviation.
5. Contractor's responsibility for errors and omissions in submittals or deviations from Contract Documents is not relieved by the Department's review of submittals.
6. The Contractor shall direct specific attention, in writing or on submitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Department on previous submittals.

B. After Submittal

1. Begin no work which requires submittals until return of such submittals with the Department's stamp and signature indicating review.
2. Distribute copies of submittals to subcontractors, suppliers or manufacturers as their interests appear.

1.04 IDENTIFICATION OF DATA

A. All submittals for review shall have the following identification data, as applicable, contained thereon or permanently adhered to.

1. Project Name and Location
2. Specifications Number
3. Subcontractor's, Vendor's, and/or Manufacturer's Name, Address and Phone Number
4. Product Identification
5. Shop Drawing Title, Contractor's Drawing Number, and Date of Drawing and Revisions
6. Applicable Contract Drawings and Specifications Section Numbers
7. Contractor's Approval, Signature and Date

B. Submittal Format

Submittal No. _____

Project Name _____

Specifications No. _____

Product _____

Section No. _____

Supplier _____

We have reviewed the submitted, and have verified that it meets the criteria required in accordance with the plans and specifications.

Contractor's Name _____

Signature _____

Title _____

C. Catalog Data

1. Each separate catalog, brochure or single page data sheet submitted shall have the identification required and the Contractor's approval.
2. Catalogs or brochures containing multiple items for review need identification only on the cover. Identify page numbers and catalog items.
3. In the event that one or more of the multiple items are not accepted in any submittal, additional copies required will not be required until all items are accepted.
4. Provide a space approximately 4" x 4" for the Department to affix its status stamp.

1.05 COLOR AND FINISH SELECTION

A. Contractor Submittals

1. Submit as soon as practical, subsequent to award of contract, names of manufacturers and pertinent products or materials proposed for use in which a color selection is required.
2. Submit standard color charts or samples as requested by the District. All items for color selection must be submitted prior to issuance of any approvals.
3. Contractor is responsible for submitting products that comply with technical specifications.

1.06 SUBMISSION REQUIREMENTS

- A. Submit all Shop Drawings, Product or Catalog Data and Samples to the District by transmittal containing identification of project, specifications number and identification of items being submitted.

B. Product Data

1. Original Submittal – Six (6) copies of all Shop Drawings and/or Product Data for review in ample time to coordinate necessary features of construction with all fabrication and installation requirements.
2. Resubmittal – When required, copies will be returned to Contractor. After revision submit new copies as stipulated for original submittal. Indicate all changes.

C. Samples

1. Original Submittal – Furnish three (3) samples, unless otherwise specified, of each item for which samples are required for review. Obtain review prior to delivery of material to project site. Such samples shall be representative of actual material proposed for use in project and of sufficient size to demonstrate design, color, texture, and finish.
2. Resubmittal – All rejected samples will be returned upon request. All resubmittals shall consist of three (3) samples.

1.07 REVIEW AND PROCESSING

A. General

1. The Department will review and accept or take other appropriate action upon Contractor's submittals for conformance with the design concept of the work and with the information given in the Contract Documents. Acceptance of a specific item shall not indicate acceptance of an assembly of which the item is component.
2. Submittals not approved by the Contractor will be returned to Contractor. Submittals will not be reviewed or accepted by the Department or Architect without Contractor's prior approval.

B. Review

1. Product Data – After review, two (2) copies bearing the Department's review stamp and signature will be returned to Contractor.

2. Samples – After review one (1) sample will be returned and the remainder will be retained by the Department until completion of the work.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Tests.
- B. Inspections.
- C. County will employ and pay for the services of an Independent Testing Laboratory or Soils Engineer to perform specified testing and/or inspections.
- D. Related requirements specified elsewhere:
 - 1. Refer to the various trade sections for specific test and inspection requirements.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Los Angeles County Building Code.
- B. Uniform Building Code Standards, as applicable.
- C. California Code of Regulations.
 - 1. Title 17 and 24.

1.03 QUALITY ASSURANCE

- A. General Test Requirements. Materials to be furnished under the Contract are subject to testing and inspection for compliance with requirements of Drawings and Specifications.
- B. Testing Laboratory or Agency shall be the licensed Testing Laboratory or Agency meeting the requirements of ASTM E-329, designated by the County and referred to hereafter as the Testing Laboratory. Perform all testing under supervision and control of a California registered professional engineer employed by the Testing Laboratory.
- C. Soils or Foundation Engineer will be the registered professional Geotechnical Engineer employed and paid by the County.
- D. Disqualified Material. Any material shipped or delivered to the site by the

Contractor from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of a notice from the County or Architect that such testing and inspection will not be required, shall not be incorporated in the Work.

1.04 QUALITY CONTROL

A. Earthwork.

1. Approval of fill material.
2. Compaction tests.
3. Inspection of subgrades and excavations.

B. Concrete.

1. Materials.
 - a. Portland cement tests.
 - b. Concrete aggregates.
 - c. Reinforcing bars.
2. Concrete quality.
 - a. Concrete mix designs.
 - b. Strength tests of concrete.
3. Concrete inspection.
 - a. Job site inspection.
 - b. Batch plant or weighmaster inspection.

C. Masonry.

1. Materials.
 - a. Tests of brick or block masonry units.
 - b. Tests of mortar and grout materials.

- c. Reinforcing steel bars.
- 2. Mortar and grout quality.
 - a. Strength tests for mortar and grout
- 3. Masonry inspection.
 - a. Job site inspection.
- D. Structural steel and metal deck tests and inspections.
 - 1. Materials.
 - a. Material identification and certification.
 - b. Testing of unidentified material.
 - 2. Inspection of structural steel, light gage steel deck and welding.
 - a. Welding inspection (shop and field).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials to be tested and/or inspected as specified in respective sections.

PART 3 - EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to Work.
 - 1. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Furnish copies of products test reports as required.
- D. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested.

2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- E. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed after such notice, reimburse County for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- F. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

3.02 FIELD QUALITY CONTROL

A. Tests.

1. County will select an independent testing laboratory to conduct tests. Selection of material required to be tested shall be by the laboratory or County's representative and not by Contractor.
2. Contractor shall notify County in sufficient time in advance of manufacture of material to be supplied, which must by terms of the contract be tested, in order that the County may arrange for testing.
3. County will select and pay testing laboratory costs for all tests and inspection, except as provided elsewhere in this section.

B. Test reports.

1. One copy of all test reports shall be forwarded to the County by the testing agency. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Sample taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of (Title 24) and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or

not the material or materials tested comply with requirements.

C. Verification of test reports.

1. Each testing laboratory shall submit to the County a verified report in duplicate covering all of the tests which were required to be by that laboratory during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project, covering all tests.

D. Inspection.

1. The County shall at all times have access for the purpose of the inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.
2. The County shall have the right to reject materials and workmanship which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the County. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the County may correct same and charge the expense to the Contractor.
3. Should it be considered necessary or advisable by the County at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.
4. Reimbursement of Inspection Costs. Contractor shall reimburse the County all or any part, of the actual excessive inspection costs incurred by the County due to any or all of the following.
 - a. Contractor's failure to complete the Work within the Contract

Time and any previously authorized extensions thereof.

- b. Claims between separate contractors.
- c. Covering of any of the Work before the required inspections or tests are performed.
- d. Extra inspections required for Contractor's correction of defective Work.

E. Inspector.

- 1. An Inspector employed by the County will be assigned to the Work.
- 2. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

* * *

SECTION 01 50 00
TEMPORARY FACILITIES

1 - GENERAL

1.01 DESCRIPTION

- 1.02 Office.
- 1.03 Storage structure.
- 1.04 Telecommunications.
- 1.05 Hardware and Software Requirements.
- 1.06 Toilets.
- 1.07 Protection from Weather.
- 1.08 Utilities.
- 1.09 Construction signboards.
- 1.10 Temporary chain link fencing.
- 1.11 Temporary Walkways and Driveways
- 1.12 Storage of materials.
- 1.13 Parking.
- 1.14 Staging areas.
- 1.15 Steel plates

1.02 OFFICE

Contractor shall provide an office facility of at least 150 square feet. Facility shall have a lockable exterior door, screened windows, heating and air conditioning, a six foot wide desk with drawers, plan tables, plan rack, bookcase, shelf, a minimum three drawer file cabinet and at least three chairs. This facility may be used as the Contractor's office.

1.03 STORAGE STRUCTURE

Contractor shall provide and maintain on the premises, where directed, watertight storage structure for all materials which might be damaged by weather, including storage facilities for concrete test samples or other material samples required for work.

1.04 TELECOMMUNICATIONS

1. Telephone

Contractor shall provide, at his own expense, a non-pay telephone limited to local calls for use of Contractor. Local calls are considered to be those within 213, 310, 323, 562, 626, 714, 818, 909, and 949 area codes.

2. Digital Subscriber Line (DSL)

Contractor shall provide, at his own expense, one (1) DSL line for use by Contractor and the County and their authorized representatives respectively.

3. Virtual Private Network Card (VPN)

Contractor shall provide, at his own expense, one (1) VPN Card for access into the County network to be returned to the County at acceptance of the project.

1.05 HARDWARE AND SOFTWARE REQUIREMENTS

- A. The Contractor shall provide a computer for the project. The computer shall be for the Contractor's use. The computer shall be maintained by the Contractor until the project is substantially complete.

The Contractor shall provide current industry standard minimum hardware and software requirements for the computer:

- Windows 10, Primavera P6, Outlook 360 and Microsoft Office Software
- 19" viewable widescreen monitor with contrast ratio of 800.1 and speakers (Dell 1908FP+AS501).
- Intel Core i5, or better
- Video Card with 128 MB memory
- 2 GB of RAM memory

B. Security Requirements

For the above noted computers, the Contractor shall provide the following minimum security requirements:

- Installation of anti-virus software
- Upgrade virus definitions as they become available
- Upgrade Microsoft patches (critical and security) and services packs as they become available
- Installation of firewall (hardware or personal) for broadband Internet access (DSL, cable modem, etc.)
- Maintain confidentiality of log-on ID, password, and SecureID passcode (for VPN)

1.06 TOILETS

Contractor shall install and maintain in a sanitary condition, suitable chemical toilets for use of workmen. Toilets shall be in a location approved by the Department. There shall be a minimum of one (1) toilet for each multiple of twenty (20) Contractor's employees, or fractional part thereof, working at the job site. The temporary restroom facilities shall be serviced a minimum of three (3) times a week.

1.07 PROTECTION FROM WEATHER

The existing building structure and interior finish and furnishings shall be protected from rain, dew, wind, and all other elements of the weather during periods when roof areas are unprotected by roofing or when breaches are present in exterior walls. Such areas shall be covered with weathertight tarpaulins or roofing materials firmly secured or by other approved methods. Refer to General Conditions. When, in the opinion of the Department, breaches in roof or wall areas afford access to unauthorized persons, the Contractor shall, at no additional expense to the County, construct at such breaches, substantial barricades of type and material as approved by the Department.

1.08 UTILITIES

The Contractor shall arrange for and provide all utility services necessary to the work, including electrical current for power and light, and water supplies; or at Contractor's option, he may use free of charge, available County utility services as may exist on the site. Motors connected to County electrical circuits shall not exceed 1/3 horsepower. Contractor shall provide, maintain and remove upon completion of work, all temporary connecting lines to sources of supplies, and temporary meters and accessories as needed.

The Contractor shall bear all expenses involved in the provisions of providing and connecting all temporary utility services. The County will assume payment for utility service charge at the time the various permanent meters are set. Refer to Project General Requirements section for permanent utility services.

1.09 CONSTRUCTION SIGNBOARDS

Refer to article entitled "Advertising" of the General Conditions. Prior to any ground breaking operation or in the case ground breaking is not required, within ten (10) days after award of contract, the Contractor shall furnish and erect two (2) identification signboards 4'-0 x 8'-0 in size, constructed of 3/4" exterior grade plywood within a frame, supported on posts, and adequately braced to resist wind stresses. The sign background shall be painted with two (2) coats of exterior type paint over a suitable primer and lettered with block letters professionally applied. The signboard shall set forth, in sequence, the following information with the layout as directed by the Department.

CAMP AFFLERBAUGH CCTV PROJECT
County of Los Angeles
Board of Supervisors

Hilda L. Solis	1st District
Holly J. Mitchell	2nd District
Lindsey P. Horvath	3rd District
Janice Hahn	4th District
Kathryn Barger	5th District

Fesia Davenport, Chief Executive Officer, Chief Executive Office
Mark Pestrella, Director, Department of Public Works
Guillermo Viera Rosa, Interim Chief Probation Officer, Department of Probation

Huitt-Zollars, Inc.
Name of Contractor

In addition, individual signs of Contractors, subcontractors and materialmen may be displayed as approved.

Signs shall be promptly removed by the Contractor or by the owner, if individually owned, upon completion of the work. The size, construction, subject matter and location of all signs shall be subject to the approval of the Department.

1.10 TEMPORARY CHAIN LINK FENCING

1. For work outside of the secured facility, the Contractor shall provide and maintain a 6 ft. high chain link fence around the construction area(s) consisting of 11 gauge (minimum) x 2" mesh chain link fabric attached to substantial steel pipes spaced at 10 feet on center maximum. Provide top and bottom tension wires and corner post bracing. Provide chain link gates with welded steel pipe frames and all hardware required for proper operation. Fencing shall not have any loose or easy to remove tie wires, hog rings, etc.
2. Provide and maintain the County specified chain link fence enclosures around each jobsite with vehicle and man gates as specified by the County.
3. Obtain and pay for all required permits and inspections. Construct in accordance with applicable codes and regulations of public agencies having jurisdiction.
4. Chain link fencing is not allowed inside the facility. Use alternate method to secure the work areas.

1.11 TEMPORARY WALKWAYS AND DRIVEWAYS

- A. All new temporary walkways shall be properly joined or tied in with existing walkways. All permanent walkways shall consist of concrete.
- B. Areas where temporary walkways or driveways have been installed shall be returned to their condition prior to construction.

1.12 STORAGE OF MATERIALS

Storage of materials shall be only within areas designated by the Department.

1.13 PARKING

Do not park at the facility's parking area. The Contractor is responsible for providing off-site parking to all contractor construction personnel at no additional cost to the County.

1.14 STAGING AREAS

Contractor shall coordinate with County for location, extent and type of construction staging areas.

1.15 STEEL PLATES

Cover all unattended trenches with traffic grade steel plates. Paint all edges in bright yellow to prevent trip hazards.

* * *

SECTION 01 57 00

STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.01 Water Pollution Control.

1.02 Best Management Practices (BMPs). Apply BMPs for project that disturbs less than 1 acre of soil.

1.03 Terms and Definitions.

- 1. Active Areas of Construction** - areas subject to land surface disturbance activities related to the Project including, but not limited to, the Project site, staging areas, immediate access areas, and storage areas. Previously active areas will be considered active areas until temporary or final soil stabilization BMPs are implemented.
- 2. Accumulated Precipitation Procedure (APP)** – the methods and procedures for management and discharge of accumulated precipitation on the Project site.
- 3. Best Management Practices (BMPs)** - shall be defined as specified in the permits listed in 1.05.
- 4. BMP Manager** - an individual who meets the requirements of Los Angeles Regional Water Quality Control Board MS4 Permit Order No. R4-2012-0175-DWQ, Section VI. D. 8. L ii (2).
- 5. BMP Manual** - the edition of the Los Angeles County Department of Public Works Construction Site Best Management Practices (BMPs) Manual in effect as of the date of advertisement of the Contract.
- 6. Exposed Soil** - native soil left exposed as the result of uncovering, removal of vegetation or pavement, grading, excavation, or any other construction activity. Soil protected with temporary soil stabilization BMPs will not be considered exposed soil.
- 7. Inactive Disturbed Soil Areas (DSA)** – areas that have been disturbed and have not or will not be disturbed for at least 14 Days.
- 8. Non-Storm Water Discharges** - discharges that do not originate from precipitation events.
- 9. Run-On** - storm water discharges that flow onto the Project site.

10. Run-On Control BMPs - BMPs used to divert or direct run-on either around or through the Project site.

1.04 Abbreviations.

<u>Abbreviation</u>	<u>Word or Words</u>
APP	Accumulated Precipitation Procedure
BMP	Best Management Practice
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board

1.05 General. This Project lies within the boundaries of the County of Los Angeles and shall conform to the following requirements:

- a) Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges within the County of Los Angeles, and the Incorporated Cities therein, except the City of Long Beach (Order No. R4-2012-0175. NPDES Permit No. CAS004001). Within the City of Long Beach (Order No. 99-060, NPDES Permit No. CAS004003).
- b) Within the unincorporated areas of the County of Los Angeles, Los Angeles County Code, Chapter 12.80.

1.06 Best Management Practices (BMPs).

- a) **General.** The Contractor shall effectuate a year-round program for implementing, inspecting, and maintaining BMPs for wind erosion control, tracking control, erosion and sediment control, non-storm water control, and waste management and materials pollution control.

Best Management Practices conforming to the "Minimum Requirements" specified in Table 1.06 shall be implemented throughout the duration of the Project. The Contractor shall be responsible for the implementation, maintenance, and inspection of BMPs throughout any temporary suspension of the Work or designated construction moratorium.

The National Weather Service weather forecast shall be monitored by the Contractor on a daily basis. Whenever a rain event is predicted, the contractor shall implement all required BMPs according to the BMP Manual and these Special Provisions.

- i. **BMP Manual.** Water pollution control work shall conform to the requirements in the BMP Manual. BMP Manual may be accessed at Public Works' Contracts Opportunities, <https://dpw.lacounty.gov/contracts/opportunities.aspx>, under **County Sites links (scroll to the bottom of the page)**.

The Contractor shall have a minimum of one readily accessible copy of the BMP Manual on the Project site at all times.

- b) BMP Manager.** The Contractor shall designate a BMP Manager who meets the requirements of Los Angeles Regional Water Quality Control Board (RWQCB) MS4 Permit Order No. R4-2012-0175-DWQ, Section VI, D. 8.I.ii (2).

MS4 Permit Order No. R4-2012-0175-DWQ, Section VI, D. 8.I.ii (2):

"Each Permittee shall ensure that its inspectors are knowledgeable in inspection procedures consistent with the State Water Board sponsored program QSD or a Qualified SWPPP Practitioner (QSP) or that a designated person on staff who has been trained in the key objectives of the QSD/QSP programs supervises inspection operations. Each Permittee may provide internal training to staff or require staff to obtain QSD/QSP certification. Each inspector must be knowledgeable of the local BMP technical standards and ESCP requirements."

The BMP Manager shall have the responsibility and authority to fully implement, maintain and inspect the required BMP's in accordance with the Contract Documents and as directed by the County Project Manager. The BMP Manager shall be fully knowledgeable of the requirements in the BMP Manual.

The designated BMP Manager's name and qualifications shall be submitted in accordance with MS4 Permit Order No. R4-2012-0175-DWQ, Section VI, D. 8.I.ii (2), prior to issuance of the Construction Contract, Part 2 NTP.

- c) Minimum Requirements.** The Contractor shall implement an effective combination of erosion and sediment controls and maintain the appropriate Construction Site BMPs shown in Table 1.06. The BMPs shown in this table meet or exceed the Waste Discharge Requirements referenced in 1.05.

Table 1.06 Construction Site BMPs		
ID	BMP Name	Minimum Requirement
Temporary Soil Stabilization		
SS-1	Scheduling	X
SS-2	Preservation of Existing Vegetation	X
SS-3	Hydraulic Mulch	
SS-4	Hydro seeding	
SS-5	Soil Binders	
SS-6	Straw Mulch	
SS-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	X
SS-8	Wood Mulching	
SS-9	Earth Dikes/Drainage Swales & Ditches	
SS-10	Outlet Protection/Velocity Dissipation Devices	
SS-11	Slope Drains	
SS-12	Streambank Stabilization	
Temporary Sediment Control		
SC-1	Silt Fence	X

SC-2	Sediment/Desilting Basin	
SC-3	Sediment Trap	
SC-4	Check Dam	
SC-5	Fiber Rolls	X
SC-6	Gravel Bag Berm	X
SC-7	Street Sweeping and Vacuuming	X
SC-8	Sandbag Barrier	X
SC-10	Storm Drain Protection	X

Wind Erosion Control		
WE-1	Wind Erosion Control	X
Tracking Control		
TC-1	Stabilized Construction Entrance/Exit	X
TC-2	Stabilized Construction Roadway	
TC-3	Entrance/Outlet Tire Wash	
Non-Storm Water Management		
NS-1	Water Conservation Practices	X
NS-2	Dewatering Operations	X
NS-3	Paving and Grinding Operations	X
NS-4	Temporary Stream Crossing	
NS-5	Clear Water Diversion	
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	X
NS-7	Potable Water/Irrigation	X
NS-8	Vehicle Equipment Cleaning	X
NS-9	Vehicle Equipment Fueling	X
NS-10	Vehicle Equipment Maintenance	X
NS-11	Pile Driving Operations	
NS-12	Concrete Curing	
NS-13	Material and Equipment Use Over Water	
NS-14	Concrete Finishing	
NS-15	Structure Demolition Over or Adjacent to Water	
NS-16	Temporary Batch Plant	
Waste Management and Material Pollution Control		
WM-1	Material Delivery	X
WM-2	Material Use	X
WM-3	Stockpile Management	X
WM-4	Spill Prevention and Control	X
WM-5	Solid Waste Management	X
WM-6	Hazardous Waste Management	X
WM-7	Contaminated Soil Management	
WM-8	Concrete Waste Management	X
WM-9	Sanitary/Septic Waste Management	X
WM-10	Liquid Waste Management	X

Additional BMPs may be required as a result of actual field conditions, Contractor activities, or construction operations.

Year-Round Implementation Requirements. Implementation shall conform to the requirements in the BMP Manual and the following:

Temporary Soil Stabilization

- ii. Active Areas of Construction shall be stabilized and temporary sediment controls implemented prior to a rain event.

Temporary Sediment Control

- iii. Sediment shall not be discharged offsite or to the storm drain system or receiving waters.
- iv. Stockpiles shall be removed from roadways at the end of each work day and shall be covered and bermed with perimeter sediment controls prior to every rain event and when not in use.

Wind Erosion Control

- v. Wind erosion control BMPs shall be implemented in conformance with the requirements of the jurisdictional air quality regulatory agency.

Tracking Control

- vi. Each entrance to, and exit from, the Project site shall be stabilized. Traffic entering/exiting the Project site shall be directed so as to only use such stabilized entrances/exits. Tracking of mud and/or sediment onto paved surfaces shall be removed by the end of each Day.

Non-Storm Water Management

- vii. Accumulated precipitation shall be discharged in accordance with the Accumulated Precipitation Procedure, Section 7.2 of the BMP Manual.
- viii. BMP Manual may be accessed at Public Works' Contracts Opportunities, **County Sites links**, <https://dpw.lacounty.gov/contracts/opportunities.aspx>
- ix. Non-storm water BMPs shall be implemented to prevent un-authorized discharges.
- x. Non-storm water discharges shall be in compliance with Section III of the Waste Discharge Requirements referenced in 1.05.

Waste Management and Material Pollution Control

- xii. Material and waste stockpiles shall be covered prior to all rain events.
 - xiii. Stockpiles of temporary asphalt concrete ("cold mix") shall be covered at all times.
 - xiii. The Contractor shall have a minimum of 3 spill response cleanup on the Project site at all times.
 - xiv. Spills and leaks shall be cleaned up within one hour after spillage and disposed of off the Project site.
 - xv. Concrete waste shall be contained in a concrete washout bin. At grade and below grade washouts are prohibited. There shall be no discharge of concrete washout or waste into the underlying soil or onto the surrounding areas. Concrete waste shall be considered as including, but not be limited to, slurry, cement, wash waters, additives, or grout.
- 1.07 **Accumulated Precipitation Procedure (APP).** The Contractor shall prepare an accumulated precipitation procedure (APP) for review and approval by the County Project Manager before any discharge from the Project site and as required by the County Project Manager. The APP shall describe the location of proposed discharges, the BMPs to be implemented (e.g., NS-2), and the actual equipment to be used. The APP shall be prepared and submitted in accordance with BMP NS-2 and Section 7 of the BMP Manual, <https://dpw.lacounty.gov/contracts/opportunities.aspx>
- 1.08 **BMP Inspections.** The Project site shall be inspected by the BMP Manager and documented on the LACDPW BMP checklist (contained in the BMP Manual) as follows:
- a) Within 24 hours prior to a rain event.
 - b) Within 48 hours after a rain event (0.01 inch or more of accumulated precipitation).
 - c) At 24-hour intervals during extended rain events.
 - d) Once every week.
- 1.09 **Non-Storm Water Discharge Reporting.** If the Contractor identifies any non-storm water discharge(s) as identified in Section III of the Waste Discharge Requirements referenced in 1.05, or if the Project receives a written notice or order from any regulatory agency, the Contractor shall so inform the County Project Manager within 24 hours. The Contractor shall submit a written report to the County Project Manager within 5 Days of the discharge event, notice or order. The report shall include the following information:
- a) The date, time, location, nature of the operation and type of discharge, including the cause or nature of the notice or order.
 - b) The BMPs implemented before the discharge event, or prior to receiving the notice or order.

- c) The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent recurrence.
- d) The Contractor shall conduct applicable water quality monitoring per the MS4 Permit Order No. R4-2012-0175-DWQ, Section VI, D. 8.I.ii (2) Section III A.4 and Table 8 of the Waste Discharge Requirements referenced in 1.05.

1.10 **Progressive Enforcement.** The Agency, as a permittee, is subject to enforcement action by the State Water Resources Control Board (SWRCB), Environmental Protection Agency, private citizens and citizen groups. The Contractor shall notify the County Manager immediately following receipt of a request from any jurisdictional regulatory agency, to enter, inspect, sample, monitor or otherwise access the Project site or the Contractor's records pertaining to water pollution control.

The Agency will assess the Contractor a penalty of \$1,000 for each Day that the Contractor fails to fully-comply with the specified requirements. The penalty will be deducted from Contract progress payments due the Contractor.

The Contractor shall be responsible for the costs and liabilities imposed by law as a result of its failure to fully-comply. Costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the Agency or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act. In addition the Agency will deduct, from any monies due the Contractor, the total amount of any legal fees, staff costs, and consultant fees.

Payment. Payment for the implementation of BMPs, including the BMP Manager, construction, deployment, inspection, maintenance, removal, and the furnishing of all necessary labor, equipment, materials, and all other related costs shall be considered as included in the lump sum Bid price for "IMPLEMENTATION OF BMPs."

Payment will be prorated on a monthly basis over the duration of the Contract.

SECTION 01 57 19

TEMPORARY AND ENVIRONMENTAL CONTROLS

SECTION 1 - GENERAL

1.1 SUMMARY

This section establishes general control requirements for protection of land and water resources; control of noise, dust, and debris, and other environmental pollution; regulation traffic, and control of other activities of the Contractor and the Contractor's subcontractors in performance of the work of the contract.

1.2 DEFINITIONS

- A. Environmental pollution and damage means the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to human life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
- B. Sediment means soil and other debris that has been eroded and transported by storm or well production runoff water.
- C. Inert solids/inert waste means non-liquid solid waste including, but not limited to, soil and concrete, that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established pursuant to Division 7 of the California Water Code and does not contain significant quantities of decomposable solid waste.
- D. Inert fill means a permitted facility that accepts inert waste such as asphalt and concrete exclusively.
- E. Construction and demolition waste includes solid wastes such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.

1. Rubbish includes both combustible and noncombustible wastes such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.
 2. Debris includes both combustible and noncombustible wastes such as leaves and tree trimmings that result from construction or maintenance and repair work.
- F. Class III landfill means a landfill that accepts nonhazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.
- G. Chemical waste includes petroleum products, bituminous materials, salts, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- H. Sanitary Wastes:
1. Garbage includes refuse and scraps resulting from preparation, cooking, distribution, or consumption of food;
 2. Sewage means domestic sanitary sewage.

1.3 SUBMITTALS

- |
- A. Comply with pertinent provisions of Section -01 33 00.
- B. Environmental Protection Program: Prior to commencement of the work of this contract. Compile and submit to the County the written environmental protection program proposed by the Contractor for compliance with requirements of this section, as defined under paragraph 1.4 below. Meet with the County to review the proposed environmental protection program, make changes in the plan, and secure the County's approval of the written environmental protection program, prior to commencement of the work.

1.4 QUALITY CONTROL

- A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this section. Comply with all pertinent Federal, State, and local regulations pertaining to water, air, solid waste, and noise pollution. Require the Contractor's subcontractors to comply with the provisions of this section.

B. Environmental Protection Program:

1. After award of the contract, and prior to commencement of the work, schedule and conduct a meeting with the County representatives to discuss solid waste management and environmental protection, recycling, and rebate programs required in connection with the work.
2. Not more than 21 calendar days after the meeting, prepare and submit a written and/or graphic Solid Waste Management and Environmental Protection Plan including, but not necessarily limited to:
 - a. List of Federal, state and local laws, regulations, and permits concerning environmental protection, pollution control, noise abatement, and noise control that are applicable to the Contractor's proposed operations;
 - b. Procedures to be implemented to provide the required environmental protection and to comply with applicable laws and regulations;
 - c. Location or locations of solid waste disposal areas proposed to be used by the Contractor, with statement as to current permits or licenses issued to those disposal areas;
 - d. Contractor's proposed procedures for recycling and re-use of materials;
 - e. Contractor's proposed participation in rebate programs.
 - f. Revise and submit the Solid Waste Management and Environmental Protection Plan as required by the County.
 - g. Approval of the Contractor's Waste Management and Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protective measures.
3. With each application for progress payment, submit a summary of solid waste generated by the construction and demolition operations.
 - a. Submit on form copied from the example at the end of this

section on a different form acceptable to the County;

- b. Include copies of all manifests, weight tickets, receipts, and invoices specifically identifying the work and waste materials from recycling centers, class III landfills, and inert fills.
- C. Prepare and maintain a 3-ring binder with rebate information and product identification as required for the County to qualify for rebate programs; submit the binder with final closeout submittals.

SECTION 2 - PRODUCTS

2.1 MATERIALS

Except for materials proposed by the Contractor for compliance with the requirements of this Section, and approved in advance by the County, no materials are needed.

SECTION 3 - EXECUTION

3.1 PROTECTION OF LAND RESOURCES

- A. It is intended that land resources within boundaries of the project, but outside the limits of permanent work performed under this contract, shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project.
 - B. Insofar as possible, confine activities of the Contractor to pertinent areas defined on the drawings or elsewhere in the Contract Documents. Maintain natural drainage patterns. Conduct construction activities in such a manner that ponding or stagnant water conducive to mosquito breeding habitat will not occur at any time.
 - C. Land Resources: Do not remove, cut, deface, injure, or destroy trees or other vegetation outside the work area limits. Do not remove, cut, deface, injure, or destroy trees or other vegetation inside the work area limits except as permitted by the County and where land resources are damaged by the Contractor, promptly replace or repair to the approval of the County and at the Contractor's expense.
 - D. Tree Trimming: In accordance with recognized standards for such work, trim
- Specs. No. 7701 Temporary and Environmental Controls

and seal tree limbs overhanging the line of the work and in danger of being damaged by the Contractor's operations. Remove other tree limbs as directed by the County so the tree will present a balanced appearance. Roots: Do not cut any roots unnecessarily during excavating or trenching operations, expose roots 75 mm (3 inches) in diameter or larger, encountered in the course of excavation, and do not sever but wrap them in burlap as a protective measure while exposed, and at the edge of the excavation or trench, neatly trim all roots 25 mm (1 inch) in diameter or larger that are severed in the course of excavation and paint them with a heavy coat of tree seal approved by the County.

- E. When and as directed by the County obliterate all signs of temporary construction such as work areas, structures, foundation of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction; Level all temporary roads, parking areas, and other areas which have become compacted or shaped; At unpaved areas where vehicles are operated, provide a suitable surface treatment or wet down periodically to prevent dust from becoming a nuisance, keep haul roads clear of objects which create unsafe conditions, and promptly remove contaminants and construction materials dropped from construction vehicles.
- F. Do not drop mud and debris from construction vehicles onto public streets; sweep turning areas and pavement entrances as needed.

3.2 NOISE CONTROL: Do not permit noise levels exceeding the following:

- A. Trenchers, pavers, graders, and trucks: 90 dBA at 50 feet as measured under the noisiest operating conditions;
- B. All other equipment: 85 dBA at 50 feet.
- C. Use whisperized type generators as approved by the County.
- D. Jack Hammers: Equip with exhaust mufflers and steel muffling sleeves; Use whisperized type air compressors as approved by the County.
- E. Operations: Keep noise equipment as far as possible from noise-sensitive site boundaries, do not leave machines idling, use electric power in lieu of internal combustion engine power when practicable; Maintain equipment in a manner to reduce noise from excessive vibration, faulty mufflers, and similar sources, provide mufflers on all engines, and schedule operations to

minimize their duration at any given location.

- F. Monitoring: As needed, provide portable sound metering devices meeting requirements of ANSI S1.4 for Type 2 sound level meters. Promptly locate and correct noncomplying noise levels.
- G. Contractor shall take all practical measures to minimize, or eliminate if possible, air borne and structure borne noise generated from construction activities. Contractor shall comply with the ground vibration limits as specified by ANSI S3.29-1983.
- H. The use of explosives and riveting will be prohibited.

3.3 RECYCLING REQUIREMENTS

Implement a recycling program which includes separate collection of waste materials. Refer to technical specifications for recycling of building materials via an on-site crushing operation.

3.4 ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION

There are no known archaeological remains at the project site. Should skeletons, artifacts, or other archaeological remains be uncovered: Suspend operations of this contract at the site of discovery, continue operations in other areas, and notify the County immediately of the finding. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an adjustment under pertinent provisions of the contract.

3.5 BURNING RUBBISH AND DEBRIS

Do not permit open burning of rubbish, debris, and/or other combustibles on the site.

3.6 DUST CONTROL/AIR QUALITY

- A. Contractor shall prevent air borne debris and dust generated during construction activities from traveling outside the area of work in accordance with SCAQMD Rule 403. All loose materials being hauled onto or out of the site in open truck beds or trailers shall be covered in accordance with State of California Vehicle code Section 23114. Wheels of all vehicles shall be cleaned prior to leaving the Project site.

- B. County and City of Los Angeles streets shall be kept free of construction dirt

and debris at all times by use of street sweeping equipment. The degree of cleanliness to be maintained will be determined by the County.

- C. Contractor shall water down all construction activities, such as excavation that create dust.
- D. The Contractor shall provide temporary dust proof enclosures to ensure that particulate matter does not migrate outside of enclosed work areas to adjacent occupied hospital areas. The Contractor's means and methods shall dictate the exact method used to comply with this requirement.
- E. Maintain and operate construction equipment so as to minimize exhaust emissions. During construction, the site shall be watered and all equipment cleaned once a day to reduce particulate and dust emissions.
- F. The Contractor shall not allow any construction equipment with an internal combustion engine to idle more than five (5) minutes in accordance with California Vehicle Code § 2485 (diesel).

3.7 COMPLIANCE

- A. The County will notify the Contractor in writing of any observed noncompliance with the provisions of this section, and will describe actions to be taken. Such notice, when delivered to the Contractor or his authorized representative at the job site, will be deemed sufficient for the purpose. Immediately upon receipt of such notice, initiate the required action or actions.
- B. Noncompliance: If the Contractor fails or refuses to comply promptly, the County may issue an order stopping all or part of the work of this contract until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it was determined that the Contractor was in compliance.

3.8 TRAFFIC REGULATION

- A. Traffic Maintenance: Determine the routing of construction vehicles before starting work, based on restrictions indicated on the drawings and the safeguards and procedures necessary to carry out the work. In addition be responsible for controlling construction traffic within and adjacent to the site, provide all entrances, lifts and safeguards required necessary to the progress

of the work, and effectively control such traffic to provide minimum hazard to the work and all persons, route all construction equipment, trucks, and similar vehicles via existing public streets to and from the site as approved by the governing authorities and the Construction Access Plan.

- B. Obtain and pay for permits and inspections necessitated by the use of public streets, sidewalks, curbs, and paving. Post guarantees and bonds that may be required, and repair and make good any damages thereto, acceptable to the authorities having jurisdiction, construct and maintain temporary walks and bridges for pedestrians. Keep streets adjacent to the site open to vehicular and traffic.
 - C. Maintain constant access for police, fire, and ambulance service.
 - D. Provide and maintain for proper control of traffic and safety of all concerned. All necessary barricades, suitable and sufficient lights, reflectors, and danger signals, warning and closure signs, directional and detour signs, and whatever additional measures necessary.
 - E. Indicate on a 24-hour basis all restricted and dangerous conditions existing on or adjacent to the site, illuminate barricades, danger signals, warning signs and obstructions and night and keep warning lights burning from one hour before sunset and until one hour after sunrise.
- 3.9 Parking: Do not permit parking on site to interfere with activities related to the performance of the work. The Contractor is responsible for providing offsite parking for all Contractor construction personnel at no additional cost to the County, if the County provided Contractor parking area does not provide enough parking spaces for construction personnel.

END OF SECTION

SECTION 01 60 00

PRODUCT HANDLING

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Work Included: Products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Include within the Contractor's written quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURER'S RECOMMENDATIONS

- A. Except as otherwise approved by the Architect, determine and comply with manufacturer's recommendations on product handling, storage, and protection.

1.4 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
- B. Maintain packaged materials with seals unbroken and labels intact until time of use.
- C. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the County.

- D. The Architect may reject as non-complying such material and products that do not bear identification satisfactory to the Architect as to manufacturer, grade, quality, and other pertinent information.

1.5 PROTECTION

- A. Protect unfinished surfaces, including jambs and soffits or openings used as passageways, through which equipment and material are handled.
- B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.
- C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the County.

1.6 REPAIRS AND REPLACEMENTS

- A. In the event of damage, promptly make replacements and repairs to the approval of the Architect and at no additional cost to the County.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Architect to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING **FOR** **LOS ANGELES COUNTY PROJECTS**

PART 1 GOAL

Consistent with the County's efforts to comply with the California Integrated Waste Management Act of 1989 (Public Resources code, Section 40000 et seq.), one goal of this project is to reduce, reuse, and/or recycle the construction and demolition debris generated by the project in accordance with Los Angeles County Code, Chapter 20.87, Construction and Demolition Debris Recycling and Reuse.

PART 2 GENERAL DEBRIS RECYCLING REQUIREMENTS

- 2.1 Prior to the commencement of construction, the Contractor shall submit to the Los Angeles County Public Works, Environmental Programs Division (EPD), a Construction and Demolition Recycling and Reuse Plan (RRP) via EPIC-LA.
- 2.2 Contractor shall submit a RRP for any work done for or on behalf of the County that generates C&D debris.

PART 3 DEBRIS RECYCLING REQUIREMENTS FOR ANY WORK DONE FOR OR ON BEHALF OF THE COUNTY

- 3.1 The RRP submitted in accordance with Paragraph 2.2 of this Section must demonstrate that the Contractor will reduce, reuse, and/or recycle the C&D debris generated by the project. The RRP must demonstrate that the project will deliver debris to an approved facility for recycling or reuse of at least 70% of the mixed and inert debris and 100% of soil and land clearing debris generated by the project. A list of approved facilities is available on the CND website under reference materials (dpw.lacounty.gov/epd/CD/cd_attachments/Recycling_Facilities.pdf).

The RRP must also identify proper recycling or disposal of 100% of universal waste generated by alteration or renovation projects.

- 3.2 As part of the Contractor's request for final payment, the Contractor shall submit a Final Compliance Report to EPD for review and approval.

The Final Compliance Report shall include information and documentation as set forth in the Section D of the C&D Recycling and Reuse Guidelines.

- 3.3 As part of the approval of the final payment, EPD will review the Final Compliance Report to determine if the Contractor documented the quantity of debris generated, reused, and recycled, and achieved a recycling/reuse rate at least 70% by weight and of mixed and inert debris and 100% of soil debris generated and disposed during the project duration.
- 3.4 If EPD determines that the applicant has not provided sufficient documentation to show that all of the project C&D Debris and universal waste included in the RRP, were properly recycled, reused and/or disposed, within one year of the completion of the project plus any additional time provided by Public Works for the correction of any deficiencies, or if the documentation indicates that the project C&D debris and universal waste were not properly recycled, reused and/or disposed, EPD will calculate the applicable penalty in accordance with the penalty schedule below:

Tons of C&D Not Recycled and Not Reported	Penalty Amount	
For up to the first ton	\$ 100	fixed amount; plus, as applicable, amounts below
From above the first ton up to 15 tons	\$ 60	per ton (or fraction thereof); plus, as applicable, amounts below
From above 15 tons up to 45 tons	\$ 45	per ton (or fraction thereof); plus, as applicable, amounts below
From above 45 tons	\$ 30	per ton (or fraction thereof)

PART 4 COST

Cost of compliance with the C&D Ordinance shall be considered as included in the Contractor's lump sum base bid.

SECTION 01 74 23

FINAL CLEANING

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Keep premises, adjacent private properties and public properties free from accumulations of waste, debris and rubbish caused by construction operations.
2. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces.

1.02 SAFETY REQUIREMENTS

A. Standards: Maintain Project in accord with State and local safety and insurance standards.

B. Hazard control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on Project site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains. Store in containers with tight-fitting lids and remove to legal dump site.
3. Special reference is made to the Los Angeles County Department of Public Works Storm Water Pollution Control Requirements for Construction Sites which require implementation of the NPDES standards. The cost of implementing the NPDES standards and adhering to the Storm Water Pollution Control Requirements must be included in the lump sum bid for the Project.

2.00 PRODUCTS (Not applicable)

3.00 EXECUTION

3.01 DURING CONSTRUCTION

- A. Remove or paint over, as appropriate to the substrate, graffiti on the site or surrounding fence daily.
- B. Wet down materials and rubbish to lay dust and prevent it from blowing.
- C. Provide on-site covered containers for collection of waste materials, debris and rubbish. Provide a collection can at each location used as an eating area. Pick-up all garbage daily.
- D. Remove waste materials, debris and rubbish from site and legally dispose of at legal public or private dumping areas off County's property.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- F. Comply with the County of Los Angeles Department of Health design /construction and maintenance risk assessment: Policies and Procedures Infection Control Policy Guidelines Procedure No.918.01.

3.02 FINAL CLEANING

- A. In preparation for Substantial Completion or Occupancy conduct final inspection of all work.
- B. Repair, patch and touch-up marred surfaces to specified finish to match adjacent surfaces.
- C. Contaminated earth:
 - 1. Final clean-up operation includes the removal and disposal of earth contaminated or unsuitable for support of plant life in planting areas, and filling of resulting excavations with suitable soil.
 - 2. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry, and similar materials, areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and areas that have been oiled, paved, or chemically treated.

3. Do not dispose of waste oil, solvents, paints, solutions, or like penetrating material by depositing or burying on County's property. All material shall be disposed in accordance with all regulatory requirements.
- D. Broom clean paved surfaces; rake clean other surfaces of grounds.
- E. Keep Project clean until Final Acceptance by the County.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Sections of the Specifications, apply to this section.

1.02 SUMMARY

This section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:

- A. Inspection procedures.
- B. Project record document submittal.
- C. Operation and maintenance manual submittal.
- D. Submittal of warranties.
- E. Final cleaning.

- 1. Closeout requirements for specific construction activities are included in the appropriate sections.

1.03 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request:

- 1. In the application for payment that coincides with, or first follows, the date substantial completion is claimed, show one hundred (100) percent completion for the portion of the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the contract sum.
 - b. If one hundred (100) percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Prepare and deliver to the County a completion list enumerating all items of work not complete, the work required to complete the items of work, the reason that each item is not complete, the action taken by the Contractor to complete all other work in light of the item at work remaining, and the date that the item of work will be completed.
 3. Advise the County of pending insurance changeover requirements.
 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 5. Obtain and submit releases enabling the County unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 6. Submit record drawings, operation and maintenance manuals, project photographs, damage or settlement surveys, property surveys, and similar final record information.
 7. Deliver tools, spare parts, extra stock, and similar items.
 8. Make final changeover of permanent locks and transmit keys to the County. Advise the County's personnel of changeover in security provisions.
 9. Complete startup testing of systems and instruction of the County's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mock-ups, construction tools, and similar elements.
 10. Complete final cleanup requirements, including touch-up painting.
 11. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the County and the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The County and the Architect will repeat inspection when requested and assured that the Work is substantially complete. If, after making such reinspection, the County determines that the work is not substantially complete, the Contractor shall be responsible for the cost

that the County and the Architect incurred in the performance of additional inspections for the purpose of determining Substantial Completion.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the contract sum.
3. Submit a certified copy of the architect's final inspection list of items to be completed or corrected, endorsed, and dated by the architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the architect.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the County took possession of and assumed responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The County will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed.

1. Upon completion of reinspection, the County will prepare a certificate of final acceptance. If the Work is incomplete, the architect will advise the

Contractor of Work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance.

2. If necessary, reinspection will be repeated, and the Contractor shall be responsible for the costs of the County and the Architect incurred in the performance of the reinspection or reinspections.

1.05 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the architect's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the County, but was not shown on Contract Drawings or Shop Drawings.
 3. Note related Change-Order numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets and print suitable titles, dates, and other identification on the cover of each set.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one (1) copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
 1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 3. Note related Record Drawing information and product data.
 4. Upon completion of the Work, submit record Specifications to the architect for the County's records.
- D. Record Product Data: Maintain one (1) copy of each product data submittal. Note related Change Orders and markup of Record Drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
 3. Upon completion of markup, submit complete set of record product data to the architect for the County's records.
- E. Record Sample Submitted: Immediately prior to Substantial Completion, the Contractor shall meet with the architect and the County's personnel at the Project site to determine which samples are to be transmitted to the County for record purposes. Comply with the County's instructions regarding delivery to the County's sample storage area.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the architect for the County's records.
- G. Maintenance Manuals: Organize operation and maintenance data as described in Section 01 78 23, Operations and Maintenance manuals.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the County's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
1. Maintenance manuals.
 2. Record documents.
 3. Parts and materials.
 4. Tools.
 5. Identification systems.
 6. Control sequences.
 7. Hazards.
 8. Cleaning.
 9. Warranties and bonds.
 10. Maintenance agreements and similar continuing commitments.
- B. As part of instructions for operating equipment, demonstrate the following procedures:
1. Startup.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.
 5. Safety procedures.
 6. Economy and efficiency adjustments.
 7. Effective energy utilization.
- C. See additional requirements for training in the specification sections.

3.2 FINAL CLEANING

- A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1, Section 01 74 23, "Final Cleaning."
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean and remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the project of rodents, insects, and other pests. Provide one (1) digital copy of each pest control inspection report to the County.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the County's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

* * *

SECTION 01 78 23

OPERATIONS AND MAINTENANCE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. To aid the continued instruction of operating and maintenance personnel, and to provide a positive source of information regarding the products incorporated into the Work, furnish and deliver the data described in this Section and in other Sections of Division 1.

1.02 SUBMITTALS

- A. Submit three (3) copies of a preliminary draft of the proposed Manual or Manuals to the Agency for review and comments.
- B. Unless otherwise directed in other Sections, or in writing by the Agency, submit five (5) copies of the final Manual along with (1) copy of Manual on CD latest version of Word to Engineer prior to indoctrination of operation and maintenance personnel.

PART 2 - PRODUCTS

2.01 INSTRUCTION MANUALS

- A. Where Instruction Manuals are required to be submitted under other Sections of these Specifications, prepare in accordance with the provisions of this Section.
- B. Format:
 - 1. Size: 8-1/2" x 11"
 - 2. Paper: White bond, at least 20-lb. Weight
 - 3. Test: Neatly written or printed
 - 4. Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but to fit within the Manual and provide a drawing pocket inside rear cover or bind in with test.
 - 5. Sheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing content of the ensuing portion; flysheets may be in color.

6. Measurements: Provide measurements in U.S. standard units such as feet and inches, lbs, and cfm; where items may be expected to be measured within ten years in accordance with metric formula, provide additional measurements in the "International Systems of Units" (SI).
- C. Provide front and back covers for each Manual, using durable material approved by Engineer and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS

- name and address of Work
- name of Contractor
- general subject of this Manual
- space for approval signature of Architect and approval date

- D. Contents: Include at least the following:

1. Neatly typewritten index near the front of the Manual, giving immediate information as to location within the Manual of emergency information regarding the installation.
2. Complete instructions rearing operation and maintenance of equipment.
3. Complete nomenclature of part of equipment.
4. Complete nomenclature and part number of replaceable part, name and address of nearest vendor, and all other data pertinent to procurement procedures.
5. Copy of guarantees and warranties issued.
6. Manufacturers' bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or others that are not relevant to this installation.
7. Such other data as required in pertinent Section of these Specifications.

PART 3 - EXECUTION

3.01 PREPARATION OF MANUAL

A. General

1. Prepare data in the form of an instructional Manual.
2. When multiple binders are used, correlate data into related, consistent groupings.

B. Include a directory for each product. Provide names, addresses and telephone numbers of Contractor, sub-contractor, suppliers, installers and authorized service and parts suppliers. Format as follows:

1. General Contractor: _____
Address: _____
Telephone No.: _____
Person to Contact: _____
2. Subcontractor:
Address: _____
Telephone No.: _____
Person to Contact: _____
3. Installer: _____
Address: _____
Telephone No.: _____
Person to Contact: _____
4. Manufacturer: _____
Address: _____
Telephone No.: _____
Person to Contact: _____
5. Local Service Representative: _____
Address: _____
Telephone No.: _____
Person to Contact: _____

C. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

1. Product Data: Include only those sheets pertinent to specific product. Clearly identify pertinent data; line out inapplicable test.

Operations and Maintenance

2. Drawings: Supplement product data with drawings as necessary. Coordinate drawings with information in Project records Documents to ensure correct illustration of completed installation.
3. Written test, as required to supplement product data for particular installation.
4. Submittal format and content: Provide each of the following items, as applicable, for each required items or system. Requirements will vary, depending on the equipment. Refer also to specific Specification Section requirements.
5. System description: Provide a detailed narrative description of each system, describing function, components, capacities, controls and other data specified and including the following:
 - a. Number of
 - b. Sizes
 - c. Type of operation
 - d. Detailed operating instructions, including start up and shutdown of each system, with indications for position of controls, as applicable.
6. Wiring diagrams: Complete wiring diagrams for internally wired components including controls.
7. Operating sequence: Describe in detail.
8. Manufacturers' data: Provide catalog data sheets, specifications, nameplate data and parts list.
9. Preventative maintenance: Provide manufacturers' detailed maintenance recommendations.
10. Troubleshooting: Provide manufacturers' sequence for troubleshooting procedures foe operational problems.
11. Extra parts: Provide a listing of extra stock parts furnished as part of the Contract.
12. Warranties: Provide specific manufacturer's warranty. List each component and control covered, with day and date warranty begins, date of expiration, name, address and telephone number of person to contact regarding problems during warranty period.

Operations and Maintenance

13. Provide operating and maintenance data on work required by the Scope of Work.

3.03 INSTRUCTION OF COUNTY'S PERSONNEL

- A. Prior to final inspection and acceptance, instruct County's designated and maintenance personnel in operation, adjustment and maintenance of products equipment and systems.
- B. Operation and Maintenance Manual shall constitute the basis of instruction.

* * *

SECTION 01 78 36

GUARANTEES AND WARRANTIES

PART 1 GENERAL

1.01 REQUIREMENTS

A. Section Includes: Requirements for the compilation and submittal of guarantees, warranties, and other documents specified.

1. Compile specified guarantees and warranties.
2. Compile specified service and maintenance contracts.
3. Co-execute submittals when so specified.
4. Review submittals to verify compliance with Contract Documents.
5. Submit to County's Representative for review with transmittal to the County.

B. Related Sections:

1. Section 01 33 00 Submittals.

1.02 SUBMITTAL REQUIREMENTS

A. General: Make submittals in accordance with the relevant requirements of Section 01 33 00.

B. Requirements:

1. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, supplies and subcontractors.
2. Submit two original, signed copies, each.
3. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - a. Product or work item.
 - b. Firm, with name of principal, address and telephone number.
 - c. Scope.

- d. Date of beginning of warranty, bond, or service and maintenance contract.
- e. Duration of guarantee, warranty, or services and maintenance contract.
- f. Provide information for County personnel:
 - (1) Proper procedure in case of failure.
 - (2) Instances which might affect the validity of guarantee or warranty.
- g. Contractor, name of responsible principal, address, and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8 1/2-inches by 11-inches, punch sheets for standard 3-ring binder.
 - 2. Fold larger sheets to fit into binders.
 - 3. Cover: Identify each packet with typed or printed title (GUARANTEES AND WARRANTIES).
 - List:
 - a. Title or project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into services during progress of construction:
 - 1. Submit documents within 10 days after inspection and acceptance.
- B. Otherwise make submittals within 10 days after Date of Substantial Completion, prior to final request for payment.

- C. For items of work, where acceptance is delayed materially beyond Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of guarantee/warranty period.

1.05 SUBMITTALS REQUIRED

- A. Submit guarantees, warranties, and service and maintenance contracts as specified in pertinent Sections of Specification.

* * * *

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Project Record Documents required include:
 - 1. Marked-up copies of Contract Drawings.
 - 2. Marked-up copies of Shop Drawings.
 - 3. Newly prepared Drawings.
 - 4. Marked-up copies of Specifications, addenda and Change Orders.
 - 5. Marked-up Product Data submittals.
 - 6. Record Samples.
 - 7. Field records for variable and concealed conditions.
 - 8. Record information on Work that is recorded only schematically.
- B. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and Samples available at all times for inspection by the Architect.

1.2 RECORDING

- A. Record drawings shall include dimensions from not less than two permanent and salient building points.

- B. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project.
- C. The Architect will periodically review record documents to assure compliance with this requirement.

1.3 PROCEDURES

- A. Promptly following Contract Award, General Contractor shall secure from the County one complete set of Specifications and prints of the Contract Drawings and mark them as "Project Record Documents."
- B. Timing of Entries: Make entries within 24 hours after receipt of information.
- C. Contractor shall be responsible for maintaining and recording changes on "Project Record Document" set.
- D. Do not use "Project Record Documents" set for any purpose except entry of new data and for review by the Architect and County Inspector. Maintain separate job sets for subcontractors and workers daily use.
- E. Maintain "Project Record Documents" set at job site where designated by the Architect.
- F. Use all means necessary to protect "Project Record Documents" set from deterioration, loss or damage until completion of work.
- G. Making Entries On "Project Record Documents" Drawings: Using an erasable color pencil, other than blue, not ink or indelible pencil, clearly describe change by note and by graphic line as required. Date entries. Call attention to entry by a "cloud" around area or areas affected. In even of overlapping changes, different colors may be used for each change.
 - 1. Changes due to approved change orders may be indicated by referencing change order number and scope of change in lieu of revising "Project Record Documents".

2. Location and depth below finish grade or above ceilings and attic spaces of utilities shall be fully dimensioned and indicated on "Project Record Documents". Dimensions shall be taken to building lines of permanent landmarks.
- H. The Architect's approval of current status of "Project Record Documents" will be a prerequisite to the Architect's approval of requests for progress payments and request for final payment.
1. Progress Approvals: Prior to submitting each request for progress payments, secure the County Inspector's approval of status of "Project Record Documents."
 2. Prior to submitting request for final payment and final inspection, General Contractor shall submit "Project Record Documents" set to the County Inspector, with transmittal letter, in duplicate, for approval and further processing.
 3. The General Contractor shall certify that the "Project Record Documents" are complete and accurately reflect all changes or modifications to the original Construction Documents.

SECTION 01 91 00

COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work includes the completion of formal commissioning procedures on selected mechanical and electrical equipment and systems.
- B. Commissioning is defined as the process of verifying that the design, installation, functional performance, and maintenance requirements of selected building systems meet or exceed the specified design criteria and therefore satisfies the Owner's Project Requirements.
- C. Commissioning during construction, acceptance, and warranty phases is intended to achieve following objectives:
 - 1. Verify and document equipment is installed and started per manufacturer's recommendations and to industry accepted minimum standards.
 - 2. Verify and document equipment and systems receive complete operational checkout by installing contractors.
 - 3. Verify and document equipment and system performance.
 - 4. Verify completeness of operations and maintenance materials.
 - 5. Ensure owner's operating personnel are trained on operation and maintenance of building equipment.
- D. The commissioning process includes work and services throughout the project schedule, and is not just the functional performance testing during the Construction Phase.
- E. Contractor shall be responsible for participation in the commissioning process as outlined below, and in subsequent sectional references and attachments throughout the project documents.
- F. Commissioning process does not take away from or reduce responsibility of the system designers or installing contractors to provide finished and fully functioning product.
- G. Commissioning procedures will be designed and coordinated under the direction of the Commissioning Authority (CA).

1.2 RELATED SECTIONS

- A. Division 22 Section Commissioning of Plumbing for commissioning process activities for plumbing systems, assemblies, equipment, and components.
- B. Division 23 Section Commissioning of HVAC for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.
- C. Division 26 Section Commissioning of Electrical Systems for commissioning process activities for electrical systems, assemblies, equipment, and components.

1.3 COORDINATION

- A. Commissioning Team.
 - 1. Commissioning Authority (CA)
 - 2. Owner's Technical Staff (Owner or OTS)
 - 3. General Contractor (C, CxC)
 - 4. Construction Manager
 - 5. Subcontractors (Subs)
 - 6. Manufacturer's Representatives/Vendors
 - 7. Architect/Design Professionals (A/E)
 - 8. Mechanical Contractor (MC) / Electrical Contractor (EC)
 - 9. Test and Balance (TAB) Contractor
 - 10. Controls Contractor (CC)
 - 11. Installing subcontractors

B. Management.

1. Commissioning Authority (CA):
 - a. Under contract with the Architect (A) or Owner.
 - b. Manages commissioning process with assistance of Commissioning Team: Contractor, Subcontractors and Design Professionals (A/E).

C. Scheduling: CA to work with OTS, C and Sub's to schedule commissioning activities.

1. Contractor (C) to integrate commissioning activities into master construction schedule.
2. Involved parties to address scheduling issues in timely manner to expedite commissioning process.

1.4 COMMISSIONING PROCESS

A. Following activities describe commissioning tasks coordinated by CA and C during construction in order of occurrence.

1. Scoping Meeting: Members of design and construction team involved in commissioning process meet and agree on scope of work, tasks, schedules, deliverables, and responsibilities for implementation of Commissioning Plan.
2. Commissioning Plan: Provides guidance in execution of commissioning process.
 - a. Project Manual (specification) takes precedence over Commissioning Plan.
3. Submittals: Equipment documentation submitted to CA during normal submittals, including detailed startup procedures.
4. Startup/Pre-Functional Checklists: CA works with C and Sub's to develop startup plans and documentation formats, including providing Sub's, MC and EC with pre-functional checklists to be completed by Sub's and C during startup process.
5. Functional Performance Testing: CA develops specific equipment and system functional performance test procedures.
 - a. Contractor and Sub's review procedures and provide feedback.
 - b. C and Sub's execute procedures under direction of, and documented by, CA.
6. Deficiencies and Resolution: CA documents items of non-compliance in materials, installation or operation.
 - a. Items are corrected at C or Sub's expense and equipment or systems are retested.
7. Operations and Maintenance (O&M) Documentation: CA reviews O&M documentation for completeness.

8. Training: CA reviews and coordinates training provided by C and Sub's and verifies it is completed.
9. Seasonal Testing: Deferred or seasonal testing is conducted, as required.

1.5 COMMISSIONING RESPONSIBILITIES

A. Services for Owner's Technical Staff (OTS) and Design Team are not a part of this contract.

1. Responsibilities are listed here to clarify commissioning process. See also, responsibility table included at end of this section.

B. Commissioning Authority (CA):

1. Primary Role: Develop and coordinate execution of testing plan to verify and document systems are functioning in accordance with design intent and Construction Documents.
2. May assist with problem-solving deficiencies, but ultimately that responsibility resides with Contractor (C), Sub-contractors (Sub's), and Architect (A).
3. Not responsible for design concept, design criteria, code compliance, general construction scheduling, cost estimating, or construction management.
4. Construction and Acceptance Phase:
 - a. Coordinate and direct commissioning activities.
 - b. Work with C (Cx) and Sub's to ensure commissioning activities are scheduled.
 - c. Maintain up-to-date Commissioning Plan.
 - d. Help plan and conduct commissioning scoping meeting and controls integration meetings.
 - e. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor startup and checkout procedures, and sequences of operation.
 - f. Review Contractor submittals applicable to commissioned systems, concurrent with Architect and Owner reviews.
 - g. Develop startup and checkout plans with Subs.
 - h. Write and distribute pre-functional checklists, tests and startup forms.
 - i. Perform site visits to observe component and system installations.
 - j. Attend construction job-site meetings to monitor construction and commissioning progress.
 - k. Review completed pre-functional checklist and startup reports.
 - l. Assist with coordination of startup requirements with TAB requirements.

- m. Write functional performance test procedures for equipment and systems.
 - n. Coordinate, witness, and document functional performance tests completed by sub's.
 - 1) Coordinate retesting as necessary until satisfactory performance is verified.
 - o. Maintain master deficiency and resolution record, and provide OTS with written progress reports and test results with recommended actions.
 - p. Review training proposed by sub's for Owner's operating personnel.
 - q. Review O&M manuals.
 - r. Prepare Final Commissioning Report.
5. Warranty Period:
- a. Coordinate and supervise seasonal or deferred testing and deficiency corrections.
 - b. Assist in review of Record documentation.
 - c. Assist in end of warranty review/walk-through inspection.
- C. Design Team (A/E):
1. Construction and Acceptance Phase:
- a. Attend commissioning scoping meeting, controls integration meeting and additional meetings, as necessary.
 - b. Provide design intent and sequence of operation documentation as required by CA.
 - c. Assist in resolution of system deficiencies identified during commissioning.
 - d. Review and approve operations and maintenance manuals (O&M).
 - e. Optional: Witness equipment startup and performance testing.
2. Warranty Period:
- a. Assist in resolution of system deficiencies identified during warranty period commissioning.
- D. Owner's Technical Staff (OTS):
1. Construction and Acceptance Phase:
- a. Plan/Attend
 - b. Arrange for facility operating and maintenance personnel to participate in commissioning activities and training sessions.
 - c. Provide final acceptance for commissioning work.
2. Warranty Period:

- a. Ensure seasonal or deferred testing and deficiency issues are addressed.

E. Contractor (C, Contractor or Sub):

1. Construction and Acceptance Phase:

- a. Contractor to assign a commissioning coordinator (CxC) to facilitate coordination of commissioning work by CA.
- b. Attend commissioning scoping meeting, controls integration meeting and additional meetings, as necessary.
- c. Furnish copies of construction documents, addenda, change orders and approved submittals and design drawings related to commissioned equipment to CA.
- d. Ensure Sub's execute their commissioning responsibilities according to Project Manual and Commissioning Plan.
- e. Coordinate training of owner personnel.
- f. Work with Sub's to prepare O&M manuals, according to Project Manual, including updating original sequences of operation to Record (as-built) conditions.
- g. Develop startup and checkout plan for commissioned equipment based on manufacturer's recommendations and pre-functional checklists from CA.
 - 1) Submit to CA for review and approval prior to startup.

2. Warranty Period:

- a. Ensure Sub's execute required seasonal or deferred functional performance testing.
- b. Ensure Sub's correct deficiencies and make necessary adjustments to O&M manuals and Record Drawings for issues identified during warranty period.

F. Mechanical Contractor, Electrical Contractor, Controls Contractor and TAB Contractor:

1. Construction and Acceptance Phases:

- a. Attend commissioning scoping meeting, controls integration meeting and additional meetings, as necessary.
- b. Provide additional requested documentation, prior to normal O&M manual submittals, to CA for development of startup and functional testing procedures.
- c. Assist in clarification of operation and control of commissioned equipment where Project Manual, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

- d. Help develop startup and checkout plan for commissioned equipment based on manufacturer's recommendations and pre-functional checklists from CA.
- e. During startup and checkout process, execute pre-functional checklists for commissioned equipment.
 - 1) Perform and document completed startup and system operational checkout procedures.
- f. Resolve punch list items before functional testing.
 - 1) Air and water TAB to be completed with discrepancies and problems resolved before functional testing.
- g. Perform functional performance testing, under direction of CA, for commissioned equipment.
- h. Resolve equipment or system deficiencies and retest as required to verify modified performance.
- i. Prepare O&M manuals according to Project Manual, including updating original sequences of operation to record conditions.
- j. Provide training of Owner's operating personnel.
- k. Coordinate with equipment manufacturers to determine requirements to maintain validity of warranties.

2. Warranty Period

- a. Execute seasonal or deferred functional performance testing.
- b. Correct deficiencies and make necessary adjustments to O&M manuals and Record Drawings for issues identified during warranty period.

G. Controls Contractor (CC). Commissioning responsibilities of CC during construction and acceptance phases, in addition to those listed in Paragraph (F), are:

- 1. Sequences of Operation Submittals. Temperature controls submittals to include complete and detailed sequences of operation for each piece of equipment, regardless of completeness and clarity of sequences in Project Manual, and include:
 - a. Narrative description of system, describing its purpose, components and function.
 - b. Interactions and interlocks with other systems.
 - c. Delineation of control interactions between packaged controls and building automation system, including listing of monitored points, controlled points, and adjustable points.
 - d. Written sequences of control for packaged controlled equipment.
 - e. Sequences of control for modes of operation (Start-up, Warm-up, Cool-down, Normal occupied, Unoccupied, Emergency Shutdown, etc.).

- f. Capacity control sequences and equipment staging.
- g. Temperature and pressure control sequences (setbacks, resets, etc.).
- h. Sequences for control strategies (economizer control, optimum start/stop, optimization, demand limiting, etc.).
- i. Effects of power or equipment failure with standby component functions.
- j. Sequences for alarms and emergency shutdowns.
- k. Seasonal operational requirements.

2. Control Drawings Submittal

- a. Control drawings to have key to abbreviations.
- b. Control drawings to provide graphic schematic depictions of systems and each component.
 - 1) Schematics to include system and component layout of equipment that control system monitors, enables or controls, even if equipment is primarily controlled by packaged or integral controls.
- c. Provide full points list with following included for each point:
 - 1) Controlled system
 - 2) Point abbreviation
 - 3) Point description
 - 4) Point type (digital/analog, input/output)
 - 5) Display unit
 - 6) Control point or setpoint (Yes / No)
 - 7) Monitoring point (Yes / No)
 - 8) Intermediate point (Yes / No)
 - 9) Calculated point (Yes / No)
- 3. Record Drawing version of control drawings and sequences of operation to be included in final controls O&M manual submittal.
- 4. Written plan indicating step-by-step manner and procedures that will be followed to test, checkout and adjust control system prior to functional performance testing.
- 5. Signed and dated certification to CA and Owner upon completion of control system checkout.

H. Equipment Suppliers

- 1. Provide requested submittal data, including detailed startup procedures and specific responsibilities of Owner to keep warranties in effect.

2. Provide information requested by CA regarding equipment sequence of operation and testing procedures.
3. Assist in equipment testing per agreements with Sub's.

1.6 COMMISSIONING SCOPE:

<u>System</u>	<u>Equipment</u>
Security System (FLIR Latitude VMS):	FLIR, Cisco, audio/video equipment

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

- A. Standard testing equipment required to perform startup and initial checkout and required functional performance testing to be provided by Division Contractor for equipment being tested.
- B. Testing equipment to be of sufficient quality and accuracy to test or measure system performance as required by Project Manual.
- C. Datalogging equipment or software required to test equipment to be provided by CC but shall not become property of Owner.

PART 3 EXECUTION

3.1 MEETINGS

- A. Scoping Meeting:
 1. CA will schedule, plan and conduct Commissioning Scoping Meeting and Controls Integration Meetings with entire commissioning team in attendance.
 2. CA to distribute meeting minutes to those in attendance.
- B. Miscellaneous Meetings. Other meetings to be planned and conducted by CA as construction progresses
 1. Meetings to cover coordination, deficiency resolution and planning issues

3.2 REPORTING

- A. Regular Reports: CA to provide regular reports to Owner with increasing frequency as construction and commissioning progresses.
- B. Progress Reports: CA to regularly communicate with commissioning team, apprising them of commissioning progress and scheduling changes through memos, progress reports, etc.
- C. Commissioning Report: CA compiles final Report that summarizes tasks, findings, and documentation of commissioning process.
 - 1. Report addresses actual performance of building systems in reference to design intent and contract documents.
 - 2. Report includes:
 - a. Completed pre-functional inspection checklists,
 - b. Functional performance testing records
 - c. Diagnostic monitoring results
 - d. Identified deficiencies
 - e. Recommendations
 - f. Summary of commissioning activities

3.3 SUBMITTALS

- A. CA reviews submittals related to commissioned equipment
 - 1. Reviews intended primarily to aid in development of functional performance test procedures.
- B. CA may submit written requests for additional information from contractors to facilitate the commissioning process.
- C. CA may request additional design and operations narratives from design team and Controls Contractor.

3.4 START-UP, PREFUNCTIONAL INSPECTION CHECKLISTS

- A. Following procedures apply to equipment commissioned, according to Article 1.6, Commissioning Scope.
- B. General: Pre-functional Inspection Checklists are developed and completed for major equipment and systems being commissioned.
 - 1. Checklist documents equipment nameplate and characteristics data and confirms as-built status of equipment or system.
 - 2. Checklists ensure systems are complete and operational, so functional performance testing can be scheduled.

- C. Start-up Plan. CA assists responsible contractors and Sub in developing detailed start-up plans for equipment.
 - 1. Primary role of CA in this process is to ensure there is written documentation and that each manufacturer-recommended procedures be completed.
 - 2. CA creates pre-functional checklists, based primarily on manufacturer's startup and checkout procedures.
 - a. Each start-up item will have date and initial line for completion by contractor during start-up.
 - 3. Start-up plans and documentation to be provided to Owner and A/E team for review.
- D. Completion of Pre-functional Inspection Checklists and Startup:
 - 1. Subs and equipment suppliers schedule startup and checkout with Owner, C, CxC and CA.
 - 2. CA may observe start-up procedures for major pieces of primary equipment.
 - a. Multiple Units: Sampling strategy may be used according to commissioning plan.
 - 3. Lower-level equipment components (e.g., VAV boxes, reheat coils) CA may observe sampling of start-up procedures.
 - a. Sampling procedures are identified in commissioning plan.
 - 4. Subs and Vendors execute startup and provide CxC with signed and dated copy of completed start-up and pre-functional inspection checklists for routing to CA.
 - 5. Only individuals who have completed or witnessed line item task are to make initials or checks on forms.

- E. Deficiencies, Non-Conformance and Approval in Checklists and Startup.
1. Subs to clearly list any items of start-up and pre-functional procedures not successfully completed at bottom of form or on an attached sheet.
 - a. Procedures form and any outstanding deficiencies are provided to CA within two days of test completion.
 2. CA reviews and verifies pre-functional inspection checklists and start-up reports and recommends approval to Owner.
 3. CA assists Subs and Vendors to correct and retest deficiencies or uncompleted items, involving other members of Commissioning Team as necessary.

3.5 FUNCTIONAL PERFORMANCE TESTING

- A. Following procedures apply to all equipment commissioned, according to Article 1.6, Commissioning Scope and to all commissioning functional performance testing.
- B. Objectives and Scope:
1. Demonstrate each system is operating according to documented design intent and Construction Documents.
 2. Functional performance testing comprises tests to verify components, equipment, systems, and interfaces between systems operate correctly and includes operating modes, interlocks, control sequences, and responses to emergency conditions.
 3. Verification procedures are directed, witnessed, and documented by CA.
- C. Development of Test Procedures:
1. CA develops specific test procedures and forms to verify and document proper operation of each piece of equipment and system.
 2. CA provides test procedures to Contractors and Sub's who review the tests for feasibility, safety, equipment and warranty protection prior to execution.
 3. CA may submit tests to Owner for review.
 4. Test procedure forms, developed by CA, to include the following information:
 - a. System and equipment or component name(s).
 - b. Equipment location and ID number.
 - c. Date.
 - d. Project name.
 - e. Participating parties.
 - f. Instructions for setting up test, including special cautions, alarm limits, etc.
 - g. Specific step-by-step procedures to execute test.

- h. Acceptance criteria of proper performance with date passed and initials boxes.
- i. Section for comments or notes.

D. Execution of Functional Performance Tests:

1. Test Methods: Functional performance testing and verification may be achieved by direct manipulation of system inputs (i.e. heating or cooling sensors), manipulation of system inputs with building automation system (i.e. software override of sensor inputs), trend logs of system inputs and outputs using building automation system, or short-term monitoring of system inputs and outputs using stand alone data loggers.
 - a. Combination of methods may be required to test complete sequence of operations.
 - b. CA determines which method, or combination, is most appropriate.
2. Setup: Each test procedure is performed under conditions that simulate normal operating conditions as closely as possible.
 - a. Sub executing test provides necessary system modifications to produce specified conditions (flows, pressures, temperatures, etc) necessary to execute test and, at completion of test, returns affected building equipment and systems to their pre-test conditions.
3. Sampling: Multiple identical pieces of non-life-safety or non-critical equipment may be functionally tested using sampling strategy developed by CA and approved by Owner. A 10% sampling rate is typical
4. Test values: If after three attempts at testing of specified sample percentage, failures are still present, remaining units are tested at Contractors' expense.

E. Coordination and Scheduling: Subs provide sufficient notice to CA regarding completion schedule for pre-functional checklists and startup of equipment and systems.

1. CA schedules functional tests through Owner, Contractor and affected Sub's and following sequential priorities followed:
 - a. Equipment is not "temporarily" started (for heating or cooling), until pre-start checklist items and manufacturer's pre-start procedures are completed and moisture, dust and other environmental and building integrity issues have been addressed.
 - b. Functional performance testing does not begin until pre-functional, start-up and TAB is completed for given system.

- c. Controls system and equipment it controls are not functionally tested until points have been calibrated and pre-functional checklists are completed.

F. Problem Solving:

- 1. CA may recommend solutions to deficiencies identified during functional testing. Contractor, Subs and A/E team to resolve, correct and retest deficiencies.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation:

- 1. CA witnesses and documents results of functional performance tests using forms developed for that purpose.
 - a. Prior to testing, forms are provided to Contractor, Sub's and Owner for review and approval.

B. Non-Conformance:

- 1. CA records results of functional test on procedure or test form.
 - a. Deficiencies identified during verification testing are documented on standard form and reported to Owner, Contractors and sub's.
 - b. Deficiency Report: Includes details of components or systems found to be non-compliant with parameters of test plans.
 - c. Report details adjustments or alterations required to correct system operation, and identifies responsible party.
- 2. Corrections of minor deficiencies identified may be made during tests at discretion of CA and deficiency and resolution documented on procedure form.
- 3. Make every effort to expedite testing process and minimize unnecessary delays, while not compromising integrity of procedures.
- 4. Identified deficiency resolution:
 - a. No dispute on deficiency and responsibility to correct it:
 - 1) CA documents deficiency and adjustments or alterations required to correct it.
 - 2) Sub corrects deficiency and notifies CA that equipment is ready to be retested.
 - 3) CA reschedules test and test is repeated.

- b. Dispute about deficiency or who is responsible:
 - 1) Deficiency is documented on non-compliance form and copy given to Owner and Contractor.
 - 2) Resolutions are made at lowest management level possible and additional parties are brought into discussions as needed.
 - a) Final interpretive authority is with A/E team.
 - b) Final acceptance authority is with Owner.
 - 3) CA documents resolution process.
 - 4) Once interpretation and resolution have been decided, appropriate party corrects deficiency and notifies CA that equipment is ready to be retested.
 - a) CA reschedules test and test is repeated until satisfactory performance is achieved.

C. Cost of Retesting:

- 1. Sub's:
 - a. Responsible for costs to retest pre-functional or functional test, if they are responsible for deficiency.
 - b. If not responsible for deficiency, cost recovery for retesting costs to be negotiated with C.
- 2. Time for CA and Owner to direct any retesting because pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to C.

D. Approval:

- 1. CA makes formal approval of functional performance test after review.
- 2. CA recommends acceptance of each test to Owner.
- 3. Owner gives final approval on each test.

3.7 DEFERRED TESTING

- A. Unforeseen Deferred Tests: Functional testing that cannot be completed due to building structure, required occupancy condition, or other deficiency may be delayed upon approval of Owner.
 - 1. Tests are conducted in same manner as seasonal tests as soon as possible.

- B. Seasonal Testing: Seasonal variation in operations or control strategies may require additional testing during opposite season to verify performance of HVAC system and controls.
 - 1. During warranty period: Seasonal testing and other deferred testing is completed as required to fully test sequences of operation.
 - a. CA coordinates these activities.
 - 2. Tests are executed and documented, with deficiencies corrected by appropriate Subs.
 - 3. Final adjustments to O&M manuals and Record Drawings due to testing are also completed.

3.8 COMMISSIONING PLAN

- A. Commissioning Authority has prepared the Commissioning Plan:
 - 1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
 - 2. Required attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. General Contractor is responsible for compliance with the Commissioning Plan
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
- D. Commissioning Schedule:
 - 1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
 - a. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
 - b. Prefunctional Checklists and Functional Tests are to be preformed in sequence from components, to subsystem, to systems.
 - c. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.9 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan for field checkout

sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entry.

- C. Submit directly to the Commissioning Authority.

3.10 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned:

1. No sampling of identical or near-identical items is allowed
2. These checklists do not replace manufacturer's recommended startup checklists, regardless of apparent redundancy.
3. Prefunctional Checklist form will not be completed until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
 - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
 - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
 - c. Manufactured, model number, and relevant capacity information; list information; "as specified," "as submitted," and "as installed."
 - d. Serial number of installed unit.
 - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's startup checklist items and minor testing.
 - f. Sensor and actuator calibration information.

- B. General Contractor is ultimately responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the commissioning Authority is not required unless otherwise specified:

1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not completed until all line items are initialed and dated completed without deficiencies.
2. Checklists with incomplete items may be submitted for approval provided the General Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
3. Individual Checklists may contain line items that are the responsibility of more than one installer; General Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
4. If any Checklist line item is not relevant, record reasons on the form.

5. General Contractor may independently perform startup inspections and/or tests, at his option; see Section 017500 for additional general startup requirements.
 6. Regardless of these reporting requirements, General Contractor is responsible for correct startup and operation.
 7. Submit completed Checklists to Commissioning Authority within two days of completion.
- C. Commissioning Authority is responsible for furnishing the Prefunctional Checklist to General Contractor:
1. Initial Drafts: General Contractor is responsible for initial draft of Prefunctional Checklists where so indicated in the Contract Documents.
 2. Provide all additional information request by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittal, manufacturers' startup checklists, and O&M data.
 3. Commissioning authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in the Contract Documents or not.
 4. When asked to review the proposed Checklist, do so in a timely manner.
- D. Commissioning Authority Witnessing: Required for:
1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
 2. A sampling of non-primary equipment, as allowed by the commissioning plan.
- E. Deficiencies: Correct deficiencies and re-inspected or re-test, as applicable, at no extra cost to Owner:
1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.11 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
- B. General Contractor is ultimately responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

- C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. General Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the General Contractor's stated intentions regarding correction:
 - 1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.
 - 2. When the deficiency has been corrected, the General Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the General Contractor re-test.
 - 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
 - 4. General contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
 - 5. General Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, General Contractor shall bear the cost of the second and subsequent re-test.
- E. Functional Test Procedures:
 - 1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with General Contractor.
 - 2. Examples of Functional Testing:
 - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (Direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).

- b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
 - c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
 - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
- F. Deferred Functional Tests: Some test may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these test remains the General Contractor's responsibility regardless of timing.

3.12 TEST PROCEDURE - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary test, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and condition as necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
 - 1. Identical Units: Defined as units with same application and sequence of operation; only minor size of capacity difference.
 - 2. Sampling is not allowed for:
 - a. Major equipment.
 - b. Life-safety-critical equipment.
 - c. Prefunctional Checklist execution.
 - 3. XX= the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
 - 4. YY= the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
 - 5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "First Sample".
 - 6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.

7. If YY percent of the units in the second sample fail, test all remaining identical units.
 8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require General Contractor to perform and document a checkout of the remaining units prior to continuing testing.
- D. Manual Testing: Use hand- held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).
- E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
- F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- H. Indirect Indicators: Remote indicators of a response of condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operating using dataloggers of the trending capabilities of the relevant control systems; where monitoring of specific points is called for in functional Test Procedures:
1. All points that are monitored by the relevant control system shall be trended by General Contractor; at the Commissioning Authority’s request, General Contractor shall trend up to 20 percent more points than specified at no extra charge.
 2. Other points will be monitored by the Commissioning Authority using dataloggers.
 3. At the option of the commissioning authority, some control system monitoring may be replaced with datalogger monitoring.
 4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
 5. Graphical output is desirable and is required for all output if the system can product it.
 6. Monitoring may be used to augment manual testing.

3.13 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01780 for additional requirements.
- B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning authority for review; make changes recommended by Commissioning Authority.
- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.14 SUMMARY TABLE OF RESPONSIBILITIES

Activity		Commissioning Authority (CA)	Contractor (C) (Cx) and Subcontractors, including Manufacturer Reps/Vendors	Owner (OTS) Owner's Technical Staff	Design Professionals (A/E) Architect/Engineers	Sub-Contractor (Sub's)
1.	Commissioning Plan	Writes and manages the commissioning plan. Review and comment	Reviews plan for understanding and scope issues.	Reviews and accepts.	May review and comment.	Reviews and comments.
2.	Construction Submittals of commissioned equipment and assemblies	Reviews for information to inform functional testing	Reviews for compliance with specification and submits to A, OTS and CA for review.	Reviews CA and A comments, and reviews selected submittals.	Reviews CA comments, incorporates with their own comments and submits to (C).	Provides submittal material to (C).
3.	Controls Integration Meetings	Fully participates.	Works with A/E and Sub's with support from CA.	May participate	May participate in meeting that deal with design issues upon Owner Request via executed SSA.	Work with C and support from CA.
4.	Prefunctional Checklists, Tests and Startup forms	Develops based on information provided by A/E	Reviews for scope issues.	May review with CA.	None.	Reviews for scope issues.
5.	Construction Startup and Checkout Plan	Reviews and approves.	Develops by combining prefunctional checklists, tests and startup forms and manufacturer data.	May review with CA.	None.	Per scope of contract.
6.	Prefunctional Checklists Execution.	Spot checks selected items. Reviews completed forms.	Assists DBC with format and checkout. Reviews completed forms.	Spot checks selected items. Reviews completed forms.	None.	Works with C to execute the checklists.

Activity		Commissioning Authority (CA)	Contractor (C) (Cx) and Subcontractors, including Manufacturer Reps/Vendors	Owner (OTS) Owner's Technical Staff	Design Professionals (A/E) Architect/Engineers	Sub-Contractor (Sub's)
7.	Startup	Witnesses major equipment or systems. Reviews completed forms.	Coordinates tasks and schedules with Subcontractors.	Observes selected systems.	May witness selected systems upon Owner request via executed SSA.	Works with C to coordinates tasks and schedules with Subcontractors.
8.	Construction Observation	Some observation of critical systems and issues.	Observes to ensure Sub-contractors are executing accepted installation and startup plans.	Periodic walk-through. Reports findings to CA and C.	Per scope of contract.	Works with C to observe and ensure Subcontractors are executing accepted installation and startup plans.
9.	Management and Keeper of Issues Log	Manages, develops and keeps updated	Uses log to address issues.	Reviews and provides input to CA.	None (but may add all open issues to their punch list near end of construction).	Uses log to address issues.
10.	Commissioning Meetings	Plans, conducts and takes and distributes minutes for regular commissioning meetings.	Attends commissioning meetings.	Attends commissioning meetings.	May attend selected commissioning meetings upon Owner request via executed SSA.	Attends selected commissioning meetings
11.	Functional Performance Test Procedure Development	Writes procedures for all tests, except regulated tests such as fire alarm, fire suppression, elevators and electrical tests.	Reviews for safety, warranty and scope.	May review.	None.	Reviews for safety, warranty and scope.
12.	Test Plan (process, schedule and sequencing)	Develops plan with input from C and Sub's.	Reviews and accepts.	May review.	None.	Reviews and accepts.
13.	Functional Performance Test Execution	Oversees and witnesses all tests and documents testing.	Helps execute testing.	May participate in selected tests.	May review design issues upon Owner request via executed SSA.	Executes testing with help of C.
14.	Test and Balance (TAB) of Air and Water Systems	Reviews and comments to C, A/E .	Assists TAB contractor in documenting per project contract, and will help resolve issues, if any. Approves final results.	May review.	May help resolve issues, if any, upon Owner request via executed SSA..	Executes and documents per project contract, and will help resolve issues, if any. Approves final results.

Activity		Commissioning Authority (CA)	Contractor (C) (Cx) and Subcontractors, including Manufacturer Reps/Vendors	Owner (OTS) Owner's Technical Staff	Design Professionals (A/E) Architect/Engineers	Sub-Contractor (Sub's)
15.	O&M Manuals	Reviews for clarity, usability and completeness. Comments to Owner.	Works with Sub's to develop O&M Manual and submits to A.	Reviews and comments. Resolves issues on comments from reviewer. Provides final direction to C.	Submittal review per CO scope.	Works with C to develop O&M Manual and submits to A.
16.	Systems Manual	Receives some data from C, develops other required data and compiles into manual.	Provides specified data and information and submits to CA.	Provides Owner objectives / design intent. Assists in initial outline and reviews / comments on final.	Submittal review per CO scope.	Works with C to provide specified data and information.
17.	Training	Coordinates with Owner regarding functional testing as hands-on training for OTS	Assists in training agenda. Works with Sub's to implement training agendas.	Receives training.	None	Works with C to develop and fill in training agendas. Executes training.
18.	Scheduling	Reviews the Contractor's schedule for commissioning activities. Provides input. Notifies Owner of concerns.	Works with Sub's to control the schedule.	May review.	None	Works with C to control the schedule.
19.	As-Built / Redlines	May check to see that C / DBC are keeping redlines updated.	Develops and submits to A per their scope.	Reviews and accept redlines.	Submittal review per CO scope.	Develops and submits to C per their scope.
20.	Commissioning Report	Compiles and submits to Owner.	None.	Accepts Report.	Submittal review per CO scope.	None.
21.	Seasonal and Deferred Testing	Same as for functional testing.	Same as for functional testing. Schedules testing with OTS.	Same as for functional testing. Works with C to schedule.	None	Works with C to help perform functional testing.

* * *

SECTION 02 08 00

HAZARDOUS MATERIALS, ASBESTOS AND LEAD ABATEMENT

1.00 GENERAL

1.01 DESCRIPTION

- A. Based on the results of the survey, lead-based paint and asbestos fibers are not contained in the building materials. The County makes no representation or warranty that the conditions indicated by the survey report either are representative of those conditions existing throughout the area, or that unforeseen developments may not occur, or that materials other than, or in proportions different from those indicated may not exist. The Contractor shall be responsible for verifying abatement quantities prior to submittal of bid. The Contractor is advised that the location of all asbestos containing materials may not be clearly known and that the Contractor shall proceed with caution in all phases of work. The Contractor shall notify the County immediately should they identify existing hazardous materials.

1.02 CONTRACTOR'S RESPONSIBILITY

- A. Work included - Base Bid: Contractor shall furnish all labor, materials, and equipment required for proper removal and disposal of lead-based paint and asbestos containing materials from the existing utility building and kennel building to be demolished as part of the project.
- B. The Contractor shall be responsible for hiring a certified abatement subcontractor to perform the lead-based paint and asbestos abatement in a manner that complies with all applicable local, state, and federal laws and regulations.
- C. The Contractor shall submit a complete work plan, including methodology, specifications and schedule for abatement work, complying with all applicable laws and regulations. Submit the name and license number of a State of California certified abatement subcontractor for the County's approval prior to performance of the abatement work. Certification must be by the State Contractor License Board and currently registered by the State of California Division of Occupancy Safety and Health.
- D. The Contractor shall obtain and pay for the required notifications and permits for removal and disposal of the lead-based paint and asbestos containing materials.

- E. The Contractor at his expense shall provide all tests and inspections required by applicable regulations, codes, standards, contract documents and any other tests and inspections that he deems necessary for his own use.
- F. The Contractor, prior to any demolition work, must abate all lead-based paint and asbestos containing materials and provide air monitoring to verify that the air is clean and acceptable as required by applicable laws and regulations.
- G. Remove and dispose all lead-based paint and asbestos containing materials in accordance with jurisdictional and regulatory agency requirements. Abated materials for disposal shall be segregated from normal construction debris and transported off-site to an approved landfill.

1.03 COUNTY'S RESPONSIBILITIES - HAZARDOUS MATERIALS ABATEMENT MONITORING SERVICES

The County will hire an Environmental Consultant to provide abatement monitoring services that are customarily rendered when providing professional services of this nature, and shall include, but not be limited to the following:

- A. Review the Contractor/subcontractor submitted abatement detailed work plan, methodology, and other pertinent documents to verify compliance with applicable guidelines, laws, and regulations, including the proper licenses, certificates and all other applicable documents required to perform and complete the project.
- B. Visually observe the progress of the work, including but not necessarily limited to the following:
 - 1. Verify contained work areas, isolated work areas, and decontaminated enclosure system design and installation.
 - 2. Verify that the proper abatement methods and procedures are being followed.
 - 3. Take air tests, core samples and bulk samples to complete the work.
 - 4. Conduct periodic review of isolation and containment barriers to determine the level of compliance with the requirements.
 - 5. Observe abatement process to assure that methods for removal and disposal are in accordance with applicable laws and regulations. Verify that abated materials for disposal are segregated from normal

construction debris and transported off-site to an approved landfill.

6 Provide ongoing progress and final close-out reports.

Note: The use of an Environmental Consultant by the County to monitor the abatement work will not relieve the Contractor of his responsibilities to conduct tests and inspections required by applicable laws and regulations, codes, and standards for the protection and safety of his employees.

**SECTION 02 4116
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:
 - 1. Protection of existing improvements to remain.
 - 2. Cleaning existing improvements to remain.
 - 3. Disconnecting and capping utilities.
 - 4. Removing debris, waste materials, and equipment.
 - 5. Removal of items for performance of the Work.
 - 6. Salvageable items to be retained by the Owner.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 01 1100 - Summary of Work.
 - 3. Division 26 — Electrical.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.

1.03 QUALITY ASSURANCE

- A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.
- B. Prior to commencement of Work, schedule a walkthrough with the OAR, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.
- C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.
- D. Related Standard: ANSI/ASSE A10.6.

1.04 PROJECT CONDITIONS

- A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.
- B. Repair damage to existing improvements or damage due to excessive demolition.
- C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.
- D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

- A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the OAR. Items shall be cleaned, packaged and labeled for storage.
- B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection:
 - 1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed.
 - 2. Provide safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.
- B. If safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the OAR.

3.02 DEMOLITION

- A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.
- B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.
- C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

- A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting

with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.

- B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.
- C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

- A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

- A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.
- B. Woodwork: Cut or remove to a joint or panel line.
- C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.
- D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.
- E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.
- F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.
- G. Gypsum Board: Remove to a panel joint line on a stud or support line.
- H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.
- I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

- A. Patch or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

- A. Clean existing materials to remain with appropriate tools and equipment.
- B. Protect existing improvements during cleaning operations.
- C. Debris shall be dampened by fog water spray prior to transporting by truck.
- D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
- E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.
- F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

**SECTION 03 1000
CONCRETE FORMING**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Design and construction of formwork for concrete.
 - 2. Setting in forms, all anchor bolts, metal inserts, sleeves, etc., embedded in concrete.
 - 3. Miscellaneous concrete work, including but not limited to areaways, cast-in-place valve boxes, pits, splash blocks, equipment bases, and other items as shown or required to complete all work.
- B. Related Sections:
 - 1. All Pertinent Provisions of Division 01, "General Requirements."
 - 2. Section 03 20 00: Concrete Reinforcement.
 - 3. Section 03 30 00: Cast-In-Place Concrete
 - 4. Section 31 10 00: Site Clearing
 - 5. Section 31 20 00: Earth Moving
- C. Related Work Specified Elsewhere:
 - 1. Finishing and final curing of cast-in-place concrete.
 - 2. Placing of embedded anchor bolts and inserts.
 - 3. Gravel fill under interior floor slabs.
 - 4. Cement fill in metal stair pans.
 - 5. Trench grates
 - 6. Screeds for slabs.

1.02 SUBMITTALS

- A. Comply with pertinent provisions of Division 01 Section "Submittal Procedures".
- B. Shop Drawings: Submit shop drawings showing form pattern layouts of all exposed exterior and interior concrete dimensioned to precisely locate grooves, form panel jointing, bulkhead formwork detail at construction joints and similar features. Review and approval will not include form strength and adequacy.
- C. Record Document: Keep an accurate record of the dates of removal of forms, form shores and reshores, and furnish copies to the SEOR and Owner.
- D. Submit product data for all proprietary items to be used on project.

1.03 QUALITY ASSURANCE

- A. Comply with pertinent provisions of Division 01, Section 01 43 00, "Quality Assurance Requirements."
- B. Construct forms according to ACI 347, "Guide to Formwork for Concrete," and conforming to tolerances specified in ACI 301, "Specifications for Structural Concrete," as applicable, unless exceeded by requirements of AUTHORITY HAVING JURISDICTION or otherwise indicated or specified.
- C. Prior to construction of formwork for concrete beams and slabs above grade, General Contractor shall conduct a meeting at the site to determine and define all camber which may be required for the project. The Architect, Structural Engineer of Record, General Contractor, Contractor and Contractor's formwork installer shall be in attendance at this meeting.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Division 01, Section 01 61 00, "Common Product Requirements."
- B. Deliver materials for forms in timely manner to ensure uninterrupted progress.
- C. Store materials by methods that prevent damage and permit ready access for inspection and identification.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Form lumber: Lumber with adequate strength, stiffness, dimensional accuracy and stability, workability, and durability in conformance with ACI 347 "Guide to Formwork of Concrete."
- B. Form plywood: PS 1-95, Group I, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4" thick for exposed locations and not less than 5/8" thick for unexposed locations, grade marked, not mill oiled. Plywood having medium or high density overlay is acceptable.
- C. Coated form plywood: For exposed painted concrete, plastic overlaid plywood of grade specified above, factory coated with a form coating and release agent "NoxCrete", or equal.
- D. Tube forms: Sonoco "Seamless Sonotubes", or approved equal, type leaving no marks in concrete, 1-piece lengths for full required heights.
- E. Joist forms: Approved steel or molded plastic types as required.
- F. Special forms: For exposed integrally-colored concrete, plywood as above with high density overlay, plywood with integral structural hardboard facing or fibrous glass reinforced plastic facing, or approved equal producing specified finish.

- G. Form ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, or equal, not leaving metal within 1-1/2" of concrete surface.
- H. Form coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Cast-Off" by BASF or equal approved equal by the SEOR. Where form liners are used, provide form coatings recommended by form liner manufacturer.
- I. Form liner: Rigid or resilient type by Labrado Forms, Symons, or approved equal, types shown or directed, matching approved sample.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Rigidly construct forms to prevent mortar leakage, sagging, displacement or bulging between studs. Use clean, sound, approved form material, coated with specified materials only, not oil. Provide backing on all plywood joints.
- B. Sides of all footings and grade beams shall be formed or cast against clean vertical cuts in unweathered bedrock, unless the member detail provides at least 3" clear cover to reinforcement and indicates that the member is cast against earth, or permission is obtained to place concrete directly against earth. Where this permission is granted, the footing or grade beam dimension shall be increased 3". Remove formwork prior to backfilling operations.

3.02 FORM ERECTION AND REMOVAL

- A. Conform to ACI 301, ACI 318 and ACI 347 except as exceeded by the requirements of AUTHORITY HAVING JURISDICTION or herein.
- B. Construction: Coat forms with the specified resin coating, not form oil. Construct forms to exact shapes, sizes, lines, and dimensions required to obtain level, plumb, and straight surfaces. Provide openings, offsets, keys, reglets, anchorages, recesses, moldings, chamfers, blocking, screeds, drips, bulkheads, and all other required features. Make forms easily removable without hammering or prying against concrete. Space forms apart with metal spreaders. Construct forms to accurate alignment, location and grades, and provide against sagging, leakage of concrete mortar, or displacement occurring during and after placing of concrete. Coordinate installation of inserts and anchors in forms according to Shop Drawings and requirements for work of other sections.
- C. Camber: Place suitable jacks, wedges, or similar means to induce camber and to correct settlement in forms before and during concrete placing. Camber shall be as determined in pre-installation meeting specified above. In general, formwork shall be capable of accommodating camber of 1/8" per 10' of span plus 1/4". Provide camber as noted on the Structural Drawings (if required).
- D. Corners and Angles: Provide 3/4" by 3/4" beveled chamfer strips for all exposed concrete corners and angles unless otherwise indicated. Form concealed concrete corners and angles square unless otherwise indicated.

- E. Reglets and Rebates: Form required reglets and rebates to receive frames, flashing, and other equipment. Obtain required dimensions, details, and precise positions for work to be installed under other sections and form concrete accordingly.
- F. Form Joints: Fill joints to produce smooth surfaces, intersections, and arises. Use polymer foam or equivalent fillers at joints and where forms abut or overlap existing concrete to prevent leakage of mortar.
- G. Recesses, Drips, and Profiles: Provide smooth milled wood or pre-formed rubber or plastic shapes of types shown and required.
- H. Cleanouts and Cleaning: Provide temporary openings in all wall forms and other vertical forms for cleaning and inspection. Clean forms and surfaces to receive concrete prior to placing.
- I. Re-Use: Clean and recondition form material before re-use.
- J. Form Removal: Do not remove concrete forms until concrete attains sufficient strength to support its own weight and all superimposed loads as determine by testing field cured concrete cylinders, but not sooner than specified in ACI 347, Section 3.6.2.3, or ACI 318, Section 26.11. Load supporting forms may be removed when concrete has attained 75 percent of required 28 day compressive strength, but no sooner than 3 days, provided construction is reshored. Vertical formwork for cast-in-place concrete walls may be removed no sooner than 1 day following concrete placement, provided that contractor can demonstrate that no sloughing or sagging of concrete will occur.
 - 1. Reshore structural members as specified per ACI 347.
 - 2. Remove formwork progressively so unbalanced loads are not imposed on the structure.
 - 3. Avoid damage to concrete surfaces during form removal.
 - 4. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.
 - 5. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.
- K. Reshoring:
 - 1. Minimum reshoring shall be as per the requirements of ACI 347.
 - 2. Record: Maintain a form and shoring removal record.
 - 3. Contractor shall submit shoring/reshoring plans and calculations for review and approval by the SEOR. Calculations and plans shall be stamped and signed by a licensed structural engineer registered in the State of California. Reshoring loads to the lower floors shall be consistent with the design loads specified on the construction documents and with the acquired strength of the lower floors based on the time they have been allowed to cure before being loaded.

- L. Shoring for Tributary Loads: Set temporary shoring for structural steel beams supporting cast-in-place concrete beams, walls, or slabs.

3.03 FORMWORK TOLERANCES

- A. Deflection: Limit deflection of forming surfaces from concrete pressure to L/240.
- B. Finish Lines: Position formwork to maintain hardened concrete finish lines within following permissible deviations.
 - 1. Variation from Plumb:

In 10'-0"	1/4 inch
In any story or 20'-0"	3/8 inch
In 40'-0" or more	3/4 inch
 - 2. Variation from Level or Grades Indicated

In 10'-0"	1/4 inch
In any bay or 20'-0" maximum	3/8 inch
In 40'-0" or more	3/4 inch
 - 3. Cross-Sectional Dimensions

Minus	1/4 inch
Plus	1/2 inch
- C. Building Lines: Variation of linear building lines from established position in plan and related position of columns, walls and partitions:
 - 1.

In any bay or 10'-0" maximum	1/2 inch
In 40'-0" or more	1 inch
- D. Slab Openings: Variations in size and location of sleeves and slab openings shall not exceed 1/4 inch.

3.04 SURVEY AND ADJUSTMENT

- A. Check forms before and during placement of concrete, using an instrument, and make corrections as work proceeds.

3.05 EMBEDDED PIPING AND ROUGH HARDWARE

- A. Comply with ACI 318, Section 26.11. Where work of other sections require openings for passage of pipes, conduits, ducts, and other inserts in the concrete, obtain all dimensions and other information. All necessary pipe sleeves, anchors, or other required inserts shall be accurately installed as part of the work of other sections, according to following requirements. See specification Section 03 30 00, Section 1.3.B for submittal requirements related to this scope.
- B. Conduits or Pipes: Locate so as not to reduce strength of concrete. Do not place pipes, other than conduits, in a slab 4-1/2" thick or less in any case. Conduit buried in a concrete slab shall not have an outside diameter greater than 1/3 the slab thickness nor be placed below the bottom reinforcing steel or over top reinforcing steel.

- C. Sleeves: Pipe sleeves may pass through slabs or walls if not exposed to rusting or other deterioration and are of uncoated or galvanized iron or steel. Provide sleeves of diameter large enough to pass any hub or coupling on pipe, including any insulation. Refer to Architectural and MEP drawings and specifications for details of waterproofing seals at wall penetrations.
- D. Conduits: Conduits may be embedded in walls only if the outside diameter does not exceed $\frac{1}{3}$ the wall thickness, are spaced no closer than 3 diameters on centers, and do not impair the strength of the structure.
- E. Clusters of Conduits:
 - 1. Clusters of conduits embedded in a concrete slab shall not exceed 6 conduits per cluster and each conduit per cluster shall be individually spaced as per the above requirements. Conduit clusters exceeding this requirement shall be reviewed and approved by the Structural Engineer of Record and AUTHORITY HAVING JURISDICTION prior to the installation of the conduits.
 - 2. If more than one conduit cluster is required in a specific area of the slab, routing and spacing of the clusters shall be reviewed and approved by the structural engineer of record and AUTHORITY HAVING JURISDICTION prior to the installation of the conduits.
 - 3. At no time shall the quantity and routing of clusters of conduits impair the strength of the concrete construction.

3.06 FIELD QUALITY CONTROL

- A. Inspection: Obtain inspection and approval of forms per 2019 CBC Table before placing structural concrete. Comply with the general provisions of Division 01, Section 01 43 00, "Quality Assurance Requirements."

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes concrete reinforcement for the following:
 - 1. Mat foundation.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Concrete Toppings.
 - 5. Concrete Masonry Units.
- B. Related Sections:
 - 1. Section 031000 "Concrete Forming and Accessories"
 - 2. Section 033000 "Cast-In-Place Concrete"

1.03 REFERENCES

- A. Abbreviations & Acronyms
 - 1. ACI – American Concrete Institute
 - 2. CRSI – Concrete Reinforcing Steel Institute
- B. Reference Standards
 - 1. ACI 301-10: Specification for Structural Concrete Buildings.
 - 2. ACI 117-10: Specification for Tolerances for Concrete Construction and Materials.

1.04 ACTION SUBMITTALS

- A. Submit in accordance with Division 01 Section "Administrative Requirements."
- B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 1. Provide details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include special reinforcement required for openings through concrete structures.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For welder

- B. Welding certificates.
 - C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Steel reinforcement and accessories.
- 1.06 QUALITY ASSURANCE
- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301-10, "Specifications for Structural Concrete for Buildings"
 - 2. ACI 117-10, "Specification for Tolerances for Concrete Construction and Materials"
 - B. CRSI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. Manual of Standard Practice
 - 2. Documents 63 and 65.
 - C. Qualifications
 - 1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

- 2.01 STEEL REINFORCEMENT
- A. Reinforcing Bars: See Structural Drawings
 - B. Plain-Steel Wire: See Structural Drawings
 - C. Deformed-Steel Wire: See Structural Drawings
- 2.02 DEFORMED BAR ANCHORS
- A. Nelson, Type D2L automatically end-welded deformed bar
- 2.03 REINFORCEMENT ACCESSORIES
- A. Tie Wire: Minimum 16 gage, ASTM A 82, or acceptable patented system.
 - B. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
 - C. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
 - D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.01 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Defective Work: The following reinforcing steel work will be considered defective, and shall be removed and replaced by the Contractor at no additional cost to the Owner:
 1. Bars with kinks or bends not shown on the drawings.
 2. Bars damaged due to bending or straightening.
 3. Bars heated for bending.
 4. Reinforcement not placed in accordance with the drawings.

3.02 DEFORMED BAR ANCHOR INSTALLATION

- A. Install in accordance with ICC ESR-2907

3.03 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. All concrete work is subject to special inspection and testing. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency, the Owner, or the Engineer/Architect if project conditions warrant.
- C. Special Inspector Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

- D. Tests and inspections shall be in conformance with Division 1, Section "Quality Requirements".
- E. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).
- F. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
- G. Reinforcing Steel Testing: Independent Testing Agency will perform the following:
 - 1. All steel bars that can be positively identified as to heat number and mill analysis shall have one tensile test bending test for each 10 tons, or fraction thereof, for all #5 bars and larger.
 - 2. All steel bars that cannot be identified shall have one tensile and one bend test made for each 2 1/2 tons, or fraction thereof, of each size and kind of reinforcing steel.
 - 3. Testing procedure shall conform to ASTM A 615.
- H. Reinforcement Welding: All shop and field welds of reinforcing steel will be inspected. The Special Welding Inspector will check the materials and equipment, the qualifications and ability of the welder, and details of construction and procedure, as well as the welds themselves. The Inspector may use gamma ray, magneflux, trepanning, ultrasonics, or any other aid to visual inspection which the Inspector may deem necessary to determine the adequacy of the welding.
- I. No concrete shall be placed until placement of reinforcement steel has been inspected and approved. Provide 48 hours notice to the Inspector prior to placing concrete.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including, concrete materials, mixture design, placement procedures, and finishes, for the following:

- 1. Mat foundation.
- 2. Foundation walls.
- 3. Slabs-on-grade.
- 4. Concrete Toppings.

- B. Related Sections:

- 1. Section 031000 "Concrete Forming and Accessories"
- 2. Section 032000 "Concrete Reinforcing"

1.03 REFERENCES

- A. Abbreviations & Acronyms

- 1. ACI – American Concrete Institute
- 2. NRMCA – National Ready Mixed Concrete Association

- B. Definitions

- 1. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- 2. W/C Ratio: The ratio by weight of water to cementitious materials.

- C. Reference Standards

- 1. ACI 301-10: Specification for Structural Concrete Buildings.
- 2. ACI 117-10: Specification for Tolerances for Concrete Construction and Materials

1.04 ADMINISTRATIVE REQUIREMENTS:

- A. Steel and Concrete Preconstruction Coordination Meeting: Conduct coordinate meeting at project site a minimum of 3 weeks prior to submitting any shop drawings or procurement of materials.
 - 1. Require representatives of each entity directly concerned with steel fabrication and erection and concrete placement to attend, including but not limited to the following:

- a. Construction Manager
 - b. Steel Fabricator
 - c. Steel Erector
 - d. Concrete Contractor
 - e. Structural Engineer of Record
 - f. Architect of Record
2. Review and coordinate the following:
- a. Anchor rod installation requirements and tolerances
 - b. Method for securing anchor rods against movement during concrete placement
 - c. Steel Embed Plates
 - d. Submittal Schedules
 - e. Critical Path and Long Lead Items
 - f. Any and all items that require cross-trade coordination
- B. Preinstallation Meeting: Conduct meeting at project site
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
- a. Construction Manager
 - b. Independent testing agency responsible for concrete design mixtures
 - c. Ready-mix concrete manufacturer
 - d. Concrete contractor
 - e. Special concrete finish contractor
 - f. Structural Engineer of Record
 - g. Architect of Record
2. Review the following:
- a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Concrete finishes and finishing.
 - c. Cold- and hot-weather concreting procedures.
 - d. Curing procedures.
 - e. Construction contraction and isolation joints.
 - f. Forms and form removal limitations.
 - g. Shoring and re-shoring procedures.
 - h. Vapor-retarder installation.

- i. Anchor rod and anchorage device installation tolerances
- j. Steel reinforcement installation.
- k. Floor and slab flatness and levelness measurement
- l. Concrete repair procedures.
- m. Concrete protection.

1.05 ACTION SUBMITTALS

- A. Submit in accordance with Division 01 Section "Administrative Requirements."
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Submit proposed mix designs at least 15 days in advance of placing operations for each concrete mixture. The submitted mix design shall include the following:
 - a. Supporting strength test data not more than 12 months old. At the Engineer's request, reports from the independent testing agencies may be required to document the test data. Reports from the independent testing agencies will be required if fly ash is used in the design mix.
 - b. Statistical analysis in compliance with ACI 301.
 - c. Gradation of fine and coarse aggregates not more than 90 days old (ASTM C 33). No substitution of aggregate type or size from those submitted will be permitted.
 - d. Proportions of all ingredients, including all admixtures added either at time of batching or at job site. Aggregate weights shall be based upon saturated surface dry conditions.
 - e. Water/cement ratio.
 - f. Slump (ASTM C 143): When high range water-reducing admixtures are used, slump before and after addition of admixture are required.
 - g. Air content of freshly mixed concrete (ASTM C 231).
 - h. Material Certificates for the following:
 - 1) Cementitious Materials
 - 2) Admixtures
 - i. Certification that all ingredients in each mix design are compatible
 - j. Locations or intended use of each mix design.
 - k. Source of all materials.
 - l. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Embedded Item Placement Drawings: Drawings indicating the location and type of plates, anchorages, or other items to be embedded in the finished concrete

surfaces. Include wall elevations, slab plans, and details required to locate and install embeds.

- D. Samples: For waterstops and vapor retarder.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Form materials and form-release agents.
 - 2. Steel reinforcement and accessories.
 - 3. Waterstops.
 - 4. Curing compounds.
 - 5. Floor and slab treatments.
 - 6. Bonding agents.
 - 7. Adhesives.
 - 8. Semirigid joint filler.
 - 9. Joint-filler strips.
 - 10. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Written curing procedure, including curing procedures for hot and cold-weather placement.
- F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

1.07 QUALITY ASSURANCE

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301-10, "Specifications for Structural Concrete for Buildings"
 - 2. ACI 117-10, "Specification for Tolerances for Concrete Construction and Materials"
- B. CRSI Publications: Comply with the following, unless more stringent provisions are indicated:

1. Manual of Standard Practice
 2. Documents 63 and 65.
- C. Qualifications
1. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
 2. Manufacturer Qualifications: A firm experienced in manufacturing ready mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
 3. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician- Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Coordinate chemical and adhesion compatibility of curing compounds used for curing concrete with coatings, stains, paints, liquid flashings, sealers, waterproofing membranes, joint sealants and other materials that penetrate, adhere to or otherwise come into contact with concrete surfaces that are specified in other sections.
- F. Batch Tickets: Provide batch tickets for review by inspector for each truckload of concrete used in the work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of cement and water introduced.
- G. Concrete Finishing and Curing:
1. Obtain each type, composition, and variety of liquid membrane-forming curing compound used for the Project from the same manufacturer.
 2. Products from more than one approved manufacturer may be used for different applications, however all products for like applications shall be by the same manufacturer.
 3. Liquid membrane curing compound manufacturer qualifications: Obtain materials only from a manufacturer that will send an experienced technical field representative to the Project site before the start of work to verify existing conditions, and during the execution of work to perform manufacturer's field services.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in accordance with ACI 301. Admixtures which have been in storage at the project site for longer than six months or which have been subjected to freezing shall not be used, unless retested and proven to meet the specified requirements.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.09 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- B. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- C. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

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 Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. 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.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - c. Silica Fume: ASTM C 1240, amorphous silica.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, graded. Provide aggregates from a single source.
 - 1. Unless maximum aggregate size is listed specifically under "Project Mix Requirements," the maximum aggregate size shall not exceed:
 - a. Three-fourths of the minimum clear spacing between reinforcing bars.
 - b. One-fifth of the narrowest dimension between the sides of the forms.
 - c. One-third of the thickness of the slabs or toppings.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

2.03 ADMIXTURES

- A. General
 - 1. Admixtures certified by manufacturer to contain not more than 0.05 percent water-soluble chloride ions by mass of cementitious material. Do not use admixtures containing calcium chloride or thiocyanate.
 - 2. Where more than one admixture is used in the mix, furnish manufacturer's certification to the Architect that the admixtures to be used are compatible in combination with the cement and aggregates.
 - 3. Accelerating admixtures shall not be used.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

- D. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

1. Products:
 - a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
 - b. BASF Construction Chemicals – Building Systems; Rheocrete CNI.
 - c. Euclid Chemical Company (The); Eucon, CIA.
 - d. Grace Construction Products, W.R. Grace & Co.; DCI.
 - e. Sika Corporation; Sika CNI.

- E. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products:
 - a. BASF Construction Chemicals – Building Systems; Rheocrete 222+.
 - b. Cortec Corporation; MCI [2000] [2005NS].
 - c. Grace Construction Products, W.R. Grace & Co.; DCI-S.
 - d. Sika Corporation; FerroGard-901.

2.04 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513 for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Profile: As indicated.
2. Dimensions: 6 inches by 3/8 inch thick; nontapered.

- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.05 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fortifiber Building Systems Group; Moistop Ultra 15
 - b. Meadows, W.R., Inc; Perminator 15 mil.
 - c. Raven Industries Inc.; Vapor Block 15.
 - d. Reef Industries, Inc; Griffolyn 15 Green
 - e. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.06 LIQUID FLOOR TREATMENTS

- A. Refer to section 033562 – Burnished Concrete Floor Finish
- 2.07 CURING MATERIALS
- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
 - B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 - C. Water: Potable.
- 2.08 RELATED MATERIALS
- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber
 - B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
 - C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 - D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- 2.09 REPAIR MATERIALS
- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
 - B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Slump: 4 inches plus or minus 1 inch
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Concrete mix design shall comply with the requirements of the structural drawings.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
 2. Install connection plates, angles, or other embedded items flush with concrete surface and at accurate locations per the approved embedded item placement drawings required by Part 1, "Submittals," section.

3.02 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls at maximum of 30-foot spacing. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 8. Provide roughened surfaces at joints where shown on the drawings. Roughen to a full amplitude of approximately 1/4-inch.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. V-Grooved Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. V-Groove top with 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.03 WATERSTOP INSTALLATION

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.04 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Place vapor retarder directly on top of granular course
 - 2. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.05 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- D. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause

seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.06 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view or to receive a rubbed finish.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of

bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.07 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
 1. Apply scratch finish to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces indicated to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- E. Broom Finish: Apply a broom finish to exterior concrete, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic rout. Coordinate required final finish with Architect before application.

3.08 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as

specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.09 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surface to be burnished.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - c. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least [one] [six] month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. All concrete work is subject to special inspection and testing. This section specifies the minimum testing and inspection required. Additional testing and inspection may be required by the Testing Agency, the Owner, or the Engineer/Architect if project conditions warrant.
- C. Special Inspector Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, and qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Tests and inspections shall be in conformance with Division 1, Section "Quality Requirements".
- E. Independent Testing Agency shall check batch tickets for compliance with required mix design(s).
- F. Continuous Field Inspection: The Independent Testing Agency shall be present at all times during the placing of structural reinforced concrete. Work shall not proceed until all inspections are completed. Prior to placing concrete, the Inspector shall inspect:

1. Accuracy, configuration, and cleanliness of all formwork
 2. Quantity, cleanliness, and placement of all reinforcing steel.
 3. Testing Agency need not be present during entire reinforcing steel placing operations, provided he has inspected for conformance with the approved placement drawings prior to closing of forms or the delivery of concrete to the job site.
- G. Inspections:
1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
- H. No concrete shall be placed until placement of reinforcement steel has been inspected and approved. Provide 48 hours notice to the Inspector prior to placing concrete.
- I. Concrete Sampling: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. At the Contractor's expense and direction, cast and field-cure standard cylinder specimens as may be required for construction. Number of specimens and testing age shall be determined by the Contractor based on construction sequence requirements.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

7. Test field-cured specimens at the Contractor's direction.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 11. Linear Shrinkage Tests: Test for linear shrinkage in accordance with ASTM C 157 (air storage method for 28 days. Take a minimum of 3 test samples from each mix, at the Project Representative's direction, of concrete for elevated slabs and beams. Take samples at truck and discharge end of pumped mix. Consistency of the concrete must not be altered after test samples have been taken.
 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- J. Measure floor and slab flatness and levelness according to ASTM E 1155 within 8 hours of finishing.
1. Finish surfaces to the following tolerances, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; with minimum local values of flatness, F(F) 24; for suspended slabs.
 - c. Specified overall values of flatness, F(F) 40; and of levelness,

F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for concrete receiving polished concrete finish.

3.13 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 05 0519
POST-INSTALLED CONCRETE ANCHORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Cast-in and drilled in anchors for concrete.
- B. Related Sections:
 - 1. Division 3 Concrete Sections.
 - 2. Division 5 Metals Sections.
 - 3. Division 22 Hangers and Supports Section.
 - 4. Division 23 Hangers and Supports Section.
 - 5. Division 26 Hangers and Supports Section.

1.02 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
 - 1. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.
 - 2. Samples: Representative length and diameters of each type anchor shown on the Drawings.
 - 3. Quality Assurance Submittals:
 - a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 4. Manufacturer's installation instructions.
 - 5. Installer Qualifications & Procedures: Submit installer qualifications as stated in Section 1.03.B. Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.
- B. Closeout Submittals: Submit the following:
 - 1. Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout Submittals Section.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Drilled-in anchors shall be installed by a contractor with at least three years of experience performing similar installations.
- B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
 - 1. hole drilling procedure

2. hole preparation & cleaning technique
 3. adhesive injection technique & dispenser training / maintenance
 4. rebar dowel preparation and installation
 5. proof loading/torquing
- 1.04 DELIVERY, STORAGE AND HANDLING
- A. General: Comply with Division 1 Section □ Product Storage and Handling Requirements.
1. Store anchors in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Fasteners and Anchors:
1. Bolts and Studs: ASTM A307; ASTM A449 where “high strength” is indicated on the Drawings.
 2. Carbon and Alloy Steel Nuts: ASTM A563.
 3. Carbon Steel Washers: ASTM F436.
 4. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.
 5. Wedge Anchors: ASTM A510; or ASTM A108.
 6. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
 7. Stainless Steel Nuts: ASTM F594.
 8. Zinc Plating: ASTM B633.
 9. Hot-Dip Galvanizing: ASTM A153.
 10. Metric Anchor Bolts, Screws, and Studs: ISO 898 Part 1.
 11. Metric Anchor Nuts: EN 24033.
 12. Metric Anchor Stainless Steel Bolts, Screws, and Studs: ISO 3506 Part 1.
 13. Metric Anchor Stainless Steel Nuts: ISO 3506 Part 2.
 14. Reinforcing Dowels: ASTM A615

2.02 CAST-IN-PLACE BOLTS

- A. Anchors, Bolts, Nuts, and Washers: Bolts and studs, nuts, and washers shall conform to ASTM
- B. A307, Grade A, and ASTM A449, ASTM A563, and ASTM F436, as applicable. Hot-dip galvanized bolts and studs including associated nuts and washers in accordance with ASTM A153.

2.03 DRILLED-IN ANCHORS

- A. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage complete with required nuts and washers. Provide anchors with length identification markings. Type and size as indicated on Drawings.

1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1).
 2. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. Stainless steel nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 3. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik Bolt 3.
 - b. Hilti Kwik Bolt TZ2 (carbon steel and AISI Type 304 Stainless Steel).
- B. Screw Anchors: screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating equivalent to DIN EN ISO 4042 (8µm min.).
 2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik-HUS-EZ.
 - b. Hilti Kwik-HUS EZ-I.
 - c. Hilti Kwik-HUS.
- C. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel threaded rods conforming to ASTM A36, ASTM A 193 Type B7 or ISO 898 Class 5.8 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1) [or carbon steel HIT TZ rods conforming to ASTM A510 with chemical composition of AISI 1038].
 2. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 3. Reinforcing dowels shall be A615 Grade 60.
 4. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:

- a. Hilti HAS threaded rods with HIT-HY 200 Safe Set System using Hilti Hollow Drill Bit System for anchorage to concrete.
- b. Hilti HIT-Z anchor rods with HIT-HY 200 Safe Set System for anchorage to concrete.
- c. Hilti HAS threaded rods with RE 500 SD Injection Adhesive Anchoring System for anchorage to concrete.
- d. Hilti HAS threaded rods with RE 500 Injection Adhesive Anchoring System for anchorage to concrete.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Cast-In-Place Bolts: Use templates to locate bolts accurately and securely in formwork.
- B. Drilled-In Anchors:
 - 1. Drill holes with rotary impact hammer drills using carbide-tipped bits, hollow drill bit system, or core drills using diamond core bits. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
 - a. Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer's instructions.
 - b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
 - c. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 2. Perform anchor installation in accordance with manufacturer instructions.
 - 3. Wedge Anchors, Heavy-Duty Sleeve Anchors, and Undercut Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.
 - 4. Cartridge Injection Adhesive Anchors: Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Inject adhesive into holes proceeding from the bottom of the hole

and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

5. Capsule Anchors: Perform drilling and setting operations in accordance with manufacturer instructions. Clean all holes to remove loose material and drilling dust prior to installation of adhesive. Remove water from drilled holes in such a manner as to achieve a surface dry condition. Capsule anchors shall be installed with equipment conforming to manufacturer recommendations. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
6. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.

3.02 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

3.03 FIELD QUALITY CONTROL

- A. Testing: 10% of each type and size of drilled-in anchor shall be proof loaded by the independent testing laboratory. Adhesive anchors and capsule anchors shall not be torque tested unless otherwise directed by the Engineer. If any of the tested anchors fail to achieve the specified torque or proof load within the limits as defined on the Drawings, all anchors of the same diameter and type as the failed anchor shall be tested, unless otherwise instructed by the Engineer.
 1. Tension testing should be performed in accordance with ASTM E488.
 2. Torque shall be applied with a calibrated torque wrench.
 3. Proof loads shall be applied with a calibrated hydraulic ram. Displacement of adhesive and capsule anchors at proof load shall not exceed $D/10$, where D is the nominal anchor diameter.
- B. Minimum anchor embedment, proof loads and torques shall be as shown on the Drawings.

END OF SECTION

**SECTION 05 1210
WELDING**

PART 1 - GENERAL

1.01 SUMMARY

A. Work included in This Section:

1. Provisions for the welding of all structural steel members. This includes both field and shop welding.
2. All Welding shall be performed in full accordance with the latest edition of the AWS D1.1-2015 Structural Welding Code-Steel, except as supplemented or modified by this specification. Reiteration or amplification of code provisions as contained in the specification shall not reduce the necessity of compliance with all other code requirements.
3. Shop welding may be by any of the AWS D1.1-2015 approved welding processes except electroslag (ESW) and electrogas (EGW) without specific approval by the engineer.

B. Related Sections:

1. All pertinent provisions of Division 01 Specification Sections
2. Section 03 20 00: Concrete Reinforcement
3. Section 05 06 50: Welded Stud Connectors
4. Section 05 12 00: Structural Steel Framing
5. Section 05 31 50: Metal Floor and Roof Decking

1.02 REFERENCES

- A. References as specified in Section 05 12 00, "Structural Steel Framing."
- B. Applicable portions of specification section 05 12 00 apply to the work of this section. Contractor shall be responsible to incorporate all applicable portions of specification section 05 12 00 into this section.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of Division 01, Section 01 33 00, "Submittal Procedures."

B. Welding Procedure specification (WPS):

1. All WPS's shall be submitted to the Structural Engineer of Record (SEOR) for review and approval prior to use.
2. For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Engineer for review and approval. All WPS's and PQR's shall be in accordance with the forms shown in this section.
3. Manufacturer's product data sheets or catalog data for SMAW, FCAW and GMAW composite (cored) filler metals to be used. The data sheets shall describe the product, limitations of use, recommended or typical welding

parameters, and storage and exposure requirements, including baking, if applicable.

4. Copies of the manufacturer's typical certificate of conformance for all electrodes, fluxes and shielding gases to be used. Certificates of conformance shall satisfy the applicable AWS A5 requirements. For demand critical welds, submit applicable manufacturer's certifications that the filler metal meets the supplemental notch toughness requirements.
5. Included shall be WPS for repair welds.
- C. Submit current valid certificate issued by an independent testing agency for all welders, welding operators, and tack welders.
- D. Submit qualification credentials of all inspectors.
- E. Submit to the Engineer for approval, a step-by-step welding sequence for the field welding of beam-to-column CP-welded and beam-to-beam CP-welded splice connections.
- F. Submit a quality control plan that addresses all inspection issues, including in-process and final inspection that are addressed in AWS D1.1.

1.04 QUALITY ASSURANCE

- A. Comply with all pertinent provisions of Division 01, Section 01 40 00, "Quality Requirements."
- B. Standards:
 1. American Welding Society
 - a. Structural Welding Code (AWS D1.1-2015)
 - b. Structural Welding Code – Seismic Supplement (ASWS D1.8-2009)
 2. American Institute of Steel Construction
 - a. Specification for Structural Steel Buildings (AISC 360-16)
 - b. Code of Standard Practice for Steel Buildings and Bridges (AISC 303-10).
 - c. Seismic Provisions For Structural Steel Buildings including Supplement No. 1 (AISC 341-16), including Appendix W.
- C. Welder Qualification:
 1. All welders, welding operators, and tack welders shall be qualified by test with the largest diameter electrodes to be used on the work and hold a current valid certificate issued by an independent testing agency, to perform the type of welds required by the work; including the process, position, and thickness of materials used per AWS D1.1 section 4.
 2. In addition to meeting the requirements above (section 1.4.B.1), welders that will make welds with restricted access such as, but not limited to, the flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration. Qualification test per

Annex C of AWS D1.8 is acceptable. Qualifications for welders that have been qualified on previous projects who meet the activity requirements of specification section 05 12 00, section 3.3.B, will be accepted.

3. All Welders on the project shall be capable of understanding and following the requirements of the written WPS.
4. Each welder employed on the project shall understand all the requirements of this welding specification before welding on the project.
5. Copies of the Welder Performance Qualification Records (WPQR), including supplemental testing requirements shall be made available for the SEOR and IOR.

PART 2 - PRODUCTS

2.01 WELDING PROCESSES

- A. Weld Procedure Specifications, including Procedure Qualification Records shall be submitted and approved by the SEOR prior to welding. PQRs shall include test results that demonstrate all-weld metal CVN values meet the requirements of Paragraph 2.2A.1 and a minimum tensile strength of 70KSI. CVN and minimum tensile strength conformance of the filler metal may be established by submitting with the PQR the results of heat input envelope testing as per AWS D1.8 section 6.3.8.1.

2.02 MATERIALS

- A. Electrodes:
 1. Filler metals shall conform to the requirements of the latest edition of ANSI/AWS Specifications for Electrodes as listed herein and shall meet Charpy V-Notch Impact Energy of 20 ft-lbs. at 0°F. Filler metals for demand critical welds shall meet Charpy V-Notch Impact Energy of 20 ft-lbs. at -20°F and 40 ft-lbs at 70°F as per AWS D1.8 Section 6.3.5.
 - a. SMAW A5.1 or A5.5 E70XX Low Hydrogen
 - b. SAW A5.17 or A5.23 F7XX-EXXX or F7XX-EXXX-XX
 - c. GMAW A5.18 or A5.28 ER70S-X
 - d. FCAW A5.20 or A5.29 E7XT-X except T8-K6
 - e. The Charpy V-Notch requirement above does not apply to welds used in the construction of stairs, elevator guiderail supports, steel supports for partitions or exterior walls, steel supports for exterior architectural appendages, steel supports for MEP equipment, rooftop screen walls, and light gage metal stud framing.
 2. The use of E70-T4 Electrode is not allowed for any welding application.
 3. The manufacturer shall certify that consumables used in the Work conform with AWS D1.8 Section 6.3.

PART 3 - EXECUTION

3.01 WELDING PROCEDURE SPECIFICATION (WPS)

- A. All welding shall be performed in strict adherence to a written WPS, whether the WPS be pre-qualified or qualified by test. Electrodes shall be limited to the diameters listed herein and welding shall preferably use a stringer bead technique. If weave beads are used, they shall be limited to the following diameter widths:
1. SMAW – Maximum diameter (d) 3/16 inch and maximum widths shall be:
 - a. 4d for 3/32 inch electrodes
 - b. 3d for 1/8 inch electrodes
 - c. 2 ½ d for 5/32 inch electrodes
 - d. 2 d for 3/16 inch electrodes limited to flat and horizontal positions
 - e. These weave widths shall be strictly adhered to except final (cover) pass(s) may be a maximum of 5/8 inches.
- B. All WPS's shall be prepared by qualified individuals and the same individual responsible for the suitability of the WPS.
- C. The written WPS shall be available to the welder, welding supervisor, and inspector.
- D. All welding equipment shall be properly maintained. Current/amperage and voltage shall be tested for compliance to WPS required ranges by calibrated instruments and also such gauges on the equipment shall be checked for manufacturers stated accuracy.
- E. WPS's for SMAW, SAW and FCAW-G may be pre-qualified providing they meet all the requirements of AWS D1.1-2015, paragraph 3.2.1. Any deviation from the pre-qualified WPS requirements shall necessitate qualifications by test.
- F. WPS's that are not pre-qualified shall be subject to the qualification testing specified in AWS D1.1-2015, section 4. For WPS's that have not been qualified by test, the supporting procedure qualification record (PQR) shall be submitted with the WPS for approval by the Engineer.
- G. The written WPS shall contain all the necessary information required by the code, this specification, and any other information necessary to produce the welds that are in compliance with these requirements.
- H. The WPS shall list the applicable base metal types and thicknesses.
- I. The WPS shall contain a sketch of the joint and shall list the welding joint details, including type, weld type, joint geometry, and applicable dimensions. Individual weld passes shall be identified in the sketch and numbered to identify the maximum layer thickness and bead widths. Layer thickness shall conform to AWS D1.1 table 3.7 or as qualified by the PQR.
- J. The WPS shall list the applicable welding processes.
- K. The WPS shall indicate the minimum preheat requirements. The preheat and inter-pass temperatures shall be determined in accordance with AWS D1.1 Table 3.2. Maximum inter-pass temperature shall be 550°F.
- L. The WPS shall list all applicable electrical characteristics for the process employed and shall include, as a reference, the electrode manufacturer's cutsheet. The product data sheets or catalog data for SMAW FCAW and the WPS shall clearly indicate the acceptable values required for each welding pass. These electrical characteristics shall include at a minimum the following:

1. Type of current, and acceptable ranges of current measures in amperage. For wire feed process both wire feed and amperage should be listed.
 2. Voltage
 3. Travel speed (range)
 4. Electrode extension for wire feed processes
 5. Amperage, voltage and electrode extension (as applicable) shall be within the filler metal manufacturer's recommendation
- M. The diameter of the electrodes specified on the WPS shall not exceed the limits listed in section 3.1.A. of this specification section.
- 3.02 FABRICATION AND ERECTION
- A. Assembly:
1. Assembly shall not exceed those for pre-qualified joint detail employed, or the limits of AWS D1.1-2015, Figures 5.3 and 5.4, as applicable. The minimum root opening dimension shall be maintained for the length of the joint. For joints where the minimum root opening dimension is less than the minimum requirement, compensation may be made by increasing the root opening by gouging, chipping or grinding. At the contractor's option, or alternate approved written WPS suitable for the smaller root opening may be employed. Root openings that exceed the maximum allowable may be corrected by welding to acceptable dimensions prior to joining the parts by welding. The Engineer shall be notified when the root opening exceeds the allowable tolerance range.
- B. Tack Welds: All tack welds shall be of the same quality as the final welds. This includes the requirements for preheat except as noted in AWS D1.1 section 5.18.5.
- C. Weld Access Holes: Weld Access holes shall be sized to ensure adequate access for the welding process being used. Minimum sizes shall be in accordance with AWS D1.1-2015, 5.17 and Figure 5.2
- D. Weld Termination:
1. Weld tabs shall be employed as shown in the Structural Drawing. Minimum length shall be the thickness of groove joint or 1 inch, whichever is greater, but not exceed 2 inches as per AWS D1.8 section 6.11.1.
 2. End dams shall not be allowed.
 3. Weld tabs shall be removed in accordance with AWS D1.8 section 6.10.
- E. Steel Backing: Remove steel backing where so indicated on drawings. If backing bars are removed, the removal area shall be tested for defects or a reinforcing fillet weld, at least $\frac{1}{4}$ of the flange thickness, but not greater than $\frac{3}{8}$ inch, shall be applied.
- F. Preheating: To ensure the work place is properly heated, the temperature of the part shall be measured at a distance from the axis of the weld equal to twice the thickness of the thickest part being welded, but in no case less than 3 inches in all directions, including the through thickness dimension of the part being welded, for the full length of the weld joint. Preheat shall be verified by the inspector before welding commences.

- G. Peening: Peening shall not be allowed except if approved by the SEOR.
- H. Technique for making Welds involving Weld Access Holes:
 - 1. After the joint is assembled (bolts not fully torqued), the weld shall be completed as follows:
 - a. The root pass shall initiate near the center of the joint, in the area of the weld access hole. The welder shall extend the electrode through the weld access hole approximately 1" beyond the opposite side of the web. After the arc is initiated, travel shall progress toward the end of the joint, and the weld shall be terminated on the weld tab.
 - b. The half-length of root pass shall be thoroughly cleaned.
 - c. The start of the weld in the weld access hole area shall be visually inspected to ensure fusion, soundness, freedom from slag inclusions, and excessive porosity, the resulting lead profile shall be suitable for obtaining good fusion by the subsequent pass to be initiated on the opposite side of the beam web. If the profile is not conducive to good fusion, the start of the first root pass shall be ground, gouged, chipped or otherwise prepared to ensure adequate fusion.
 - d. The second half of the weld joint shall have the root pass applied before any other weld passes are performed. The arc shall be initiated in the area of the start of the first root pass, and travel shall progress to the end of the joint, terminating on the weld tab.
 - e. Each new layer shall be completed on both sides of the joint before a new layer is deposited.
 - f. Deviation from the preceding procedure may be made, providing the contractor submits in writing an alternate sequence that is approved by the Engineer prior to fabrication.

3.03 QUALITY CONTROL AND QUALITY ASSURANCE

- A. Where there is a conflict with the above specifications and the drawings, the more stringent of the two shall prevail.
- B. Comply with pertinent provisions of Division 01 Section 01 40 00 "Quality Requirements."
- C. Inspection provided by the Owner:
 - 1. Qualifications: All inspectors shall meet the requirements of AWS D1.1, section 6.1.4 and hold current Certified Welding Inspector (CWI) certification.
 - 2. Inspection Agency Responsibility: The inspection agency shall perform all required inspection including the requirements herein. The inspector(s) shall be present before during and after welding on all Complete Joint Penetration (CJP) weld and as necessary during all other welding operations. The inspector(s) shall also be present during removal of steel backing and run off tabs.
 - 3. All full penetration groove welds shall be ultrasonic testing, as per AWS D1.1, Section 6 "Inspection, Part "F", Ultrasonic Testing of Groove Welds".

All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

4. Flanges: An area extending 6" above and below point of attachment for CJP welds and flange edge shall be inspected visually, and the entire area ultrasonically for lamination, plate discontinuities and non-metallic inclusions.
5. Ultrasonic inspections of all CJP welds shall be conducted from both the top and bottom sides of the flange, and from the back side of the column flange as necessary to determine potential rejectable welding defects.
6. All weld tabs shall be removed. The affected area shall be ground smooth and magnetic particle tested for defects. Dye penetrant may be used where required.
7. Where backup bars are required to be removed, the weld root area shall be magnetic particle tested for defects.
8. Base metal thicker than 1½ inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion. Repairs if needed, to parent material shall comply with ASTM A6 Sec.9.
9. All Non-Destructive Testing (NDT) shall be performed after all welds are complete including, but not limited to, removal of steel backing and grinding of same, removal of reinforcement as per AWS D1.1 section 5.24.4, 5.24.4.1 and 5.24.4.2; any postweld heat treatment. This is not intended to exclude in-house intermittent NDT programs.
10. All NDT except UT shall not be started before a minimum of 24 hours after subject weldments have cooled to ambient temperature.
11. NDT personnel, other than UT, shall also submit their experience and qualification on like type weldments when required by the Engineer.

WELDING PROCEDURE SPECIFICATION (WPS)

PREQUALIFIED ☐ QUALIFIED BY TESTING ☐ Yes ☐

Or PROCEDURE QUALIFICATION RECORDS (PQR) Yes ☐

Company Name _____

Welding Process _____

Supporting PQR No. (s) _____

Identification # _____

Revision _____ Date _____ By _____

Authorized by _____

Type: Manual ☐ Semi-Automatic ☐

Machine ☐ Automatic ☐

JOINT DESIGN USED

Type: _____ Single ☐ Double Weld ☐

Backing: Yes ☐ No ☐

Backing Material _____

Root Opening _____ Root Face Dim. _____

Groove Angle _____ Radius (J-U) _____

Back Gouging Y ☐ N ☐ Method _____

POSITION

Position of Groove _____

Vertical Progression: Fillet: _____

Up ☐ Down ☐

ELECTRICAL CHARACTERISTICS

Transfer Mode (GMAW) Short Circuiting ☐ Spray ☐

Globular ☐

Current: AC ☐ DCEP ☐ DCEN ☐ Pulsed ☐

☐

Other _____

Tungsten Electrode (GTAW): Size _____

Type _____

BASE METALS

Material Spec. _____

Type or Grade _____

Thickness _____ Groove _____ Fillet _____

Diameter (Pipe) _____

TECHNIQUE

Stringer or Weave Bead _____

Multi-pass or Single Pass (per _____ side)

Number of Electrodes _____

Electrode Spacing: Longitudinal _____

Lateral _____

Angles _____

Contact Tube to Work Distance _____

Peening _____

Interpass Cleaning _____

FILLER METALS

AWR Specification _____

AWS Classification _____

MNFR ID _____

SHIELDING

Flux _____

Gas _____

Composition _____

Electrode-Flux (Class) _____ Flow Rate _____

Gas Cup Size _____

POSTWELD HEAT TREATMENT

Temp. _____

Time _____

PREHEAT

Preheat Temp. Min. _____

Interpass Temp. Min. _____ Max _____

WELDING PROCEDURE

Pass or Weld Layer (s)	Process	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diam.	Type & Polarity	Amps or Wire Feed Speed			

PROCEDURE QUALIFICATION RECORD

Fabricator		Test Date
Process		Filler Metal
Position		
Electrode(s) Mfg. Designation		
Flux Mfg. Designation		
Electrode Extension		

	Diam.	Current	WFS	Voltage	Current & Polarity
Electrode (1)					
(2)					
(3)					

Calculated Heat Input (see 5.2.4)	
Shielding Gas	Flow Rate
Dew Point	Travel Speed
Base Metal Specification & Thickness	
(attach certified copy of mill test report)	

Preheat Temp.	Interpass Temp. Minimum	Maximum

SPECIMEN	TEST RESULTS
A Weld Metal Tension (AWMT)	Tensile Strength (psi)
	Yield Strength (psi)
	Elongation in 2 in. (%)
	Reduction in area (%)

Side Bends	1)	2)	3)	4)

Reduced Section Tension	Tensile Strength 1)	Location of Break 1)
	2)	2)

Charpy V-Notch Impact Toughness of Weld Metal	Avg. Ft. lb.	@	Degrees F.

SMAW, SAW, FCAW, GMAW – 5 Reg. Toughness of Weld Metal	Avg. Ft. lb.	@	Degrees F.

Chemistry of Deposited Weld Metal	C	Mn	Si	P	S
When Required by Contract Documents	Ni	Cr	Mo	V	Cu

REMARKS	Visual Radiographic Test

Wire feed may be used in lieu of current when a correlation curve for the same electrode diameter and same electrode extension.

Test Witness:	Agency:
Results Reviewed:	State Acceptance: Date:

END OF SECTION

**SECTION 07 6000
FLASHING AND SHEET METAL**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Miscellaneous metal flashing and counter flashing as required, except where provided under Divisions 22, Plumbing, 23, HVAC, or 26, Electrical.
2. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 07 9200 - Joint Sealants.
3. Division 26 - Electrical.

1.02 SUBMITTALS

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

1.03 QUALITY ASSURANCE

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

1.04 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.
- B. Stainless Steel: Plate, sheet and strip shall conform to ASTM A167, Type 304 or Type 316, No. 4 finish on exposed surfaces and No. 2 finish on concealed surfaces unless otherwise specified or indicated. Furnish Type 304 for general applications and Type 316 where exposed to acidic or alkaline conditions.
- C. Fastenings:
 - 1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.
 - 2. Stainless Steel: Nails, rivets and other fastenings furnished in connection with stainless steel Work, shall be 300 series alloy to match alloy of stainless steel being fastened.
- D. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- E. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped or cast onto each coil or bar.

2.02 FABRICATION

- A. General:
 - 1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a ½ inch minimum hemmed edge.
 - 2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Fill joint completely with solder. Clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.
 - 3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

- A. General: Coordinate with installation of underlayment indicated in the Drawings.

3.03 TESTING

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

3.04 PROTECTION

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

3.05 CLEANING

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

END OF SECTION

SECTION 07 9200 JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Joint sealants.
 - 2. Preparation for application of sealants.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 07 6000 - Flashing and Sheet Metal.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.
- B. Product Data: Submit manufacturer's literature for each sealant material.
- C. Material Samples: Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.
- D. Certifications: Submit manufacturer's certification materials comply with requirements specified.

1.03 QUALITY ASSURANCE

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

1.04 DELIVERY, STORAGE AND HANDLING

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

1.05 WARRANTY

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 MATERIALS

- A. Sealants:
1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.
 - a. Tremco Inc., Acrylic Latex Caulk.
 - b. Pecora Corporation, AC-20.
 - c. Equal.
 2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.
 - a. Tremco Inc., Tremco Butyl Sealant.
 - b. Pecora Corp., BC-158.
 - c. Equal.
 3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 790, 791, 795.
 - b. General Electric Co., Silpruf.
 - c. Tremco, Inc., Spectrem 1.
 - d. Pecora Corp., 864.
 - e. Equal.
 4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 786.
 - b. General Electric Co., Sanitary 1700.
 - c. Tremco, Inc., Proglaze White.
 - d. Equal.
 5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.

- a. Sika Corporation, Sikaflex -221e.
 - b. Equal.
- 6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.
 - a. Sika Corporation, Sikaflex 2C NS/SL.
 - b. Equal.
- 7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.
 - a. Pecora Corp., BA-98 Acoustical Sealant.
 - b. Equal.
- B. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- C. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- E. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 SURFACE PREPARATION

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

dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

- E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.
- F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

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

3.04 APPLICATION

- A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.
- B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.

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

3.05 MISCELLANEOUS WORK

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

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

3.06 CLEANING

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

3.07 CURING

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

3.08 PROTECTION

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

END OF SECTION

**SECTION 09 2900
GYPSUM BOARD**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Gypsum board, sheathing and tile backer systems and accessory.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 07 9200 - Joint Sealants.

1.02 PROJECT REQUIREMENTS

- A. Design Requirements: Provide systems capable of resisting deflection as required by CBC and authorities having jurisdiction.
- B. Regulatory Requirements: Comply with CBC requirements for design and installation.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's catalog data for each product proposed for installation.

1.04 QUALITY ASSURANCE

- A. Comply with following as a minimum requirement:
 - 1. ASTM C474 - Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction.
 - 2. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 3. ASTM C514 – Standard Specification for Nails for the Application of Gypsum Board.
 - 4. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.
 - 5. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.
 - 6. 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 inch to 0.112 inch in Thickness.
 - 7. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 8. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 9. ASTM C1178 – Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

- 10. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 11. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 12. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.
 - 13. GA 214 - Gypsum wallboard finish shall conform to requirements of GA 214, Application and Finishing of Gypsum Panel Products, published by the Gypsum Association, and as specified herein.
 - 14. GA 600 - Gypsum wallboard shall conform to requirements of GA 600 Fire Resistance Design Manual, published by the Gypsum Association.
- B. Qualifications: Installer shall have a minimum 5 years experience in installing and finishing gypsum board.
- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.
 - B. Materials shall be kept dry. Gypsum wallboard shall be neatly stacked flat; avoid sagging and damage to edges, ends, and surfaces.
 - C. Fire-rated materials shall have fire classifications numbers attached and legible.
 - D. Provide all means necessary to protect gypsum board systems before, during, and after installation.
 - E. Gypsum wallboard showing any evidence of water damage shall not be installed. Gypsum wallboard showing evidence of water damage after installation shall be removed and replaced.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Georgia-Pacific, National Gypsum Co., U.S. Gypsum Co., James Hardie, or equal.

2.02 MATERIALS

- A. Gypsum Board Type X (fire-resistant): 5/8 inch thick, 4-foot wide and up to 16-foot long conforming to ASTM C1396 with long edges tapered.

GYPSUM BOARD SYSTEM			
Panel	Fasteners	Joint Tape	Joint Treatment
United States Gyp. Co.: 5/8 inch Sheetrock regular, type X, Firecode Core, or Firecode C Core Gypsum panels, as required by UL design.	Wood: 1 1/4-inch Type W drywall screws. Steel: 1 1/4-inch Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C 475.	Sheetrock Setting Type, Lightweight Setting, Sheetrock Taping, Topping, or All-Purpose, Sheetrock Ready- Mixed Taping, Topping, or All- Purpose, or Sheetrock Lightweight All- Purpose or Ready- Mixed - Plus 3
Georgia-Pacific: 5/8 inch ToughRock regular, Fireguard or Fireguard C gypsum, as required by UL design.	Wood: 1 1/4-inch Type W drywall screws. Steel: 1 1/4-inch Type S or S-12 drywall screw.	Sheetrock paper tape Heavy Duty to meet ASTM C475.	Same as above
National Gypsum Co. 5/8 inch Gold Bond regular, Fire-Shield or Fire-Shield C gypsum wallboard, as required by UL design.	Wood: 1 1/4-inch Type W drywall screws. Steel: 1 1/4-inch Type S or S-12 drywall screw.	ProForm Joint Tape, ProForm Multi-Flex Tape Bead, ProForm Fiberglass Mesh Tape to meet ASTM C 475.	ProForm Multi-Use, ProForm All Purpose, ProForm Lite, ProForm Ultra, ProForm Taping, ProForm Triple-T, ProForm Topping, or ProForm Sta-Smooth, Sta-Smooth Lite, Sta- Smooth HS Joint Compound.

2.03 ACCESSORIES

- A. Metal Trim: Paper-faced metal drywall beads and trim meeting ASTM C1047, as manufactured by USG/Beadex, National Gypsum, or equal. Trim units shall be of size and type to fit gypsum board construction and shall include corner beads, casings, edge trim and other shapes indicated and required.
- B. Mold Resistant Joint Compound: As recommended by board manufacturer, OnePass by CTS Cement Manufacturing Co., or equal, meeting the following requirements:
 1. Minimum score of "10" when tested in accordance with ASTM D3273 and evaluated in accordance with ASTM D3274.
 2. Shall conform to ASTM C475.
- C. Joint Tapes: Shall conform to ASTM C475.
- D. Finishing Materials:
 1. High solids primer shall be SHEETROCK Brand First Coat manufactured by USG or High-build primer by Sherwin Williams, or equal.
 2. Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.

- E. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919.
- F. Fasteners:
 - 1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 ¼-inch long for metal framing,
 - 2. Wood framing:
 - a. Nails: Hot dip, 0.016 inch diameter galvanized nails with 7/16 inch head and 1 ¼-inch minimum length.
 - b. Screws: Type W 1 ¼-inch minimum length for single-layer panels. Screws shall be furnished with a corrosion-resistant treatment.
 - 3. Adhesive: as recommended by board manufacturer and in compliance to ASTM C557.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Metal Trim:
 - 1. Provide corner beads at outside corners and angles, metal casing where gypsum board terminates at uncased openings, metal edge trim where board edges abut horizontal and vertical surfaces of other construction.
 - 2. Install trim in accordance with manufacturer's directions with appropriate joint compound. Install trim in longest practical pieces.
- B. Gypsum Board:
 - 1. Install gypsum board in conformance with ASTM C840.
 - 2. Gypsum board shall be cut by scoring and breaking or by sawing, working from face side. Where board meets projecting surfaces it shall be scribed and neatly cut. Unless conditions require otherwise, gypsum board shall be installed first to ceilings, then to walls. End joints shall occur over a support. Install panels of maximum practical length so a minimum number of end joints occur.
 - 3. End joints shall be staggered and joints on opposite sides of a partition shall be arranged to occur on different studs. Joint layout at openings shall be installed so no end joints will align with edges of openings.
 - 4. Except where specified otherwise, fasteners shall be spaced not less than 3/8 inch from edges and ends of gypsum board. Do not stagger fasteners at adjoining edges and ends.
 - 5. Install gypsum board vertically or horizontal as permitted by specific UL Design at walls. Fasten board with drywall screws spaced not to exceed 8 inches on centers around perimeter of boards and 8 inches on centers on intermediate studs. Space screws at 8 inches on centers along top and bottom runners. Screws shall be driven to provide screwhead penetration just below gypsum board surface without breaking surface paper. Where

electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs.

6. Install gypsum board to ceiling framing with long dimension at right angles to furring channels, or wood framing members, and fasten with specified drywall screws or nails spaced 6 inches to 7 inches on centers across board. Screws or nails shall be not less than 1/2 inch from side joints and 3/8 inch from butt end joints. Abutting end joints shall occur over furring channels and end joints of boards shall be staggered. Support cutouts or openings in ceilings with furring channels.
7. Install access doors, furnished under another section, in correct location, plumb, or level, flush with adjacent construction, and securely fastened to framing.

3.02 TOLERANCES

- A. Install gypsum board flat within 1/8 inch in 10 feet.

3.03 JOINT TREATMENT AND FINISHING

Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 2 separate coats of joint compound	Smooth and free of tool marks and ridges *
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. *

*At completion of specified taping and finishing, install one coat of high solids primer as specified hereafter

- B. Levels: Install tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.
- C. Levels 2 through 5:

1. Install joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.
 2. Provide metal casing beads at all edges of gypsum wallboard, which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Install all exposed joints, trims, and attachments non-apparent following installation of paint or other finishes. If joints and fasteners are visibly apparent, correct defects as required.
 3. Seal raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.
 4. When entire installation is completed, correct and repair broken, dented, scratched or damaged wallboard before installation of finish materials by other trades.
- D. Levels 3 and 4: Install one coat of high solids primer over entire surface.
- E. Level 5: Install one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface.
- 3.04 REQUIRED LEVELS OF FINISH
- A. Unless otherwise indicated or specified, levels of finish required shall be as follows:
1. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas. Taping to be as required for fire rated assemblies.
 2. Level 2: Water-resistant wallboard backing for high moisture areas to be covered with a water resistant surface other than tile, vinyl or paint, i.e stainless steel cladding etc.
 3. Level 3: Backing for vinyl wall covering and adhered acoustic tile. Also, provide where textured finish is indicated.
 4. Level 4: Exposed painted wallboard in classrooms, utility rooms, and similar spaces not requiring Level 5 finish.
 5. Level 5: Exposed, painted wallboard in offices and corridors.
- 3.05 TEXTURE COAT
- A. Spray install texture coat to interior gypsum board surfaces where indicated on Drawings.
- B. Texture coat shall provide a uniform splatter pattern finish with an 80 percent minimum coverage of surface.
- C. Provide protection from spray for interior surfaces of electrical boxes and wiring.
- 3.06 CLEAN-UP
- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.
- 3.07 PROTECTION
- A. Protect Work of this section until Substantial Completion.

END OF SECTION

**SECTION 09 9000
PAINTING AND COATING**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior painting.

B. Following items shall not be painted:

1. Brass valves, chromium or nickel-plated piping and fittings.
2. Boiler control panels and control systems.
3. Fabric connections to fans.
4. Flexible conduit connections to equipment, miscellaneous name plates, stamping, and instruction labels and manufacturer's data.
5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.
6. Flag, floodlight, parking light poles and loudspeaker poles, metal stairs, handrails and chain-link fence with a galvanized finish, unless otherwise noted.
7. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.
8. Hardboard covering on tops and backs of counters and benches.
9. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.
10. Non-metallic walking surfaces unless specifically shown or specified to be painted.

1.02 REGULATORY REQUIREMENTS

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

1.03 SUBMITTALS

- A.** List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer's name,

product name and number, including primers, thinners, and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.

- B. Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit Samples of each color selected for each type of paint accordingly:

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

- C. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE AND HANDLING

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

1.06 SITE CONDITIONS

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

1.07 WARRANTY

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

1.08 MAINTENANCE

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

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

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

HIGH GLOSS	70 and above	EGGSHELL	30 to 47
SEMI-GLOSS	48 to 69	SATIN	15 to 29

2.02 MANUFACTURERS

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

6. Equal.

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 APPLICATION

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

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

4. Spray work is permitted only on radiators, acoustic plaster, masonry and plaster.

I. Where ceilings are specified to be painted, beams, cornices, coves, ornamental features, plaster grilles, etc. shall be included.

J. Ceilings shall be white, including classrooms, storage rooms, offices, arcades, etc. Boiler room and fan room ceiling color shall match adjacent walls.

3.03 CLEANING

A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.

B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.

C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.04 SCHEDULE

A. Interior:

1. Woodwork, Painted: 3 coats.

a. First Coat: As specified in this section under Priming.

b. Second and Third Coats: Interior enamel, semi-gloss or gloss as indicated.

2. Woodwork, Stained and Varnished: 4 coats.

a. First Coat: As specified in this section under Priming.

b. Second, Third and Fourth Coats: Varnish, semi-gloss.

3. Wood Corridor doors: 4 coats.

a. First Coat: As specified in this section under Priming.

b. Second, Third, and Fourth Coats: Varnish, gloss.

4. Other Wood Doors: 4 coats.

a. Varnished or painted as indicated.

b. If varnished, same finish system as painted woodwork, with semi-gloss or gloss finish to match adjacent wall.

5. Miscellaneous Woodwork: 4 coats. Wood items including, but not limited to: stair treads and risers, handrails, rolling ladders, wood base and shoe, chair rails, counter tops and locker room benches.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third and Fourth: Exterior varnish, gloss.
6. Casework: Interior surfaces of casework (except plastic laminate-faced casework) including top, edges and underside of shelving, poles, surfaces of drawers (except fronts), interior surfaces of mailbox pigeonholes, and particle board.
 - a. First Coat: Waterborne stain.
 - b. Second and Third Coats: Satin varnish.
7. Plaster: 4 coats.
 - a. First Coats: Pigmented wall sealer.
 - b. Second coat: Enamel under coater.
 - c. Third and Fourth Coats – Interior enamel, semi-gloss or gloss as indicated.
8. Gypsum Board: 4 coats.
 - a. First Coat: Drywall sealer.
 - b. Second Coat: Enamel under coater.
 - c. Third and Fourth Coats: Interior enamel, semi-gloss or gloss as indicated.
9. Concrete: 3 coats.
 - a. First: Concrete sealer.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
10. Concrete Block: 3 coats.
 - a. First: Concrete block filler.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
11. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.
 - a. First Coat: Metal primer.

- b. Second and Third Coats: Interior gloss enamel, except metal doors and frames which shall be semi-gloss or gloss to match adjacent wall.

B. Exterior:

1. Woodwork: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior house and trim enamel.
2. Wood Doors: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
3. Plaster and Stucco: 3 coats. Flat 100 percent acrylic.
 - a. Prime Coat: Alkali resistant primer/sealer.
 - b. Exterior 100 percent acrylic.
4. Concrete: 3 coats. Flat 100 percent acrylic.
 - a. First Coat: Concrete sealer.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
5. Concrete Block: 3 coats. Flat 100 percent acrylic.
 - a. First Coat: Concrete block filler.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.

C. Mechanical and Electrical Work:

1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.

- a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Interior enamel, semi-gloss or gloss to match adjacent wall or ceiling finish.
 - 2. Insulation and Taping on Pipes and Ducts: 3 coats.
 - a. Finished Rooms:
 - 1) First Coat: Interior waterborne primer.
 - 2) Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.
 - b. Building Exterior:
 - 1) First Coat: Exterior waterborne primer.
 - 2) Second and Third Coats: Exterior gloss enamel.
 - 3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.
- D. Miscellaneous:
- 1. Outside Storage Units (wood or metal): 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
 - 2. Exterior and interior surfaces of storage bins, and potting tables shall have 3 coats of acrylic stain.
 - 3. Wood compost bins shall be finished with 3 coats of acrylic stain.
- 3.05 PROTECTION
- A. Protect the Work of this section until Substantial Completion.
- 3.06 CLEANUP
- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

**SECTION 23 0500
COMMON WORK RESULTS FOR HVAC**

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section provides the basic mechanical requirements that apply to the Work of Division 23.

B. Related Requirements:

1. Division 01: General Requirements.
2. Division 26: Electrical.

1.02 REGULATORY REQUIREMENTS

A. Materials, fabrication, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed industry standards, the manufacturer's recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

1. AMCA - Air Movement and Control Association.
2. ANSI - American National Standards Institute.
3. ASME - American Society of Mechanical Engineers.
 - a. ASME Boiler and Pressure Vessel Code.
 - b. ASME B31 - Code for Pressure Piping.
4. AHRI - Air-Conditioning, Heating, and Refrigeration Institute.
5. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.
6. ASTM - American Society for Testing and Materials.
 - a. ASTM A53 - Specification for Welded and Seamless Pipe.
7. CSA - Canadian Standards Association.
8. FM Global - Factory Mutual Global
9. IAPMO - International Association of Plumbing and Mechanical Officials.
10. NFPA - National Fire Protection Association.
11. OSHA - Occupational Safety and Health Administration.
12. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.
13. UL - Underwriters Laboratories Inc.
14. Intertek (ETL Certification).

Common Work Results for HVAC
23 0500-1

- B. Materials, fabrication, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:
 - 1. CBC, California Building Code, and CMC, California Mechanical Code.
 - a. Latest edition as adopted by the City of Los Angeles, the County of Los Angeles, and the State of California including amendments effective on the Effective Date of the Contract.
 - 2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.
 - 3. OSHA - Occupational Safety and Health Administration.
 - 4. CDPH – California Department of Public Health.
 - 5. SCAQMD - South Coast Air Quality Management District.
- C. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.
- D. Permits and Fees: Refer to the General and Supplementary Conditions.

1.03 SUBMITTALS

- A. Provide submittals in accordance with Section 01 3300: Submittal Procedures and with specific requirements of Division 23 sections, as applicable.
- B. After Architect's approval, the above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.
- C. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project. Drawings prepared in accordance with requirements of Section 01 3113: Project Coordination and Section 01 3300 may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall comply with the requirements of Section 01 3113 and Section 01 3300 and shall indicate at a minimum:
 - 1. Complete system layout of equipment, components, ductwork, and piping, indicating service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger / support locations. All the above items shall be coordinated on the shop drawings according to the requirements of Section 01 3113.
 - 2. Schedule and description of equipment, ductwork, piping, fittings, valves, dampers, and controllers.

1.04 PROJECT RECORD DOCUMENTS

- A. Comply with provisions of Section 01 7700: Contract Closeout.
- B. Project Record Drawings:

1. Provide a complete set of mechanical and control system drawings in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and three sets of prints.
 2. Before Contract Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.
- C. Operation and Maintenance Manuals:
1. Submit operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return manuals. Manuals shall be bound in accordance to Section 01 7700. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in PDF file format.
 2. Contents of Manual:
 - a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.
 - b. Manufacturer's operating instructions including, but not limited to, the following:
 - 1) Identification of components and controls.
 - 2) Pre-start checklist and start-up procedures.
 - 3) Normal operation settings and checklists.
 - 4) Pre-shut down checklist and shut down procedures.
 - 5) Trouble shooting checklist and guidelines.
 - 6) Recommendations for optimum performance.
 - 7) Warnings and safety precautions on improper or hazardous operational procedures or conditions
 - c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 23 that includes the following as a minimum:
 - 1) Manufacturer's model, identification and serial numbers.
 - 2) Exploded view of assembly drawings identifying each component or part with the relevant part number.
 - 3) Directory of manufacturer's representatives, service contractors and part distributors.

- 4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.
 - d. Project Record Drawings: Complete set of mechanical and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.
 - e. Testing, Adjusting, and Balancing reports: Submit as specified in Section 01 4525.
 - f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.
 - g. Los Angeles County industrial waste permits.
 - h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.
 - i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.
- 1.05 COORDINATION
- A. Contract Documents indicate extent and general arrangement of Work under Division 23. Contractor shall coordinate work in accordance with Section 01 3113 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.
 - B. Do not store plastic pipe or materials in direct sunlight.
- 1.07 PRELIMINARY OPERATION
- A. OAR may require any portion of mechanical Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.
 - B. Notify the Project Inspector at least 24 hours in advance of lighting or re-lighting pilots.
- 1.08 TRAINING OF OWNER PERSONNEL
- A. Training of Owner's personnel shall include:
 - 1. A minimum of 8 hours of on-site overview of the overall Mechanical System.

2. Refer to Division 23 sections for specific training on each of the components of the Mechanical System.
 3. A minimum of 8 hours of on-site overview identifying location and function of all Control Valves and Actuator assemblies.
 4. A minimum of 40 hours of (in classroom) software training for a minimum of 20 LAUSD personnel on EMS/BMS if such systems are utilized in the project. Training shall be conducted at control contractor training facility with computer setup for each person attending.
- B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site repair of each component, equipment, or system provided under this Contract.
 - C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.
 - D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by OAR.
 - E. An attendance sheet with the names and signatures of all participants attending the training shall be submitted to the OAR and kept as part of the project documents.
- 1.09 GUARANTEES AND DAMAGE RESPONSIBILITY
- A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.
- B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.
- C. HVAC equipment products from different manufacturers are never identical. Equipment approved as being equal is interpreted as being equivalent in capacity, performance and quality. The dimensions, weight, configuration and utility requirements could be quite different from the equipment used as the basis of design. Due to these differences, additional coordination and adjustments by the Contractor are required. For the equipment to be deemed truly equal, the additional coordination and adjustments by the Contractor should not incur any additional cost to the Owner and any additional labor to the design team.

- D. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. All the additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.
- E. For substitution of materials or products, refer to the General Conditions.

PART 3 – EXECUTION

3.01 SERVICE INTERRUPTIONS, OFF-SITE, GAS AND WATER

- A. Schedule Work so there shall be no service interruptions of existing systems or systems during normal hours of operation of affected systems and facilities.
- B. When service interruptions are mandatory, arrange in advance with the OAR as to time and date of such interruptions.
- C. Systems, which are interrupted, shall be returned back into operation in such manner that they will function as originally intended.

3.02 CUTTING, NOTCHING, AND BACKING

- A. Conform to California Building Code, Title 24, Part 2, for notches and bored holes in wood and for pipes and sleeves embedded in concrete and for cuts in steel, as detailed on structural Drawings.
- B. Where pipes or ducts pass through, or are located within one inch of any construction element, install a resilient pad, 1/2 inch thick minimum, to prevent contact.
- C. Furnish all necessary provisions for recesses, chases, and accesses and provide blocking and backing as necessary for proper reception and installation of mechanical Work.

3.03 LOCATION OF PIPING AND EQUIPMENT

- A. Location of piping, apparatus and equipment as indicated on Drawings is approximate and shall be altered to avoid obstructions, preserve headroom, and provide free and clear openings and passageways.
- B. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.
- C. Pipe in tunnels shall be installed close to one side of tunnel to provide maximum space for passage. Pipe shall not be installed through crawl hole unless otherwise specified or detailed on Drawings.
- D. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.

3.04 TESTS AND TESTING

- A. Tests shall be as required under the applicable sections of Division 23, including this Section.
- B. Tests required by other sections of the Contract Documents include the following:

1. Test and balance of mechanical equipment and systems: Refer to Section 01 4525: Testing, Adjusting, and Balancing for HVAC.
 2. Hydrostatic test of boilers: Refer to Section 01 4525: Testing, Adjusting, and Balancing.
 3. Test of smoke and fire detectors: Refer to Division 26: Electrical.
- C. Additional tests may be required in the case of products, materials, and equipment if:
1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.
 2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.
- D. Piping Tests:
1. Perform tests required to demonstrate that operation of mechanical systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be performed in presence of the Project Inspector, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.
 2. If required tests are not performed, Owner may provide in accordance with the Contract Documents.
 3. Pressure gages furnished in testing shall comply with CPC. Air shall be bled from lines requiring hydrostatic or water tests.
 4. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.
 5. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.
 6. Refrigerant piping may be tested with a halide detector or calibrated electronic testing equipment.
 7. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the Project Inspector.
 8. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.
- E. Pipe Testing Schedule:

System Tested	Test Pressure (psig)	Test With:

Steam piping, hot water heating system piping and chilled water piping	150	Water
Vacuum pump or condensate pump discharge and condensate return piping	150	Water
Refrigeration piping		
R-22	400	Dry nitrogen
R-134a	300	Dry nitrogen
R-401a	300	Dry nitrogen
R-401b	300	Dry nitrogen
R-404a	500	Dry nitrogen
R-407c	500	Dry nitrogen
R-410a	600	Dry nitrogen
R-507	500	Dry nitrogen
Radiant panel piping	150	Water

F. Equipment Performance Assurance Tests:

1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed and recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and materials shall be replaced or repaired as required.
2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.
3. Run-test the equipment after start-up for five consecutive days. Tests shall include operation of heating, ventilating, and air conditioning equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified heating and cooling capacities. If equipment passes, install new filters. If equipment fails, it shall be adjusted and retested until system meets all applicable codes.
4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.
 - a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.
5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.
6. Provide electric energy and fuel required for tests.

Common Work Results for HVAC
23 0500-8

7. Final adjustment to equipment or systems shall meet specified performance requirements.
8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.

G. Specific Coordinated Plan for Test and Balance:

1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.
2. Prior to final test and balance, mechanical equipment and systems shall be operated and tested as indicated in Paragraph 3.04.F above to demonstrate satisfactory overall operation of the installed systems.
3. Immediately before starting tests, air filter media shall be cleaned or renewed. Roll-type filters shall be advanced to provide new clean media. Cleanable type media shall be thoroughly cleaned and re-oiled with new, clean oil as

recommended by manufacturer if they are of viscous impingement type. Disposable type filters shall be replaced with new filters. Replaceable media shall be replaced with new media.

4. An accurate means of measuring air flow and temperatures shall be furnished to balance air supply, return, and exhaust systems so uniform temperatures occur in every room and design airflow is obtained through registers, diffusers, and grilles.
5. Systems shall be adjusted to provide airflows indicated including maximum fresh air and maximum return air. Dampers shall be checked for proper settings and operation. Air and water inlet and leaving temperatures at coils shall be checked. Complete operational data including airflows, room temperatures, fan speeds, motor currents, plenum, and duct static pressures shall be tabulated.
6. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 23 0513: Basic HVAC Materials and Methods.

3.05 NOISE AND VIBRATION REDUCTION

- A. Correct noise or vibration caused by mechanical systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level
- B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required as a result of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

3.06 PROTECTION, CARE AND CLEANING

- A. In addition to storage criteria of the General Conditions, and provisions under Section 01 5000: Construction Facilities and Temporary Controls, the following shall be provided:
1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.
 2. Protect installed Work.
 3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.
 4. Protect covering for bearings, open connections to tanks, pipe coils, pumps, compressors and similar equipment.
 5. Interior of ductwork shall be maintained free of dirt, grit, dust, loose insulation, and other foreign materials.
 6. Air handling equipment shall not be operated until building is cleaned and air filters are installed.
 7. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate, polished bronze or brass Work shall be polished. Glass shall be cleaned inside and out.
 8. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas. Refrigerant piping shall be cleaned as specified.

END OF SECTION

**SECTION 23 0553
HVAC IDENTIFICATION**

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Marking and identification required on mechanical piping systems, ducts, controls, valves, apparatus, etc.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 23 0513: Basic HVAC Materials and Methods.
 - 3. Section 23 0900: HVAC Instrumentation and Controls.
 - 4. Section 23 2013: HVAC Piping.
 - 5. Section 23 3000: Air Distribution.
 - 6. Section 23 8000: Heating, Ventilating and Air Conditioning Equipment.

1.02 SUBMITTALS

- A. Submit in accordance with Division 01 and Section 23 0500: Common Work Results for HVAC.
- B. Submit product data and installation instructions for each item specified.
- C. Submit Samples of materials.

1.03 QUALITY ASSURANCE

- A. Comply with provisions of:
 - 1. Section 23 0500: Common Work Results for HVAC.
 - 2. ANSI/ASME A13.1: Scheme for the Identification of Piping Systems.
 - 3. APWA: Uniform Color Code.

Or

 - 4. IAPMO: Uniform Plumbing Code (UPC).

PART 2 – PRODUCTS

2.01 MATERIALS

HVAC Identification
23 0553-1

- A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, shall be permanently identified.

2.02 VALVES

- A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or model number of each valve in the system, its location, and function.
- B. Install charts in aluminum frame with clear glass front and secure on wall where designated by the Project Inspector.
- C. Bind copies of each chart in operating instructions manual.
- D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.
- E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters, and marked "Danger"); submit Sample tag to the Architect for review.

2.03 INSTRUMENTS AND CONTROLS

- A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.
- B. Identify alarm indicating devices and alarm reset devices by nameplates.
- C. Identify damper motors and automatic valves, flow switches, pressure switches, etc., with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.04 EQUIPMENT

- A. Identify each major piece of equipment with engraved bakelite nameplates permanently affixed to the equipment, indicating the room numbers it services, Equipment identification designation shall be the same to its designation indicated on the "As-Built Drawings". Room numbers in the nameplates shall correspond to the final room numbers.

2.05 ABOVE GRADE PIPE IDENTIFICATION

- A. Identify pipes by means of colored labels with directional flow arrows and identification of the pipe content, in conformance to ANSI/ASME A13.1 or the UPC.
- B. Materials: Precoiled acrylic plastic with clear polyester coating, all-temperature, self-adhering, as manufactured by Brady, Brimar Industries, Seton, Stranco, Inc., or equal.
- C. Size:

Outside Diameter of Pipe or Insulation	Length of Field	Color	Size of Letter

¾ to 1 ¼-inch	8-inch	½-inch
1 ½ to 2-inch	8-inch	¾-inch
2 ½ to 6-inch	12-inch	1 ¼-inch"
8 to 10-inch	24-inch	2 ½-inch"
over 10-inch	32-inch	3 ½-inch

D. Colors: As indicated in schedule.

E. Locations:

1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where contained material is obvious due to its connection to fixtures (such as faucets, water closets, etc.).
2. Near each valve and branch connection in such accessible piping.
3. At each pipe passage through wall or floor.
4. At not more than 20 feet spacing on straight pipe run between bands required in 2 and 3 above.
5. At each change in direction.

F. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels, as required by the Project Inspector.

G. Schedule:

Content of Pipe	Legend	Background Color	Lettering Color
Steam	Steam	Yellow	Black
Steam condensate	Stm. Cond.	Yellow	Black
Chilled water supply	Chill water supply	Green	White
Chilled water return	Chill water return	Green	White
Instrument air	Inst. Air	Green	White
Heating hot water supply	Heating hot water supply	Yellow	Black
Heating hot water return	Heating hot water return	Yellow	Black
Air conditioning condensation drain	A/C condensate drain	Green	White

2.06 UNDERGROUND PIPE

A. Detectable Marking Tape:

1. Provide and install detectable marking tape along buried piping. Tape shall be specifically manufactured for marking and locating underground utilities with electronic equipment. Tape shall be acid and alkali resistant, and manufactured with integral wires or foil backing, encased with protective cladding. Tape shall be a minimum of two inches in width.
2. Manufacturer: Reef Industries, Inc., Advantage Brands, Inc., Northtown Company, Mutual Industries, Inc., or equal.
3. Detectable marking tape shall be color-coded per APWA Color Code:
 - a. Yellow: Steam.
 - b. Blue: Water.
 - c. Red: Electric power lines, cables, conduit and lighting cables. By Division 26.
 - d. Orange: Communication, alarm or signal cables. By Divisions 26 and 27.

B. Tracer Wire:

1. Solid copper wire type THWN, 12 AWG gage, with heat and moisture resistant insulation.

2.07 IDENTIFICATION OF AIR CONDITIONING EQUIPMENT

- A. Provide identification markers to locate air conditioning equipment above T-bar ceilings. Install 3/4 inch to one inch diameter colored self-adhesive dots to T-bar ceiling grid indicating point of access. The following identification markers shall be recorded on the project record documents:
1. Fire Damper and Combination Fire/Smoke Fire Damper: Red.
 2. Manual Volume Dampers, Relief Dampers, Motorized Volume Dampers: Blue.
 - a. Supply air: Full dot.
 - b. Return air: Half dot.
 3. Fan coil unit: Green.
 4. Filter Location if separate from fan coil: Yellow.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Correct detrimental conditions prior to commencing the Work of this Section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.

- B. Place tracer wire on top of non-metal utility lines allowing some slack. Do not wrap tracer wire around pipe. Fasten tracer wire in place at approximately 10 feet on centers with non-metal ties.
- C. Install underground detectable pipe marking tape continuously buried 8 to 10 inches above the buried utility pipe. Wrap tape on pipe risers up to a height of 12 inches above grade.

3.02 CLEANUP

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

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. TAB for the following:

1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.
 - c. Induction-unit systems.
2. Balancing Hydronic Piping Systems:
 - a. Variable-flow hydronic systems.
 - b. Primary-secondary hydronic systems.
3. Balancing steam systems.
4. TAB Equipment:
 - a. Heat exchangers.
 - b. Motors.
 - c. Heat-transfer coils.
5. TAB existing systems and equipment.
6. Duct leakage tests.
7. Control system verification.
8. Testing plan and balancing procedure to be provided with submittal.

1.2 QUALITY ASSURANCE

- A. TAB Agent Qualifications: AABC certified.**

1.3 EXECUTION

- A. Tolerances: Plus or minus 10 percent of design values.**

Testing, Adjusting, and Balancing for HVAC
23 0593-1

Spec No.: 7701

- B. Inspections: Random checks by TAB firm to verify final TAB report.
- C. Additional Tests: Random tests within 90 days of completing TAB to verify balance conditions and seasonal tests.

END OF SECTION

**SECTION 23 0700
HVAC INSULATION**

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Condensate-drain piping from air conditioning equipment.
2. Vacuum and condensate pump discharge lines over 50 feet in length.
3. High and low temperature equipment.
4. Refrigerant piping.

B. Related Requirements:

1. Division 01: General Requirements.
2. Section 23 0500: Common Work Results for HVAC.
3. Section 23 0513: Basic HVAC Materials and Methods.
4. Section 23 0553: Mechanical Identification.
5. Section 23 2013: HVAC Piping.
6. Section 23 3000: Air Distribution.
7. Section 23 5000: Central Heating Equipment.
8. Section 23 8000: Heating, Ventilating and Air Conditioning Equipment.

1.02 REFERENCES

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

1. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.
2. ASTM C302 - Standard Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation.
3. ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
4. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

5. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
6. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
7. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
8. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
9. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.
10. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
12. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
13. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Underwriters Laboratories Inc.:

1. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.
2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems .
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
3. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Submit in accordance with Division 01 and Section 23 0500: Common Work Results for HVAC.

1. Complete material list of items to be furnished and installed under this Section.
2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.

3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating materials.
4. Display sample cutaway sections.
5. Manufacturer's recommended method of installation procedures, which will become part of this Section.

1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer and Installer, Materials, Fabrication, Execution, and Standard of Quality: Comply with provisions stated under Section 23 0500: Common Work Results for HVAC and Section 23 0513: Basic HVAC Materials and Methods.
- B. Test Ratings:
 1. Comply with provisions stated under Section 23 0500 and 23 0513 with emphasis on ASTM E84, NFPA 255, or UL 723. ASTM C167, ASTM C302, UL label or listing of satisfactory test results from the National Institute of Standards and Technology, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.
 2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread index of not more than 25 and smoke developed rating not exceeding 50.
 3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.
 4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.
- C. Regulatory Requirements: Insulation furnished and installed under this Section shall conform to the requirements of the California Building Code Parts 4, Mechanical Code, Part 5, Plumbing Code and Part 6, Energy Code.
- D. All chemically based products such as sealers, primers, fillers, adhesives, etc. shall meet the California air quality regulations.

1.05 PRODUCT HANDLING

- A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 23 0500: Common Work Results for HVAC and 23 0513: Basic HVAC Materials and Methods.

PART 2 – PRODUCTSMATERIALS

- A. General:

1. Piping insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.
2. Piping insulating material shall be furnished with thickness indicated in Table 1, unless otherwise noted on the drawings, and shall furnish thermal resistance in the range of R-4.0 to 4.6 in accordance with inch at 75 degrees F. For any other value of R, insulation thickness shall be calculated accordingly and submitted for review.
3. Asbestos in any quantity in insulating material is not permitted.
4. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:
 - a. Nylon anchors for installing insulation to ducts or equipment.
 - b. Treated wood blocks.
5. Flame-proofing treatments subject to moisture damage are not permitted.

TABLE 1 - MINIMUM PIPING INSULATION THICKNESS (1)

Insulation Thickness Required (in inches)
Space Heating Systems (Steam, Steam Condensate and Hot Water)

Piping System Type	Temp. Range (degrees F)	Run- outs up to 2 (2)	1 and less	1.25 to 2	2.5 to 4	5 to 6	8 and larger
Hi Pres Temp	Above 350	1.5	2.5	2.5	3.0	3.5	3.5
Med Pres Temp	251 to 305	1.5	2.0	2.5	2.5	3.5	3.5
Low Pres Temp	201 to 250	1.0	1.5	1.5	2.0	2.0	3.5
Hot Water	Up to 200	0.5	1.5	1.5	1.5	1.5	1.5
Steam Cond.	-	0.5	1.0	1.0	1.0	1.5	1.5
Service Water Heating Systems (recirculating, piping supply and return)							
Hot Water	Up to 180	0.5	1.0	1.0	1.5	1.5	1.5
Space Cooling Systems (Chilled water, Brine and Refrigerant)							
Chilled Water	40-60	0.5	0.5	0.75	1.0	1.0	1.0
Refrigerant/Brine	Below 40	1.0	1.0	1.5	1.5	1.5	1.5
Condensate Drain	1/2 inch Minimum insulation thickness.	0.5	0.5	0.5	0.5	0.5	0.5
From Air Conditioning Equipment:	Insulate condensate drain lines within building, in room, inside walls and above ceilings.	0.5	0.5	0.5	0.5	0.5	0.5

NOTES: (1) For piping exposed to ambient temperatures, increase thickness by 0.5 inch.

HVAC Insulation
23 0700-4

(2) Run-outs to individual terminal units, not exceeding 12 feet in length.

- B. Lagging Adhesives: Shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Insulation finished with canvas shall be provided with laps adhered in accordance to manufacturer's recommendation. A finish coat of same material shall be applied to entire outer surface of lagging cloth at coverage specified by manufacturer.
- C. Canvas Jackets: Furnish 6 ounce in accordance with square foot minimum, 48 by 48 thread count canvas jacketing.
- D. Insulation Jackets:
 - 1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing as basis of design, or Pabco, RPR, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16 inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping. A minimum thickness of 0.020 shall be provided on tanks, equipment, and heat exchangers.
 - 2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of ½ inch to 8 inches shall be provided with Childers aluminum Ell-Jacs insulation covers as basis of design, or Pabco, RPR, or equal, manufactured from 1100 aluminum alloy of 0.024 inch thickness. Insulated elbows with a nominal pipe size of 10 inches to 18 inches shall be provided with Childers 4-piece aluminum Ell-Jacs as basis of design, or Pabco, RPR, or equal.
 - 3. Tees, Flanges, and Valve Insulation in Conjunction with Aluminum Jacketing: Furnish Childers Aluminum Special Fabrications Insulation Covers as manufactured by Childers Products Company, Pabco, RPR, or equal.
- E. Adhesives: Adhesives shall be water based, UL Classified, meet the requirements of NFPA 90A and NFPA 90B, have been tested according to relevant ASTM
- F. requirements, and be acceptable to the State Fire Marshal. Name, type and method of installation shall be submitted for review.
- G. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns Manville, Knauf Insulation, Speedline, or equal.

2.02 SPACE HEATING PIPING SYSTEM

- A. General: Insulate steam, steam condensate return, and hot water space heating supply and return, including valves, strainers and fittings with insulation thickness as indicated on Table 1.
- B. Materials:
 - 1. Classes of Insulation:

HVAC Insulation
23 0700-5

- a. Class A: Calcium silicate molded pipe insulation, suitable for service temperature up to 1200 degrees F, ASTM C533; Johns Manville Thermo-12 Gold, or equal. Fittings: diatomaceous silica thermal insulating cement.
- b. Class B: Glass fiber molded pipe insulation suitable for service temperatures up to 850 degrees F. Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4.0 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Knauf Redi-Klad 1000, Owens Corning FIBERGLAS Pipe Insulation SSL II-ASJ, or equal.
- c. Class C: Flexible open-cell melamine (foam insulation) suitable for service temperature -150 degrees F to 400 degrees F. Thermal conductivity at 75 degrees F, K = 0.26. Pipe insulation, one-piece pre-formed, laminated to heavy non-reinforced PVC jacket, with locking track, factory installed to jacket, to snap insulation and jacket onto pipe. Similar to TechLite 079 Series as manufactured by Accessible Products Co., or equal. Installation shall comply with manufacturers recommendations.
- d. Class D: Mineral fiber pipe insulation suitable for service temperatures up to 1,200 degrees F. Pipe insulation shall be one-piece, preformed up to 3 inches thickness, and provide a minimum R factor of 4.0 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire-retardant vapor barrier jacket. Pipe insulation shall be 8 pounds in accordance with cubic foot density by Roxul Techton 1200, Fibrex COREPLUS 1200, Industrial Insulation Group, LLC (IIG) MinWool-1200, or equal.

2. Locations and Class of Insulation Required:

TABLE 2 – LOCATIONS AND CLASS OF INSULATION REQUIRED

<u>LOCATION</u>	<u>CLASS OF INSULATION</u>
Boiler and Mechanical Equipment Room	A, B, C, or D
All Other Locations	A, B, C, or D

3. Fittings on indoor piping shall be covered with flush, hand-wrapped Class A, B, C, or D insulation, to match the adjoining pipe insulation and covered with polyvinyl chloride fitting covers: Zeston 2000 25/50 by Johns Manville, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal.
4. Adhesive: Fibrous Adhesive to bond calcium silicate to itself and non-porous surfaces.

2.03 COOLING PIPING SYSTEM INSULATION

- A. General: Insulate chilled water supply and return piping and refrigerant piping.
- B. Materials:

1. Classes of Insulation:
 - a. Class A: Expanded polystyrene pipe insulation, self-extinguishing type, either molded or extruded; Dow Chemical Co. STYROFOAM, ITW Insulation Systems XPS PIB, Foam-Control EPS, or equal.
 - b. Class B: Glass fiber molded pipe insulation ASTM C547. Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, CertainTeed Snap-On, Owens Corning FIBERGLAS SSL II-ASJ, or equal.
 - c. Class C: Expanded (foamed) urethane (polyurethane) or polyisocyanurate pipe insulation of self-extinguishing type molded or fabricated, Dyplast Products, LLC ISO-C1/2.0, ITW Trymer, Specialty Products & Insulation Co. Polyisocyanurate Pipe Insulation, Armacell Armalok, or equal.
 - d. Class D: Foamed plastic pipe insulation, self-extinguishing type, ASTM C534 Type 1 - tubular. Pipe insulation shall be one-piece preformed, flexible tubing type and provide a maximum K factor of 0.28 at 75 degrees F mean temperature. Pipe insulation shall be Armacell Armaflex, Aeroflex Aerocel, Rubatex INSUL-TUBE 180, or equal.
2. Locations and Class of Insulation Required: For thickness required, refer to Table 1 of this Section.

TABLE 3 – SERVICE, LOCATION AND CLASS OF INSULATION REQUIRED

<u>SERVICE</u>	<u>LOCATION</u>	<u>CLASS OF INSULATION</u>
Condensate drains from air conditioning equipment	Indoors at all locations including above ceilings and between stud walls	D
Refrigerant suction Liquid line as required	All locations except underground	D
All other piping, except underground	All locations except underground	A, B, C

3. Adhesives:
 - a. Polystyrene adhesives: Synthetic rubber and resin adhesives specifically designed to adhere extruded and expanded rigid polystyrene and urethane insulation to themselves and to other porous and non-porous substrates.
 - b. Vapor barrier laps and penetrations: Furnish protective coating and lagging adhesive on butt joints of foil-faced vapor barriers, and where pins and staples puncture facings.

2.04 HIGH TEMPERATURE EQUIPMENT INSULATION

HVAC Insulation
23 0700-7

A. General:

1. Insulate heat exchangers, hot water storage tanks, flash tanks, boiler breechings, and similar equipment operating at elevated temperatures up to 450 degrees F or 850 degrees F with high temperature insulation, jacket and material.
2. Do not insulate condensate receivers, hot water expansion tanks, hot water pump casings, chemical feeders, and factory insulated boilers.

B. Materials:

1. Equipment insulation shall be 1-1/2 inches minimum fiberglass board or insulating blocks, or molded calcium silicate, ASTM C533-Type I, Johns Manville Thermo-12 Gold or 1000 Series Spin-Glas, Knauf Insulation Board, Owens Corning Fiberglas Series 700 or Fiberglas Insul-Quick, or equal.
2. Boiler breeching insulation shall be same as above except 2 inches thick minimum.
3. Adhesive: For calcium silicate, furnish fibrous adhesive of sodium silicate base.

2.05 LOW TEMPERATURE EQUIPMENT INSULATION

A. General:

1. Insulate water chillers, heat exchangers, air eliminators and similar equipment operating at reduced surface temperatures.
2. Do not insulate chilled water expansion tanks, and chemical feeders.

B. Materials:

1. Expanded polystyrene, 2 inches thick, self-extinguishing type, Dow Chemical Co.'s STYROFOAM, Owens Corning FOAMULAR, Foam-Control EPS, or equal, or 1-1/2 inches thick expanded urethane (polyurethane) or polyisocyanurate, self-extinguishing type, Dyplast Products, LLC ISO-C1/2.0, ITW Trymer, Specialty Products & Insulation Co. Polyisocyanurate Pipe Insulation, or equal.
2. Canvas Jackets: 6 ounce in accordance with square foot minimum.
3. Vapor Barrier Laps and Penetrations: Furnish protective coating and lagging adhesive on butt joints of foil-faced vapor barriers and where pins and staples puncture facings.

2.06 DUCTWORK AND PLENUM INSULATION

A. General: Insulate ductwork and plenums with not less than the amount of insulation tabulated in Table 4, unless noted otherwise on the drawings. Insulation may be omitted under the following conditions:

1. Exposed return air ductwork in conditioned space.

2. Return air ductwork between wall studs inside an interior wall.

TABLE 4 - INSULATION OF DUCTS AND PLENUM

INSULATION TYPES

<u>Duct Location</u>	<u>Heating and Cooling</u>
Exposed interior supply ductwork	DW-1
On roof, and exterior of building	DW-2
In walls, within floor/ ceiling spaces	F-1
Hot and cold plenums	F-2 or DW-1
Attics, Garages, and Crawl Spaces, within unconditioned space or in basement	F-3

B. Insulation Types:

1. DW-1: 1 inch thick insulation sandwiched inside double-wall type ducts and fittings. Duct joints shall be waterproofed.
2. DW-2: 2 inch thick insulation sandwiched inside double-wall type ducts and fittings. Duct joints shall be waterproofed.
3. F-1: 1 ½ inch blanket fiberglass, factory-laminated with all-service jacket vapor barrier.
4. F-2: 2 inch blanket fiberglass, factory-laminated with all-service jacket vapor barrier.
5. F-3: 3 inch blanket fiberglass, factory-laminated with all-service jacket vapor barrier.

C. Notes:

1. Minimum insulation provided shall be as required by the current California Mechanical Code Title 24 for the most restrictive condition.
2. Refer to the materials indicated in this section for external insulation.
3. Insulation lining the duct interior is not permitted.

D. Materials:

1. Fire-Resistive Insulation Materials and Coatings: Submit State Fire Marshal pre-approved materials only.
2. Adhesives: See Paragraph 2.01.E for applicable products.
3. External Insulation: Provide glass fiber blankets that are factory-laminated with Foil Reinforced Kraft (FRK) vapor barrier facing; Johns Manville Microlite, Owens-Corning SOFTR Duct Wrap, Knauf Insulation Friendly Feel

HVAC Insulation
23 0700-9

Duct Wrap, or equal. Provide a minimum installed R value as required by the CEC Building Energy Efficiency Standards; but not less than scheduled below:

TABLE 5
INSULATION OF DUCTS AND PLENUM INSTALLED
THERMAL RESISTANCE R VALUES

Type	Labeled Thickness (in inches)	Installed R Value (hr.ft ² .°F/Btu)
F-1	1 ½	4.2
F-2	2	5.6
F-3	3	8.3
DW-1	1	4.2
DW-2	2	5.6

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.
- B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers, supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.
- D. Pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where fire-stop or fire-safing materials are required.
- E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.
- F. Insulation shall not be installed in the following locations unless otherwise noted:
 - 1. On vacuum return lines less than 50 feet long.
 - 2. On unions, flanged connections or valve handles.
 - 3. Over edges of any manhole, clean-out hole, clean-out plug, access door or opening to a fire damper, so as to restrict opening or identification of access.
 - 4. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

HVAC Insulation
23 0700-10

3.02 INSTALLATION OF HEATING PIPING SYSTEM INSULATION

- A. General: Space heating hot water, domestic hot water, tempered water supply and return piping and condensate return piping, after having been tested, shall be cleaned and insulated.
- B. Application: Insulate condensate return piping, hot water heating supply and return piping, steam and steam condensate piping, domestic hot water supply and return, including tempered supply and return piping in accordance with manufacturer's instructions and as specified herein.
 - 1. Install insulation on valve bodies up to valve bonnet. Fill void in saddles, in accordance with Section 23 0513: Basic HVAC Materials and Methods, with insulation and seal joints.
 - 2. Install insulating material to fittings, valves, and strainers and smooth to thickness of adjacent covering. Leave strainer clean-out plugs accessible. Covers fabricated from polyvinyl chloride shall be furnished.
- C. Insulation Jackets in Exposed Indoor Locations:
 - 1. Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams 1-1/2 inches minimum. Finish entire jacket with coating of undiluted adhesive.
 - 2. Equivalent factory applied pre-sized, glass fiber reinforced, or glass fiber jackets may be furnished. Seal jacket seams with adhesive in accordance with manufacturer's instructions.
 - 3. Johns Manville Zeston 2000, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal, fitting covers may be furnished, with molded or segmented insulation equal to specified insulation applied to fittings. Secure covers in accordance with manufacturer's instructions.
 - 4. In addition to above requirements, cover exposed insulated piping within a distance of 8 feet above floors with 26 gage galvanized steel jacket. Omit jacket in areas accessible only to maintenance personnel, such as mechanical equipment rooms, utility corridors, accessible pipe tunnels and manholes.
- D. Concealed Indoor Locations: Cover insulation over fittings, valves, and strainers with canvas. Provide pipe insulation with factory or field applied standard jacket of 4 ounce minimum canvas, fiberglass cloth, or glass fiber reinforced jacket. Seal jacket laps with adhesive in accordance with manufacturer's instructions.
- E. Exposed Outdoors: In addition to canvas or fiberglass cloth cover, pipe insulation exposed to weather shall be provided with an additional 0.016 inches thick aluminum jacket with 2 inches lap connected with one inch hem overlap joint located on side of pipe and turned down to shed water. Jacket shall be strapped 12 inches on center with 1/2 inches wide stainless steel strapping and wing seals. Aluminum jacket shall be mitered to fit fittings.

3.03 INSTALLATION OF COOLING PIPING SYSTEM INSULATION

- A. General: Chilled water supply and return piping, refrigerant piping and condensate drain lines, after having been tested, shall be cleaned and insulated.
- B. Application: Insulation on chilled water lines, refrigerant suction lines and liquid lines, if indicated, and air conditioner interior drain lines shall be jacketed with fire-resistant vapor barrier of laminated aluminum foil consisting of 2 plies with glass-yarn reinforcing. Jacket joints shall be lapped and sealed with an approved adhesive. Insulation shall be secured with aluminum bands not less than 0.005 inch thick by 3/4 inches wide, spaced not over 12 inches on centers, or as recommended by manufacturer.
 - 1. Longitudinal Seams: Butt hinged sections of covering tightly together and seal down jacket flap with adhesive, or with factory-applied, self-sealing lap with pressure-sensitive sealer protected with release paper.
 - 2. End Joints: Wrap joint with a 3-inch wide (minimum) self-sealing tape.
 - 3. Fittings and Valves: Fittings and valves shall be covered with same material of same thickness as pipe insulation, sealed with an approved, vapor-sealing tape or compound and covered with Johns Manville Zeston polyvinyl-chloride cover, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal.
 - 4. Pipe hangers shall be insulated or attached to pipe by an insulating insert, butted between adjoining insulation sections.
- C. Additional Jackets:
 - 1. Exposed Indoor Insulation: Cover with 26 gage galvanized sheet metal jacket to 8 feet above floors, except in mechanical equipment rooms and accessible pipe tunnels.
 - 2. Exposed Outdoor Insulation: In addition to canvas or fiberglass cloth cover, provide 0.016 inch thick aluminum jacket with one inch wide aluminum bands and seals. Install appropriate jackets on valves and fittings.

3.04 INSTALLATION OF HIGH TEMPERATURE EQUIPMENT INSULATION

- A. General: Provide insulation over parts of heat exchangers and similar equipment requiring insulation having removable head or sections.
- B. Application:
 - 1. Equipment: Securely tie insulation on with copper clad wire. Install tack coat weather barrier coating at a thickness specified by manufacturer. While tack coat is still wet, a layer of 10 open weave glass cloth membrane shall be embedded with fabric seams overlapped a minimum of 2 inches. Install a finish coat fully covering membrane at coverage rate specified by manufacturer.
 - 2. Boiler Breechings: Wire securely V-rib wire lath, 3/4 inches minimum depth to boiler breechings, connections and stacks inside boiler rooms, and cover with insulation and jacket as specified above.

3. Manholes and Hand Holes: Maintain accessible by beveling off permanent insulation around manhole and cover manhole plate with removable blanket.

3.05 INSTALLATION OF LOW-TEMPERATURE EQUIPMENT INSULATION

- A. General: Provide removable sections of insulation over parts of chillers and similar equipment requiring insulation and having removable heads or sections.
- B. Exterior surfaces of chilled water system expansion tanks and chilled water pumps shall be insulated with not less than 2 inches thick expanded polystyrene or fiberglass, as specified. Fill spaces between insulation and equipment with granulated polystyrene or urethane to eliminate voids. Insulation shall be secured with metal band, and covered with one inch, 20 gage hexagon galvanized mesh and $\frac{1}{4}$ inches thick insulating cement troweled smooth. Cement surface shall then be covered with 0.002 inches aluminum foil applied smoothly and secured with suitable adhesive, and a layer of 6-oz. canvas.
- C. Coat joints of polyurethane insulation with neoprene based contact adhesive. Adhesives furnished shall be approved by insulation manufacturer. Fill and seal external voids and seams with non-shrinking sealant.
- D. Canvas Jacket: Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams a minimum of 1 $\frac{1}{2}$ inches. Finish entire surface of canvas jacket with one brush coat of diluted lagging adhesive, Childers CP-50A, Foster 30-36, Mon-Eco Industries (MEI) Eco-Lag Adhesive, or equal, and heavy final coat of undiluted adhesive.

3.06 INSTALLATION OF DUCTWORK AND PLENUM INSULATION

- A. External Covering:
 1. Before installing duct insulation, sheet metal ducts shall be clean, dry, and tightly sealed at joints and seams, inspected pressure tested, and accepted by LAUSD OAR/ Inspector.
 2. Duct exterior insulation shall be firmly wrapped around ductwork with joints lapped a minimum of 2 inches. Insulation shall be securely fastened with 18 gage copper-lined steel wire, or 16 gage soft-annealed galvanized wire spaced approximately 12 inches on centers and at loose ends, presenting a neat and workmanlike appearance. Where duct width is such that wiring will not fasten insulation firmly against duct an adhesive shall be furnished to fasten insulation to duct with wiring being installed at ends of insulation segment.
 3. Insulation on ductwork transporting conditioned air, both supply and return, and outside air intake ducts when pre-conditioned, shall be furnished with a factory-applied, fire-resistant vapor barrier.
 4. Exposed Ducts or Plenum:
 - a. Install insulation to ducts or plenum furnished with butt joints, without voids and with adhesive over entire surface of duct. Cover insulation with canvas jacket, fastened tightly to insulation with lagging adhesive. Install 2 finish coats of undiluted adhesive.

- b. When installing jacket, finished covering shall be even and level, without humps, with constant diameters on round ducts maintained.

3.07 CLEANUP

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

3.08 PROTECTION

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

END OF SECTION

**SECTION 23 2013
ABOVE GROUND HVAC PIPING**

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Above ground piping systems for heating, ventilating, and air conditioning systems. Systems include but are not limited to the following:
 - 1. Chilled Water System.
 - 2. Condenser Water.
 - 3. Hot Water Heating System.
 - 4. Low-pressure Steam.
 - 5. Miscellaneous Piping Required for Equipment of this Section.
 - 6. Connections to Exterior Utilities.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 23 0500: Common Work Results for HVAC.
 - 3. Section 23 0513: Basic HVAC Materials and Methods.
 - 4. Section 23 0548: HVAC Sound, Vibration and Seismic Control.
 - 5. Section 23 0553: HVAC Identification.
 - 6. Section 23 0700: HVAC Insulation.
 - 7. Section 23 0900: HVAC Instrumentation and Controls.
 - 8. Section 23 2016: Underground HVAC Piping.
 - 9. Section 23 2500: HVAC Water Treatment.
 - 10. Section 23 6416: Oil Lubricated Centrifugal Water Chillers.
 - 11. Section 23 6418: Oil Free Centrifugal Water Chillers.
 - 12. Section 23 6423: Scroll Water Chillers.
 - 13. Section 23 6426: Rotary-Screw Water Chillers.
 - 14. Section 23 6428: Air-Cooled Rotary Screw Chillers.

Above Ground HVAC Piping
23 2013-1

15. Section 23 6500: Cooling Towers.
16. Section 31 2323: Excavation and Fill for Utilities.

1.02 REFERENCES

A. ASTM International:

1. ASTM A47 – Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A105 - Standard Specification for Carbon Steel Forgings for Piping Applications.
4. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
5. ASTM A181 - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping.
6. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
7. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
8. ASTM B32 - Standard Specification for Solder Metal.
9. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
10. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

B. American National Standard Institute (ANSI) and The American Society for Mechanical Engineers (ASME):

1. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose, Inch.
2. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
3. ANSI/ASME B16.9 - Factory Made Wrought Butt-welding Fittings.
4. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

1.03 SUBMITTALS

- ### A.
- Provide submittals in accordance with Division 01, Sections 23 0500, Common Work Results for HVAC, and 23 0513, Basic HVAC Materials and Methods.

Above Ground HVAC Piping
23 2013-2

- B. Provide Shop Drawings with dimensioned piping layout and details of expansion loops, elbows, anchor points, pipe supports, building entry points and other pertinent information required to verify layout. Indicate systems, pipe material and sizes, show location of devices such as pumps, unions, joints, valves, flow measuring devices, fittings, flexible connectors, and location of hangers and supports, intent and type of materials are in accordance with this Section. Prefabricated pipe units shall be dimensioned and numbered to fit actual Work with field verified conditions prior to start of factory fabrication.
- C. Submit manufacturer's Product Data for products listed on Part 2 of this section, demonstrating conformance to specified standards and specification requirements.

1.04 QUALITY ASSURANCE

- A. Comply with applicable codes and referenced standards: ASTM, ASME/ANSI, CPC (California Plumbing Code), CMC (California Mechanical Code).
- B. Qualifications of Manufacturer: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.

1.06 COORDINATION

- A. Coordinate related and adjacent activities in accordance with Section 01 3113, Project Coordination.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Low Pressure Steam Systems:
 - 1. Pipe: ASTM A53 Schedule 40 Type S-seamless Grade B black steel. Pipes and fittings shall be properly marked with schedule number, ASTM number, manufacturer, etcetera, in accordance with ASTM requirements.
 - 2. Fittings:
 - a. 2-inch and smaller: 150 pound standard weight, black, malleable iron, threaded. Material conforms to ASTM A47; threads, ANSI/ASME B1.20.1 malleable iron, threaded.
 - b. 2 ½-inch and larger: Standard weight, seamless steel; welding fittings and flanges ASTM A234 and ANSI/ASME B16.9 for fittings and ASTM A181 or ASTM A105 for flanges.

Above Ground HVAC Piping
23 2013-3

3. Joints: Refer to Section 23 0513, Basic HVAC Materials and Methods, for threaded pipe joints and welded connections.
 4. Unions on piping 2-inch Diameter and Smaller: 150 pound malleable iron, ground joint pattern, brass to iron seat, ASME B16.39 or ASTM A47, grade 32510, black.
 5. Flanges on Piping 2 ½-inch Diameter and Larger:
 - a. 150 pound forged steel, weld neck or slip-on, ASTM A181 and ANSI/ASME B16.5. Furnish flat faced flanges against equipment with flat faced flanges.
 - b. Flange gaskets: Mineral fiber, 1/16 inch thick, equivalent to Garlock Style 9800, Durlon 8300, or equal.
 - c. Bolting materials: Carbon steel heavy hex bolts and nuts, ASTM A307, type B.
- B. Chilled Water, Heating Hot Water and Condenser Water:
1. Pipe:
 - a. 2-inch and smaller: Standard weight, seamless copper, type L hard drawn, ASTM B88.
 - b. 2 ½-inches and larger: Schedule 40 seamless black steel, ASTM A53, grade B, type S. Pipes and fittings shall be properly marked with schedule number, ASTM number, manufacturer, etcetera, in accordance with ASTM requirements.
 2. Fittings:
 - a. 2-inch and smaller: Wrought solder-type copper, in accordance with ANSI/ASME B16.22.
 - b. 2 ½-inch and larger:
 - 1) 150 pound forged steel, weld neck or slip-on, ASTM A181 and ANSI/ASME B16.5. Furnish flat faced flanges against equipment with flat faced flanges.
 - 2) Flange gaskets: Mineral fiber, 1/16 inch thick, equivalent to Garlock Style 9800, Durlon 8300, or equal.
 - 3) Bolting materials: Carbon steel heavy hex bolts and nuts, ASTM A307, type B.
 3. Joints:
 - a. 2-inch and smaller: 95 percent tin and 5 percent antimony solder with non-acid flux type flux, ASTM B32, grade 95TA.

- b. 2 ½-inch and larger: Standard weight, seamless steel; welding fittings and flanges ASTM A234 and ANSI/ASME B16.9 for fittings and ASTM A181 or ASTM A105 for flanges.
- 4. Unions:
 - a. 2-inch and smaller Wrought solder type, copper to copper; furnish ground joint cast bronze low lead unions, NIBCO 733, where copper connects to steel.
 - b. 2 ½-inch and larger: Refer to Section 23 0513, Basic HVAC Materials and Methods, for threaded pipe joints and welded connections.

C. Valves: Chilled Water and Condenser Water.

- 1. Ball Valves, 2-inch and Smaller: Shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems, chrome plated brass ball, and threaded or solder ends with extended solder cups.

<u>Threaded</u>	<u>Solder</u>
Stockham T-285-FB-R-70 (full port)	Stockham S-285-FB-R-70 (full port)
Crane 9301	Crane 9302
Worcester 44-11-RT-SE	Worcester 44-11-RT-TE
Jamesbury 351T	---
Apollo 70-100	Apollo 70-200
Equal	

- 2. Gate Valves, 2-inch and Smaller:

Class 125, body and bonnet ASTM B62. Cast bronze composition. Threaded or soldered ends. Solid disc, copper-silicon alloy stem, brass packing gland. Threaded ends: Stockham B-100 (RS) or B103 (NRS), Crane 428 or 438, Hammond IB640 (RS) or IB645 (NRS), or equal. Soldered ends: Stockham B104 (NRS) or B108 (RS), Milwaukee 115 (NRS) or 149 (RS), NIBCO S-113 (NRS) or S-111 (RS), or equal.

- 3. Gate Valves, 2 ½-inch and Larger:

Class 125 iron body, bronze mounted, ASTM A126, class B cast iron, flanged ends with Teflon impregnated packing and 2-piece packing glass.

OSY RS	NRS	
Stockham	G-623	G-612
Crane	465 1/2	461
Powell	1793	1787
Hammond	IR1140	IR 1138
Equal		

- 4. Butterfly Valves: 150 psi tight shut-off, ASTM A126.

- a. Body: Lug type, ASTM A126iron.
 - b. Disc:

- 1) For motorized valves: 304 Stainless Steel.
- 2) For Manual Valves: Cadmium-plated ductile, iron for chilled water (bronze, or aluminum bronze for condenser water).

c. Stem:

- 1) For motorized valves: 416 Stainless Steel.
- 2) For manual Valves: Solid one-piece, 304 or 316 or 410 stainless steel.

d. Seat and O-rings: EPDM O-ring.

e. Upper and lower stem bearings: Bronze or reinforced Teflon.

f. Operators:

- 1) Valves 6-inch and smaller: Bray Series 21 as basis of design or Center Line, Stockham, Crane, Belimo, Nibco or equal, with lever handle, or Electric Actuator and disc position indicator.
- 2) Valves 8-inch and larger: Bray Series 21 as basis of design or Center Line, Stockham, Crane, Belimo, Nibco or equal, manual gear operator and disc position indicator, or Electric Actuator.

g. Manufacturers: Bray, Milwaukee, Center Line, Stockham, Crane, DeZURIK, Belimo, Nibco or equal.

5. Check Valves, 2-inch and Smaller:

Shall be of class 125, threaded or solder ends, body and caps shall be of ASTM B62 cast bronze composition, swing type disc.

Threaded

Stockham B-319Y
Hammond IB 904
Crane 37
Powell 578

Solder

Stockham B-309Y
Hammond IB 912
Crane 1707S
Powell 1825

Equal

- a) Class 150 valves meeting above Specifications may be furnished where pressure requires: Stockham B-321, NIBCO T-433-B, Milwaukee 515, or equal, threaded.

6. Check Valves, 2 ½-inch and Larger:

Shall be iron body, bronze mounted with body and cap conforming to ASTM A126, class B, cast iron, flanged ends, swing type disc.

Hammond

IR1124

Above Ground HVAC Piping
23 2013-6

Stockham	G-931
Crane	373
Powell	559
Equal	

7. Alternative Check Valves, 2 ½-inch and Larger:

Shall be class 125/250, iron body, bronze mounted, wafer check valves, with ends designed for flanged type connection, aluminum bronze disc, EPDM seats, 316 stainless steel torsion spring, and hinge pin.

Stockham WG-961
Center Line Series 800
Duo-Chek K12 HAP
Marlin M125 HZDSF
Equal

8. Non-Slam Check Valves (Pump Discharge):

Semi-steel body, bronze trim, top and bottom center guide, stainless steel spring and 125 pound flanged ends. Miller Manufacturing No. 162 or equivalent by Williams-Hager, Val-Matic Valve & Manufacturing Corp., or equal.

9. Air Vents: Spirotherm model Spirovent as basis of design or Amtrol, Watts, Dole, Bell and Gossett, or equal, manual type, of size for proper venting. Install at high points of systems.

D. Valves: Heating Hot Water, and Low-pressure Steam System.

1. Gate Valves, 2-inch and Smaller: Shall be of class 150 with body and union bonnet of ASTM B62 cast bronze composition, threaded or solder ends, solid disc, copper-silicon stem, brass packing gland, Teflon-impregnated packing, and malleable handwheel.

<u>Threaded</u>	<u>Solder</u>
Stockham B-120 (RS)	
Hammond IB629	Hammond IB648
Crane 431UB	
Powell 2714	

Equal

2. Ball Valves, 2-inch and Smaller: Shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems, chrome plated brass ball, and threaded or solder ends with extended solder cups.

<u>Threaded</u>	<u>Solder</u>
Stockham T-285-FB-R-70 (full port)	Stockham S-285-FB-R-70 (full port)
Crane 9301	Crane 9302
Worcester 44-11-RT-SE	Worcester 44-11-RT-TE
Jamesbury 351T	---
Apollo 70-100	Apollo 70-200

Above Ground HVAC Piping
23 2013-7

Equal

3. Gate Valves, 2 ½-inch and Larger: Shall be class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A126, class B, cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly.

	OS & Y	NRS
Stockham	G-623	G-612
Hammond	IR1140	IR1138
Crane	465 1/2	461
Powell	1793	1787
Equal		

4. Check Valves, 2-inch and Smaller: Shall be class 150 with body and cap of ASTM B62 bronze composition and threaded ends. Class 150 valves shall have lift-type non-metallic disc and union caps, and are to be furnished in lines with globe valves.

- a) For backflow prevention in lines with gate valves, Y-pattern valves with swing-type disc may be furnished.

Stockham B-322B
Crane 27TF
Equal

- b) For class 150 service, threaded ends:

Stockham B-321 Crane 137
NIBCO T-433-B
Equal

- c) For class 200 Service, threaded ends:

Hammond IB944 Crane 36
Stockham B-345 Powell 560
Equal

5. Check Valves, 2 ½-inch and Larger: Shall be iron body, bronze mounted, with body and cap conforming to ASTM A126, class B, cast iron, flanged ends, and swing-type disc.

Crane 373 Hammond IR1124
Powell 559 Stockham G-931
Equal

- a) Alternative for above listed check valves shall be class 125/250 iron body, bronze mounted, wafer check valve, with ends designed for flanged type connection, aluminum bronze disc, EPDM seats, 316 stainless steel torsion spring, and hinge pin.

Center Line Series 800 Hammond IR9253
Marlin M125 HZDSF Duo-Chek G12 HAP
Stockham WG-961 Equal

6. Automatic valves controlling steam to a coil in a hot water tank shall be single seated type. When these valves are installed on a gravity return system, they shall be two position type (i.e. completely open or completely closed).

Above Ground HVAC Piping
23 2013-8

7. Valves on steam mains in boiler rooms shall be angle globe valves and be set to hold no condensate.
- E. Electric Motor Operated Valves: Belimo, Bray or equal.
- F. Valves, General:
 1. Handles or hand wheels on valves shall be removable and, unless specified to be of loose key type, shall be securely fastened to their stems. Valve hand wheels, except those on radiator valves, shall be of steel, brass, or cast iron.
 2. Boiler shut-off valves and valves on steam mains installed more than 6 feet above floor, shall be furnished with chain wheels and chains to within 6 feet of floor. Chains shall be free hanging and in a position to permit operation of valve from floor. When pulleys or extensions are required to locate these chains in such a position, furnish, and install said pulleys or extensions as required to provide a satisfactory operating installation. Extensions over one foot long shall be furnished with a supported outboard bearing.
 3. Furnish and install chains or wire rope with required accessories to open safety valves from boiler room floor.
 4. Radiator or convector valves shall be corner or angle type with composition handles, composition renewable discs, packing gland, union nut on tailpiece, unless otherwise specified. If exposed, they shall have a finished or plated exterior.
 5. Temperature Control Valves: Refer to Section 23 0513.
 6. Flow Control Valves: Refer to Section 23 0513.
- G. Flow Measuring Devices: Refer to Section 23 0513.
- H. Strainers: Refer to Section 23 0513.
- I. Condensate Drain Piping, from Air Handling Units: Refer to Section 22 0513.
- J. Indirect Drains, Relief Valve Discharge Piping and Air Vent Discharge Piping:
 1. Pipe: Type L tempered copper water tube.
 2. Fittings: Wrought copper. Refer to Section 23 0513. Furnish copper to threaded international pipe size adapters at threaded connections.
 3. Joints:
 - a. Soldered: 95/5 solder.
- K. Insulation: Refer to Section 23 0700.
- L. Pipe Anchors, Pipe Guides, Expansion and Contraction Devices:
 1. Piping subject to expansion or contraction shall be fastened in a manner permitting strains to be evenly distributed and alleviated by swing joints or

Above Ground HVAC Piping
23 2013-9

expansion loops or joints. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping.

2. Provide anchors in heating or cooling piping system, to restrain and control direction of movement for expansion or contraction in piping system.
3. Provide guides at specific locations in heating or cooling piping system in conjunction with slip or bellows type expansion joint.
4. When coils or unit housings are shock or vibration isolated, provide piping flexible metal connector not less than 10 inches long whether they are indicated on the Drawings or not.

M. Flexible Metal Connectors:

1. Provide vibration elimination flexible metal connectors on chilled and hot water supply and return piping where rigidly supported pipes connects to unit housing coil attachments and units are supported by vibration isolators.
2. Schedule Numbers:
 - a. FMC-1: Corrugated bronze metal hose with outer bronze braid in tubular sheath of woven metal wires. Connector with female copper tube ends for copper piping. Metraflex model BBS, Unisource Style UPCB-BRSW, Microflex, or equal.
 - b. FMC-2: Corrugated stainless steel metal hose with outer stainless steel braid in tubular sheath of woven metal wires. Connector with male pipe threads (NPT) for threaded piping. Metraflex model SST, Unisource Style UPCS-MMT, Microflex, or equal.
 - c. FMC-3: Corrugated Bronze Metal Hose with outer bronze braid in tubular sheath of woven metal wires. Connector with female copper tubes ends for refrigeration piping. Metraflex model RAF, Unisource VIB, Anaconda Vibration Eliminators, or equal.

N. Refer to Sections 23 0513for following:

1. Pipe Hangers and Supports.
2. Pipe Sleeves and Plates.
3. Pipe Flashings.
4. Relief Valves.
5. Thermometers.
6. Pressure Gages.
7. Pressure and Temperature Test Plugs.
8. Access Panels.

Above Ground HVAC Piping
23 2013-10

9. Dielectric Fittings.
10. Expansion Tanks.
11. Condensate Traps.

2.02 EQUIPMENT

A. Furnish centrifugal pumps capable of delivering rated capacity against total dynamic head as indicated on schedule and as specified for following:

1. Condenser Water Pump:
 - a. Single stage base mounted, vertical split case, cast iron, bronze fitted construction. Pump impeller, casing bearings, capable of being serviced without disturbing piping connections.
 - b. Impeller, enclosed type, hydraulically and dynamically balanced and keyed to shaft and secured with a suitable locknut.
 - c. Pump shall employ a mechanical seal, with a carbon seal ring and ceramic (or tungsten carbide) seat. A shaft sleeve furnished under complete wetted area of mechanical seal.
 - d. Bearing frame assembly of pumps fitted with oil lubricated bronze journal bearings and a hardened alloy steel shaft.
 - e. Flexible coupling to absorb torsion vibration between pumps and motor.
 - f. Motor: Resilient mounted, furnished with oil lubricated journal bearings.
 - g. Pump: Factory tested, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. A set of installation instructions to be furnished with pump at time of shipment.
 - h. Acceptable manufacturers: Taco, Armstrong, Paco, Bell and Gossett, Grundfos, Weinman, or equal.
2. Chilled Water Pumps:
 - a. Horizontal, split case, fitted same as above, or end suction similar to that indicated below.
 - b. Frame mounted with flexible coupling on shaft.
 - c. Manufacturers: Taco, Armstrong, Paco Bell and Gossett, Weinman, or equal.
3. Hot Water Pumps: End suction, centrifugal, vertical split case, cast iron base mounted. Taco, Armstrong, Paco type L, Bell and Gossett, Grundfos, Weinman, or equal.

Above Ground HVAC Piping
23 2013-11

4. Boiler Feed Pump: Two-stage, bronze fitted mechanical seals, double suction, regenerative turbine type with cast iron housing. Construction shall permit disassembly of pump without disturbing suction and discharge pipe connections. Pump impeller shall be bronze, mounted on stainless steel shaft supported by ball bearing on each side of pump casing. Pump shall be directly connected with a flexible coupling to an open drip-proof motor and mounted on a common steel base. Pump shall be operated from a boiler water level controller mounted on boiler. Pump shall be Roth Pump Co., Skidmore, Aurora, or equal. Pumps shall be electrically interlocked to 24-hour day/night operating boiler controls.

PART 3 – EXECUTION

3.01 PIPING INSTALLATION

- A. Install piping systems for chilled water, condenser water, and hot water and steam heating systems, condensate drains, and miscellaneous piping required for equipment, as indicated on Drawings and as specified in Section 23 0513.
- B. All piping and fittings size 2-1/2" and larger shall be welded – No Grooved type fitting is allowed except at chiller barrel and condenser barrel connections.

3.02 WATER PUMPS

- A. Install water pumps as indicated on Drawings and as specified unless otherwise noted. Provide vibration isolation and flexible pipe connections as specified in Sections 23 0548 and 23 0513.
- B. Floor mounted pumps shall be provided with a 4-inch high concrete base. For base, refer to Section 03 3000: Cast-In-Place Concrete.
- C. Provide leveling and alignment for base mounted pumps before and after installation.
- D. Provide suction diffuser for pumps where space constraints exist.
- E. Install pumps to allow complete removal without having to dismantle connecting pipes.
- F. Piping shall be supported from building structure to prevent any strain on pump casing. In-line pumps shall be separately supported from piping by furnishing pump manufacturer's specialized spring support kit, if available; pump shall not be rigidly supported.
- G. Flanged connections shall be provided on pumps with a discharge connection larger than 2 inches. Smaller sizes may be furnished with threaded connections. Except for special guided inlet fittings, inlets to suction side of pumps shall be a minimum of 10 diameters of straight pipe free from strainers, valves or fittings. On discharge side, minimum length of uninterrupted length of straight pipe shall be 5 diameters.
- H. Pumps, one horsepower or larger, shall be installed with required pump connections for noise and vibration isolation and not to compensate for misalignment.

3.03 AIR AND DIRT ELIMINATION

Above Ground HVAC Piping
23 2013-12

- A. Heating and chilled water piping and steam or hot water heating and/or cooling equipment shall be installed in a manner so that air will be eliminated from lines or equipment during operation. Pitch pipe lines as specified in Section 23 0513.
- B. Manual air valve shall be installed at each high point of chilled or hot water circulating lines, on each chilled water or hot water heating unit unless unit can vent through outlet connection. Refer to valves as specified under Section 23 0513.
- C. Air vent valves shall be installed with drains to nearest floor sink or outside building.
- D. Air/Dirt separators shall be installed on all hot water heating system, chilled water system, and closed loop fluid cooler system. Units shall be furnished with internal copper coalescing medium to facilitate maximum air and dirt separation and suppress turbulence. Units shall be furnished with galvanized steel strainer and stainless steel collector tube. Provide integral high capacity float actuated air vent at top fitting of tank. Furnish cast iron float actuated air vent rated at 150 psig, threaded to the top of the fitting. Unit shall be furnished with the bottom of the vessel extended for dirt separation with the system connection nozzles equidistant from the top and bottom of the vessel and shall include a blowdown connection and valve. Refer to Air/Dirt separators as specified under Section 23 0513.
- E. Acceptable manufacturers: Spirotherm, Bell and Gossett, Wessels, or equal.

3.04 CHEMICAL POT FEEDER

- A. Provide a chemical pot feeder in each of chilled water and hot water systems as specified in Section 23 2500: HVAC Water Treatment.

3.05 CONDENSER WATER TREATMENT

- A. Provide condenser water treatment as specified in Section 23 2500: HVAC Water Treatment.

3.06 CLEANUP

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

3.07 PROTECTION

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

END OF SECTION

SECTION 23 8000
HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Air conditioning and air handling equipment including but not limited to:

1. Single Packaged Air Conditioning Units.
2. Split System Air Conditioning Units.
3. Split System Heat Pump Units.
4. Fans.

B. Related Requirements:

1. Division 01: General Requirements.
2. Section 07 6000: Flashing and Sheet Metal.
3. Section 22 1000: Plumbing.
4. Section 23 0500: Common Work Results for HVAC.
5. Section 23 0513: Basic HVAC Materials and Methods.
6. Section 23 0548: HVAC Sound, Vibration and Seismic Control.
7. Section 23 0900: HVAC Instrumentation and Controls.
8. Section 23 0923: Environmental Control and Energy Management System.
9. Section 23 2013: HVAC Piping.
10. Section 23 3000: Air Distribution.
11. Section 23 5000: Central Heating Equipment.
12. Section 23 6416: Oil Lubricated Centrifugal Water Chillers.
13. Section 23 6418: Oil Free Centrifugal Water Chillers.
14. Section 23 6423: Scroll Water Chillers.
15. Section 23 6426: Rotary-Screw Water Chillers.
16. Section 23 6428: Air-Cooled Rotary Screw Chillers.
17. Section 23 6500: Cooling Towers.

Heating, Ventilating and Air Conditioning Equipment
23 8000-1

1.02 DESIGN REQUIREMENTS

- A. Work of this Section is based on HVAC equipment units indicated as Basis of Design in Part 2 of this Section. Products from different HVAC equipment manufacturers listed are never identical, although equivalent in capacity, performance and quality. In the cases where dimensions, weight, configuration and utility requirements differ from the products used as a basis of design, the Contractor, at no additional cost to the Owner, shall coordinate and submit, for Architect review, revisions to the design.

1.03 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 23 0500: Common Work Results for HVAC.
- B. For products listed that are not the basis of design, submit the following in addition to above requirements:
 - 1. Title 24 Calculations: Replace HVAC unit values in calculation files provided by the Architect and submit for review.

1.04 QUALITY ASSURANCE

- A. Provide submittals in accordance with Section 23 0500: Common Work Results for HVAC.

1.05 PROJECT RECORD DOCUMENTS

- A. Provide Owner instructions on equipment operation and maintenance procedures, as indicated in Section 23 0500: Common Work Results for HVAC.

1.06 WARRANTY

- A. Compressors shall be provided with manufacturer's five year warranty, replacement only.
- B. Manufacturer shall warrant parts, except heat exchangers, for a period of five years.
- C. Heat exchangers shall be provided with manufacturer's ten year warranty, replacement only.

PART 2 – PRODUCTS

2.01 EQUIPMENT

- A. Capacities of air conditioning equipment indicated on Drawings are net capacities actually required. Standard catalog ratings shall be adjusted to actual Project site environmental conditions.

2.02 AIR CONDITIONING UNITS - AC (2 Tons-25 Tons)

- A. Manufacturers: Carrier, Trane, York, Lennox, American Standard Heating & Air Conditioning, or equal.

1. Basis of Design: [Carrier] [Trane] [York] [Lennox] [American Standard Heating & Air Conditioning]
- B. Furnish packaged air conditioning unit with gas heating for roof top installation. Unit shall be self-contained, completely factory assembled, with complete internal wiring and controls. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Unit shall be field configurable for down-flow or horizontal discharge. Cooling and heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.
- C. Quality Assurance:
 1. Units shall be CSA certified for outdoor installation.
 2. Cooling capacity shall be rated in accordance with current ANSI/AHRI Standard 210/240.
 3. Unit shall be UL listed and designed to conform to ANSI/ASHRAE Standard 15 Safety Code for Mechanical Refrigeration and ANSI Z21.47-2016/CSA 2.3-2016 Gas
 4. ANSI/NFPA 70: National Electrical Code.
 5. Unit cooling efficiency EER/SEER ratings shall comply with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
 6. Unit heating efficiencies AFUE ratings shall comply with current CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
 7. Unit shall comply with California Maximum Oxides of Nitrogen (NOX) Emission Regulations and current SCAQMD regulations.
 8. The unit roof curbs shall conform to NRCA standards.
 9. Insulation and adhesive shall meet NFPA 90A and 90B requirements for flame spread and smoke generation.
 10. Unit casing shall be capable of withstanding ASTM B117 500-hour salt spray test.
 11. Each unit shall be run tested at factory per ANSI/ASHRAE 37 and provided with a certificate indicating tested pressures, amperages, dates, and inspector.
- D. Unit Cabinet:
 1. Galvanized steel with baked enamel finish on external surfaces that are exposed to weather.
 2. Interior surfaces exposed to conditioned and return air streams shall be insulated with a minimum ½-inch thick, 1 pound density foil-faced cleanable insulation.

Heating, Ventilating and Air Conditioning Equipment
23 8000-3

3. Cabinet top cover shall be of one piece construction or where seams exist, shall be double hemmed and gasket sealed.
4. Cabinet panels shall be hinged access panels for filter, compressors, evaporator fan, control box and heat section areas. Each panel shall use multiple quarter-turn latches. Each major external hinged access panel shall be permanently attached to rooftop unit. Panels shall also include tiebacks.
5. Return air filters shall be accessible through a hinged access panel and be on a slide-out track using standard size filters.
6. Holes shall be provided in base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.
7. Unit shall have a factory-installed internally sloped condensate drain pan, providing a minimum 3/4-inch-14 NPT connection to prevent standing water from accumulating. Pan shall be fabricated of high impact polycarbonate material, epoxy powder coated steel or stainless steel and shall slide out for cleaning or maintenance. An alternate vertical drain (3/4-inch NPT) connection shall also be available. Drain pans shall conform to ASHRAE 62 self-draining provisions.

E. Compressors:

1. Unit shall be furnished with single (If single compressor is used, then it shall be Two Stage type) or multiple fully hermetic scroll compressors with internal vibration isolators.
2. Dual electrically and mechanically independent refrigerant circuits for 7.5 tons and above.
3. Compressors shall be provided with service access valves.
4. Compressor motors shall be cooled by refrigerant passing through motor windings.
5. Compressors shall be provided with line break thermal and current overload protection.
6. Compressors shall be provided with crankcase heaters, internal high-pressure and temperature protection.
7. Compressors on unit rated 90,000 BTU and below shall be of two stage types.

F. Refrigerant circuit components:

1. Thermostatic expansion valve (TXV) with removable power element.
2. Refrigerant strainer.
3. Service gage connections on suction, discharge, and liquid lines.
4. Solid core refrigerant filter driers.

G. Evaporator and Condenser Coils: Standard Evaporator and condenser coils shall be furnished with:

1. Acceptable Condenser Coils:

- a. Copper-tube, Aluminum-fin coil, with liquid subcooler. Internally enhanced OD seamless copper tubing mechanically bonded to aluminum fins in combination with a factory applied Corrosion-Resistant Epoxy Coating. Provide Protective Hail Guard.
- b. Spine Fin condenser coil shall be continuously wrapped, corrosion resistant aluminum with minimum brazed joints. This coil is 3/8 inch OD seamless aluminum tubing glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on four sides by louvered panels.
- c. Coil shall be air-cooled Micro-Channel Heat Exchanger Technology (MCHX) and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a factory applied Corrosion-Resistant Epoxy Coating. Provide protective Hail Guard.

2. Evaporator coils

- a. Aluminum plate fins mechanically bonded to enhanced copper tubes with joints brazed.
- b. Tube sheet openings shall be belled to prevent tube wear.
- c. Evaporator coil shall be of full-face active design.
- d. Dual circuit models shall have face-split type evaporator coil.

H. Evaporator and Condenser Coils shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints with a factory applied Corrosion-Resistant Epoxy Coating utilizing dipping process. Provide protective Hail Guard.

I. Fans and Motors:

1. Evaporator fan shall be a dynamically balanced, double width, double inlet, forward curved centrifugal type, fabricated of steel with a corrosion resistant finish that was tested and rated in accordance with AMCA requirements.
2. Evaporator fans shall be direct-driven for the AC Units with the cooling capacity of less than or equal to 48,000 BTU/H, and belt or direct-driven for the AC units with the cooling capacity of greater than 48,000 BTU/H, as indicated on Drawings.
3. Direct drive fans shall be provided with ECM motor.

4. Evaporator blower and motor shall have permanently lubricated, factory-sealed ball bearings and automatic-reset thermal overload protection.
5. Belt drive shall include an adjustable-pitch motor pulley. Belt drive fans shall accommodate from 0.6 inch to 1.6-inch external static pressure without changing drives or motors.
6. Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged vertically. Condenser fan motor shall be high efficiency or ECM type motor and provide cooling operation down to 25 degrees F outdoor temperature with automatic-reset thermal overload protection.

J. Heating Section:

1. Induced draft combustion type with energy saving direct spark ignition system, redundant main gas valve, and 2-stage heat.
2. The heat exchanger shall be of tubular section type fabricated of a minimum of 20 gage steel coated with a nominal 1.2 mil aluminum-silicone alloy or 20 gage type 409 stainless steel, including stainless steel tubes, vestibule plate.
3. Burners shall be of in-shot type fabricated of aluminum coated steel or stainless steel.
4. Gas piping shall enter unit cabinet at a single location.
5. Integrated Controls shall provide following:
 - a. Timed control of evaporator fan functioning and burner ignition,
 - b. Anti-cycle protection for gas heat operation (after one cycle on high temperature limit switch and one cycle on flame rollout switch).
 - c. Diagnostic information.
6. Induced draft motor shall be provided with permanently lubricated, sealed bearings and inherent automatic reset thermal overload protection.

K. Controls, Safeties and Diagnostic Points:

1. Unit Controls: Unit shall be furnished with self-contained, network capable and ready direct digital controls.
 - a. Controls shall be factory-installed.
 - b. Controls shall operate with zone control systems.
 - c. Controls shall furnish built-in diagnostics for thermostat commands for staged heating and cooling, evaporator-fan operation, and economizer operation.
 - d. Controls shall be furnished with a 5-minute time delay between modes of operation.

Heating, Ventilating and Air Conditioning Equipment
23 8000-6

- e. Control circuit shall be protected by a fuse on 24-V transformer side.
 - f. Control shall incorporate passive infrared detection for sensing occupancy in space serve.
2. Compressor high temperature, high current, internal overloads, internal thermostat.
- a. Compressor reverse rotation protection.
 - b. Loss-of-charge/low-pressure switch.
 - c. Freeze-protection thermostat, evaporator coil.
 - d. High-pressure switch. The lockout protection shall be easily disconnected at control board, if necessary.
 - e. Internal relief valve.
 - f. Anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.
3. Heating section shall be provided with following minimum protections:
- a. High-temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame rollout switch.
 - d. Flame proving controls.
 - e. Redundant main gas valve.
 - f. Heating controls shall consist of:
 - 1) 2-stage automatic combination gas valve.
 - 2) Pressure regulator.
 - 3) Electric spark intermittent ignition system or hot surface ignition system.
 - 4) Time delay fan control.
4. Operating Characteristics:
- a. Unit shall be capable of starting and operating at 125 degrees F ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 360 at plus or minus 10 percent voltage.
 - b. Compressor with standard controls shall be capable of operation down to 25 degrees F ambient outdoor temperature.

5. EMS Diagnostic Points: Provide diagnostic points for units, including those at projects with no EMS.
 - a. Supply air temperature.
 - b. Return air temperature.
 - c. Space temperature.
 - d. Outdoor air temperature.
 - e. Filter status.
 - f. Fan status.
 - g. Compressor status.
 - h. Economizer damper current position.
 - i. Other diagnostic point required by current Title 24, automated fault detection and diagnostics (FDD).

L. Filter Section:

1. Provide filter section with factory-installed low-velocity, throwaway 2-inch thick high capacity, MERV 8 Class 2, or equal, filters of commercially available sizes unless noted otherwise on the drawings.
2. Filter face velocity shall not exceed 300 fpm at nominal airflows.
3. Filter section shall allow installation of standard size air filter.
4. Return air filters shall be accessible through a hinged access panel using standard size filters.

M. 100 Percent Outdoor Air Economizer:

1. Provide 100 percent outdoor air economizers as indicated on drawings.
2. Gear-driven integrated economizers.
3. Integrated integral-modulating type capable of simultaneous economizer and compressor operation.
4. Furnish hardware and controls to provide cooling with outdoor air.
5. Low-leakage dampers not to exceed 3 percent leakage, at one inch wg pressure differential (variable sliding economizer).
6. Barometric relief damper. Damper shall close upon unit shutoff.
7. Differential temperature and enthalpy controller unless indicated otherwise on drawings.

8. Provide units with centrifugal power exhaust controlled by a pressure sensor in space or outdoor air measurement and tracking as indicated on drawings. The controller shall modulate VFD in centrifugal power exhaust to maintain a pressure differential of 0.03 inch of water between indoor and atmospheric pressure. Furnish field wiring to power exhaust and install tubing in space. Provide other accessories as required to comply with UL or ETL requirements.
9. Base Rail: Factory installed on both horizontal and down-flow units.
10. Dampers Using Electronic Actuators:
 - a. Manufacturer: Belimo, Honeywell, Invensys, Johnson Controls, or equal.
 - b. Size for torque required for damper seal at load conditions.
 - c. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
 - d. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent damage to the actuator during a stall condition.
 - e. Fail-Safe Operation: Mechanical, spring-return mechanism.
 - f. Power Requirements: Maximum of 10 VA at 24 VAC or 8 W at 24 VDC.
 - g. Proportional Actuators shall be fully programmable. Control input, position feedback and running time shall be factory or field programmable by use of external computer software. Diagnostic feedback shall provide indications of hunting or oscillation, mechanical overload and mechanical travel. Programming shall be through EEPROM without the use of actuator mounted switches.
 - h. Actuators shall be listed by ISO 9001, ULC, and CSA C22.2.
- N. Furnish programmable digital thermostat with following features for single zone units that are not provided with variable volume and variable temperature type controls:
 1. 7-day time clock.
 2. Heat, cool, automatic changeover.
 3. Occupied/unoccupied modes.
 4. Dry contact switch for input from an external device such as a central time clock, occupancy sensor or a telephone activated device.
 5. Remote sensors. School Areas that could be subject to vandalism or accidental impact damage such as Gymnasiums, Auditoriums, Multipurpose Rooms, Corridors, and Lobbies shall be provided with thermostats with remote return air duct or room sensors. Verify remote location of sensors and thermostats with Architect.

6. Robertshaw, Honeywell, Johnson Controls, Carrier, Schneider Electric, Viconics, or equal with built-in occupancy sensor. Refer to Section 23 0900 for areas with zone damper controls.

O. Demand Controlled Ventilation:

1. Units with 100 percent outdoor air economizers shall be provided with Indoor Air Quality (CO₂) Sensor and Accessory Electronic Expansion Boards.
2. The unit shall have ability to provide demand ventilation indoor-air quality (IAQ) control through economizer when provided with an indoor air quality sensor and accessory expansion board.
3. The IAQ sensor shall be wall mounted unless otherwise indicated on Drawings. The set point shall be adjustable.
4. The IAQ sensor shall be powered through unit. If not, required control transformer shall be provided by manufacturer. Coordinate power requirements and location with Division 26.
5. The IAQ sensor shall provide a 0-10 VDC signal to expansion board.

- P. Parts Availability: Submit proof in writing that majority (minimum 80 percent) of the replacements parts are commonly available and not proprietary. Also, submit proof in writing that a local parts sales and service facility exists, where replacement parts will be warehoused in quantity. Guarantee timely availability for parts that are proprietary.

2.03. COOLING ONLY FAN COIL UNITS AND CONDENSING UNITS

- A. Manufacturer: Carrier, Trane, York, Lennox, American Standard Heating & Air Conditioning, or equal.

1. Basis of Design: [Carrier] [Trane] [York] [Lennox] [American Standard Heating & Air Conditioning]

- B. FCU and CU: Furnish fan coil unit (FCU) and condensing unit (CU), split type, air-cooled, roof or ground for ducted connections or free blow. Units shall be air-cooled condensing unit/direct expansion fan coil combinations. Condensing unit outdoor section shall be factory assembled with a direct-drive condenser fans with horizontal or vertical air discharge, scroll-type compressor, refrigerant coil, fan motors, pre-wired control panel and a holding charge of a non-ozone depleting refrigerant. Contractor shall provide additional refrigerant for extended lines. Indoor fan coil unit shall be furnished with horizontal discharge and will include evaporator coil, fan and motor, condensate pan with drain, thermal expansion valve, pre-wired control panel and remote thermostat control. Unit shall provide an EER/SEER complying with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings. UL listed and rated at AHRI Standard 210/240.

- C. Nominal unit cooling, heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.

D. Condenser coils:

1. Acceptable Condenser Coils:

Heating, Ventilating and Air Conditioning Equipment
23 8000-10

- a. Copper-tube, aluminum-fin coil, with liquid subcooler. Internally enhanced 3/8-inch outside diameter, seamless copper tubing mechanically bonded to aluminum fins with a factory applied Corrosion-Resistant Epoxy Coating. Provide Protective Hail Guard.
 - b. Spine Fin™ condenser coil shall be continuously wrapped, corrosion resistant aluminum with minimum brazed joints. This coil is 3/8 inch outside diameter seamless aluminum tubing glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on four sides by louvered panels.
 - c. Coil shall be air-cooled Micro-Channel heat exchanger technology (MCHX) and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a factory applied Corrosion-Resistant Epoxy Coating. Provide Protective Hail Guard.
- E. Condenser Coils shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints. Coated coils are not acceptable.
- F. Evaporator coils:
 - 1. Aluminum plate fins mechanically bonded to enhanced copper tubes with joints brazed.
 - 2. Tube sheet openings shall be belled to prevent tube wear.
 - 3. Evaporator coil shall be of full-face active design. Dual circuit models shall have face-split type evaporator coil.
- G. Evaporator Coils at locations within two miles from ocean shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints. Coated coils are not acceptable.
- H. Condenser Fan and Motors: Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged horizontally or vertically. Condenser fan motors shall be high efficiency or ECM type motor.
- I. Cabinets: Fabricated of galvanized steel, bonderized and finished with baked enamel.
- J. Compressor shall be serviceable two stage or variable speed type hermetic scroll. Compressor shall be furnished with access valves and shall be installed on rubber isolators to reduce sound vibration. It shall be furnished with high and low-pressure protection. Each horizontal discharge condensing unit shall be furnished with a factory installed suction accumulator. Field installed accumulators are not permitted. It shall be furnished with high and low-pressure protection, brass external vapor supply line service valves, vapor return line service valves with service gage

connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, filter drier, pressure relief, liquid line solenoid valves, thermostatic expansion valves, and a holding charge of refrigerant.

- K. Controls: Compressor motor assembly shall be protected with high and low-pressure switches, internal overloads, internal thermostat, internal relief valve, and anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle. Unit shall incorporate an automatic relay for indoor circulating air blower. Control panel shall be pre-wired in unit casing. The control circuit shall incorporate a manual reset safety circuit to render refrigerant system (compressor and outdoor air motor) inoperative should there be a loss of airflow or refrigerant. Units shall also be furnished with automatic condenser-fan motor protection, high condensing temperature protection, compressor motor current and temperature overload protection, high pressure relief, and condenser fan failure protection.
- L. EMS Diagnostic Points:
 - 1. Supply air temperature.
 - 2. Return air temperature.
 - 3. Space temperature.
 - 4. Filter status.
 - 5. Fan status.
 - 6. Compressor status.
 - 7. Other diagnostic point required by current Title 24, automated fault detection and diagnostics (FDD).
- M. Low Ambient Operation: Head pressure control shall be provided for operation at outside air temperature below 45 degrees F.
- N. Filters: Filters shall be 2-inch standard size high capacity replaceable media type MERV 8, or equal, installed in an external 2-inch rack filter section and complete with an access door.
- O. An in-line filter-drier shall be provided with equipment and shall be installed at Project site.
- P. Economizer: Provide on units with capacities equal to, or larger than 4.5 tons nominal capacity, when the Prescriptive Compliance approach is utilized to comply with Energy Efficiency Standards or where necessary to achieve CHPS pre-requisite and/or CHPS building flush-out compliance. Economizer shall be manufacturer's standard; factory furnished and field installed. Economizer control shall maintain a fixed supply air temperature during free cooling operation by providing full modulation of operable outside and return air dampers.

2.04. HEAT PUMP AND FAN COIL UNITS

- A. Manufacturer: Carrier, Trane, York, Lennox, American Standard Heating & Air Conditioning, or equal.

1. Basis of Design: [Carrier] [Trane] [York] [Lennox] [American Standard Heating & Air Conditioning]
- B. HP and matching indoor fan coil unit and condenser unit: Furnish heat pump, split type, air-cooled, roof or ground installation with ducted connections or free blow. Units shall be air-cooled heat pump/direct expansion fan coil combinations. Heat pump outdoor section shall be factory assembled and furnished with direct-drive condenser fans with horizontal or vertical air discharge, scroll type compressor, refrigerant coil, fan motors, pre-wired control panel. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Provide additional refrigerant for extended lines. Indoor fan coil unit shall be furnished with horizontal discharge and will include evaporator coil, fan and motor, condensate pan with drain, thermal expansion valve, pre-wired control panel and remote thermostat control. Nominal unit cooling, heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.
- C. Quality Assurance:
 1. Cooling capacity rated in accordance with current AHRI Standard 210/240 and 270. Units shall be listed in AHRI.
 2. Unit construction shall comply with ANSI/ASHRAE 15, latest revision, and with NEC.
 3. Units shall be constructed in accordance with UL standards and shall carry UL label of approval. Units shall have CSA approval.
 4. Units shall be listed in CEC directory.
 5. Unit cabinet shall be capable of withstanding ASTM B117 500 hour salt spray test.
 6. Unit shall provide an EER/SEER/COP complying with CCR, Title 24, Building Energy Efficiency Standards and per the drawings.
- D. Evaporator and condenser coils: Evaporator and condenser coils shall be copper with mechanically bonded, smooth aluminum plate fins. Tube joints shall be brazed with copper or silver alloy. Coils shall be pressure-tested at factory. Protective metal guard for inlet and outlet of outdoor coil.
- E. Evaporator and Condenser Coils at locations within two miles from ocean shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints. Coated coils are not acceptable.
- F. Fans:
 1. Condenser Fan and Motors: Condenser fan shall be ECM type motor direct driven, propeller type arranged for horizontal or vertical discharge. Condenser fan motors shall be furnished with inherent protection, and shall be permanently lubricated type, resiliently mounted for quiet operation. Each fan shall be furnished with a safety guard.
 2. Evaporator fan section shall be furnished with ECM type motor centrifugal, forward curved, double width, double inlet fan or fans installed on a solid

Heating, Ventilating and Air Conditioning Equipment
23 8000-13

shaft. Fan shall be statically and dynamically balanced and shall rotate on permanently lubricated bearings.

G. Unit Cabinets:

1. Cabinets shall be fabricated of galvanized steel, bonderized and finished with baked enamel.
2. Cabinet interior shall be insulated with minimum one inch thick foil face fiberglass.
3. Outdoor unit compartment shall be isolated and have an acoustic lining to assure quiet operation.

H. Compressor: Compressor shall be two stage or variable speed type hermetic scroll.

1. Compressor shall be furnished with access valves and it shall be installed on rubber isolators to reduce sound vibration.
2. Furnish with high and low-pressure protection.
3. Each heat pump shall be furnished with factory installed suction accumulator. Field installed accumulators are not permitted.
4. It shall be furnished with high and low-pressure protection, brass external vapor supply line service valves, vapor return line service valves with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, filter drier, pressure relief, liquid line solenoid valves, thermostatic expansion valves, and a holding charge of refrigerant.

I. Refrigeration Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, bi-flow filter drier, pressure relief, reversing valve, heating mode metering device, and a holding charge of refrigerant.

J. Controls and Safeties:

1. Compressor motor assembly shall be protected with high and low-pressure switches, internal overloads, internal thermostat, internal relief valve, and anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.
2. Control panel shall be pre-wired in unit casing.
3. The control circuit shall incorporate a safety circuit to render refrigerant system (compressor and outdoor air motor) inoperative should there be a loss of airflow or refrigerant.
4. Units shall also be furnished with automatic condenser-fan motor protection, high condensing temperature protection, compressor motor current and temperature overload protection, high pressure relief and condenser fan failure protection.

Heating, Ventilating and Air Conditioning Equipment
23 8000-14

- K. EMS Diagnostic Points:
1. Supply air temperature.
 2. Return air temperature.
 3. Space temperature.
 4. Filter status.
 5. Fan status.
 6. Compressor status.
 7. Other diagnostic point required by current Title 24, automated fault detection and diagnostics (FDD).
- L. Low Ambient Operation: Head pressure control shall be provided for operation at outside air temperature below 45 degrees F.
- M. Safeties:
1. High condensing temperature protection.
 2. Compressor motor current and temperature overload protection.
 3. High pressure relief.
 4. Outdoor fan failure protection.
- N. Filters:
1. Filters shall be 2-inch standard size high capacity replaceable media type, MERV 8, or equal, installed in an external 2-inch rack filter section and complete with an access door.
 2. An-line filter-drier shall be furnished with equipment and installed at Project site.
- O. Economizer: Provide on units with capacities equal to, or larger than 4.5 tons nominal capacity, when the Prescriptive Compliance approach is utilized to comply with Energy Efficiency Standards or where necessary to achieve CHPS pre-requisite and/or CHPS building flush-out compliance. Economizer shall be manufacturer's standard; factory furnished and field installed. Economizer control shall maintain a fixed supply air temperature during free cooling operation by providing full modulation of operable outside and return air dampers.
- P. Provide programmable digital thermostat with following features:
1. 7-day time clock.
 2. Heat, cool, automatic changeover.
 3. Occupied / Unoccupied modes.

4. Dry contact switch for input from an external device such as a central time clock, occupancy sensor, or a telephone activated device.
5. Robertshaw, Honeywell, Johnson Controls, Carrier, Schneider Electric, Viconics, or equal with built-in occupancy sensor. Refer to Section 23 0900 for areas with zone damper controls.
6. Remote sensors. School Areas that could be subject to vandalism or accidental impact damage such as Gymnasiums, Auditoriums, Multipurpose Rooms, Corridors and Lobbies shall be provided with thermostats with remote return air duct or room sensors. Verify remote location of sensors and thermostats with Architect.

Q. P. Demand Control Ventilation:

1. Units of 6.25 nominal tons and higher capacity shall be provided with Indoor Air Quality (CO2) Sensor and Accessory Electronic Expansion Boards.
2. The unit shall have ability to provide demand ventilation indoor-air quality (IAQ) control through economizer when provided with an indoor air quality sensor and accessory expansion board.
3. The IAQ sensor shall be duct mounted in return air main duct unless otherwise indicated on Drawings. The set point shall be adjustable.
4. The IAQ sensor shall be powered through unit. If not, required control transformer shall be provided by manufacturer. Coordinate power requirements and location with Division 26.
5. The IAQ sensor shall provide a 4 to 20 mA signal to expansion board.

R. Start-up: Factory test each unit before shipment to Project site. Performance test shall include full refrigeration start-up, fan and controls start-up. Each unit shall be provided with its own report with its own serial number. Non-tested units are not permitted to be delivered to Project site. Provide full start-up of units to include full refrigeration and provide a written report.

S. Parts Availability: Submit proof in writing that majority (minimum 80 percent) of replacements parts are commonly available and not proprietary. Also, submit proof in writing that a local parts sales and service facility exists, where replacement parts will be warehoused in quantity. Guarantee timely availability for parts that are proprietary.

2.05 ROOF MOUNTED POWER EXHAUST VENTILATORS

A. RMEV-1

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VEBK Series	GB Series	ACEB	Domex-Belt Drive	BCRD	

2. Spun aluminum, roof mounted, belt driven, downblast centrifugal exhaust ventilator, with components as indicated and specified. Sizes, performances, and accessories shall be as indicated on equipment schedules on Drawings. Provide required accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories Inc (UL 705). Fan shall bear AMCA Certified Ratings Seals for Fan Sound and Air Performance.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 18 gage Aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The discharge baffle shall have a rolled bead for added strength. A two piece top cap shall have stainless steel, or galvanized quick release latches to provide access into motor compartment without use of tools, or screws. An integral conduit chase shall be provided through curb cap and into motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 16 gage steel power assembly, isolated from unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate.
5. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be heavy-duty ECM type with permanently lubricated sealed ball bearings and furnished at specified voltage, phase, and enclosure.
7. Bearing: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
8. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision-machined cast iron type, or heavy gauge galvanized steel, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

B. RMEV-2:

1. Manufacturer:

CARNES	GREENHECK	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VEDK Series	G Series	ACED	Domex-Direct Drive	DCRD	

2. Spun aluminum, roof mounted, direct driven, downblast centrifugal exhaust ventilator, with components as indicated and specified. Sizes, performances, and accessories shall be as indicated on equipment schedules on Drawings. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories Inc. (UL 705). Fan shall bear AMCA Certified Ratings Seals for Fan Sound and Air Performance.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 18 gage Aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through curb cap and into motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from exhaust airstream. Unit shall bear an engraved aluminum nameplate.
5. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be heavy-duty ECM type with permanently lubricated sealed bearings and furnished at specified voltage, phase, and enclosure.

C. RMEV-3:

1. Manufacturer:

CARNES	GREENHECK	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VUBK Series	CUBE Series	ACRUB	Fumex-Belt Drive	BCRU	

2. Spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator, with components as indicated and specified. Sizes, performances, and accessories shall be as indicated on equipment schedules on Drawings. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories Inc. (UL 705). Fan shall bear AMCA Certified Ratings Seals for Fan Sound and Air Performance.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 18 gage Aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. The windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel, or galvanized quick release latches to provide access into motor compartment without use of tools, or screws. An integral conduit chase shall be provided into motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 16 gage steel power assembly, isolated from unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate.
5. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be heavy-duty ECM type with permanently lubricated sealed ball bearings and furnished at specified voltage, phase, and enclosure.
7. Bearing: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
8. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron, or galvanized steel type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

D. RMEV-4:

1. Manufacturer:

CARNES	GREENHECK	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VUDK Series	CUE Series	ACRUD	Fumex-Direct Drive	DCR U	

2. Spun aluminum, roof mounted, direct driven, upblast centrifugal exhaust ventilator, with components as indicated and specified. Sizes, performances, and accessories shall be as indicated on equipment schedules on Drawings. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories Inc. (UL 705). Fan shall bear AMCA Certified Ratings Seals for Fan Sound and Air Performance.
4. Housing: Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 18 gage Aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. The windband shall have a rolled bead for added strength. An integral conduit chase shall be provided into motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from exhaust airstream. Unit shall bear an engraved aluminum nameplate.
5. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be heavy-duty ECM type with permanently lubricated sealed bearings and furnished at specified voltage, phase, and enclosure.

2.06 INLINE FANS

A. ILF-1: (Used as Garage Exhaust Fan GEF-1)

1. Manufacturer:

GREENHECK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
QEI or QEID	ESI	QSL	

2. Provide inline mixed flow type fans of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.

3. Certification: Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear AMCA certified ratings seal for sound and air performance.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The housing shall be of minimum 12 gage steel. Bearing supports shall be minimum 10 gage welded steel. Lifting eyes shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate.
5. Finish: Steel fan components shall be coated with polyester powder coating to exceed 1,000 hour salt spray test under ASTM B117 test method.
6. Wheel: Wheel shall be of mixed flow type with a wheel cone, spherical back plate and single thickness cambered blades, or formed hollow airfoil blades continuously welded to back plate. Hub shall be keyed and securely attached to fan shaft. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
7. Motor: Motor shall be ECM type, voltage and phase, as indicated on drawings. Provide permanently lubricated sealed ball bearings. Option: Energy efficient motor meets EPAct and NEMA Table 12-10.
8. Shaft: Blower shaft shall be AISI C1045/SAE 1045, or 1040 hot rolled and accurately turned, ground, and polished. Shafting shall be sized for a critical speed of at least 143 percent of maximum RPM.
9. Bearings: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball or roller type in a cast iron pillow block housing and selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
10. Drive: Fans shall be direct drive or belt driven as indicated on drawings.
11. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

2.07 CEILING CABINET FANS

A. CCF-1:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL

VCDK or VCDD Series	SP or CSP Series	GC 200 or 900 Series	Zephyr Fans	T or TL Series	

2. Provide ceiling, wall, or inline mounted, direct driven, centrifugal exhaust fans of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories (UL 507 & 705). Fan shall bear AMCA Certified Ratings Seal for Sound and Air Performance.
4. Housing: The fan housing shall be minimum 22 gage galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 16 gage reinforcing channel and shall be easily removable from housing. Motor shall be mounted on vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided. A powder painted white steel grille shall be provided as standard.
5. Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be ECM type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at specified voltage.

B. CCF-2:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VCDK or VCDD Series	CSP Series	GN 200 or 900 Series	Zephyr Fans	TL Series	

2. Provide inline mounted, direct driven, centrifugal exhaust fans of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories (UL 507 & 705). Fan shall bear AMCA Certified Ratings Seal for Sound and Air Performance.

Heating, Ventilating and Air Conditioning Equipment
23 8000-22

4. Housing: The fan housing shall be minimum 22 gage galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 16 gage reinforcing channel and shall be easily removable from housing. Motor shall be mounted on vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different mounting positions, an adjustable pre-punched mounting bracket shall be provided.
5. Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
6. Motor: Motor shall be ECM type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at specified voltage.

C. CCF-3:

1. Manufacturer:

CARNES	GREENHECK	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VDBA or VGBA Series	BCF Series	DB	Zephyr Cabinet Fans	DBS or DBT	

2. Provide duct mounted, belt driven centrifugal cabinet fans of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
3. Certification: Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear AMCA Certified Ratings Seals for Fan Sound and Air Performance.
4. Housing: The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 22 gage galvanized steel with two access doors and integral duct collars. Internal blower and motor assembly shall be mounted on rubber vibration isolators. Hanging brackets shall be provided for horizontal installation. Unit shall bear an engraved aluminum nameplate.
5. Wheel: Wheel shall be DWDI centrifugal forward curved type, constructed of painted steel. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.

6. Motor: Motor shall be heavy duty TEFC inverter duty type with permanently lubricated sealed ball bearings and furnished at specified voltage and phase.
7. Bearing: Bearings shall be permanently lubricated, sealed ball type selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
8. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

2.08 GRAVITY EXHAUST/INTAKE VENTILATORS

A. GEIV-1:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
GSAA Series	GRS Series	PR or TR	WCC	GRV	

2. Spun aluminum, roof mounted gravity ventilators of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of ventilators. Also, provide accessories for proper operation of ventilators per code and in accordance with design intent and sequence of operation.
3. Housing: The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 18 gage Aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The spun aluminum baffle shall have a rolled bead for added strength. Birdscreen constructed of 1/2" mesh shall be mounted across air opening. Unit shall bear an engraved aluminum nameplate.
4. Provide gravity type back-draft or relief dampers at relief or exhaust ventilators (with counterweights if required). Gravity relief dampers shall fully open at 0.01" static pressure.
5. Intake ventilators shall be provided with normally closed, motorized dampers that are interlocked with fan to open upon fan activation unless fan is provided with such a damper.

B. GEIV-2:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL

GEAB Series	FGR Series	GR	AEG Relief	MGR	

2. Provide hooded aluminum, roof mounted gravity relief ventilators of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of ventilators. Also, provide accessories for proper operation and balancing of ventilators in accordance with design intent and sequence of operation.
3. Housing: The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The hood interlocking panels shall be constructed of minimum 12 gage Aluminum 5052, hinged to a minimum 12 gage aluminum 5052 support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. Birdscreen constructed of ½ inch mesh shall be mounted across relief opening. Unit shall bear an engraved aluminum nameplate.
4. Provide gravity type back-draft or relief dampers at relief or exhaust ventilators (with counterweights if required). Gravity relief dampers shall fully open at 0.01 inch static pressure.
5. Intake ventilators shall be provided with normally closed, motorized dampers that are interlocked with fan to open upon fan activation unless fan is provided with such a damper.

C. GEIV-3:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
GIAB Series	FGI Series	GI	AEG Intake	MGI	

2. Provide hooded aluminum, roof mounted gravity intake ventilators of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of ventilators. Also, provide accessories for proper operation and balancing of ventilators in accordance with design intent and sequence of operation.
3. Housing: The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The hood interlocking panels shall be constructed of minimum 18 gage Aluminum, bolted to a minimum 12 gage aluminum 5052 support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. Birdscreen constructed of ½ inch mesh shall be mounted across intake opening. Unit shall bear an engraved aluminum nameplate. Units shall be provided with bird screen and anti-condensate coating as standard.
4. Provide gravity type back-draft or relief dampers at relief or exhaust ventilators (with counterweights if required). Gravity relief dampers shall fully open at 0.01 inch static pressure.

5. Intake ventilators shall be provided with normally closed, motorized dampers that are interlocked with fan to open upon fan activation unless fan is provided with such a damper.

2.09 FUME HOOD EXHAUST

A. FHE-1:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARRY	TWIN CITY & BLOWER	OR EQUAL
VBBB Series	SWB Series	CPV	Dynamo	BCV	

2. Fume Hood Exhaust: Provide single width, single inlet, backward inclined aluminum wheel, belt driven centrifugal vent sets of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
 - a. Provide the existing fume hood with airflow measuring device indicating the rate of inward airflow as a quantitative airflow monitor that continuously indicates whether air is flowing into the exhaust system during operation.
3. Certification: Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear AMCA Certified Ratings Seal for Sound and Air Performance and be manufactured with Type C spark resistant construction.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be minimum 14 gage steel with scroll drain and scroll side panels shall be minimum 14 gage steel. The entire fan housing shall have continuously welded seams for leakproof operation. A performance cut-off shall be furnished to prevent recirculation of air in fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1 ½-inch outlet discharge flange. Bearing support shall be minimum 10 gage welded steel. Side access inspection ports shall be provided with quick release latches for access to motor compartment without removing weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate.
5. Finish: Exterior steel fan components shall be an electrostatically applied, baked epoxy powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2.5 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method. Interior and exterior parts of the fan exposed to the air being moved shall be coated with minimum 15 mils of baked epoxy.
6. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast

aluminum hub. Wheel hub shall be keyed and securely attached to fan shaft. Wheel inlet shall overlap a one piece aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.

7. Motor: Motor shall be heavy-duty, explosion proof type with permanently lubricated sealed ball bearings and furnished at specified voltage, phase, and enclosure.
8. Shaft: Blower shaft shall be AISI C1045/SAE 1045 hot rolled and accurately turned, ground, and polished. Shafting shall be sized for a critical speed of at least 143 percent of maximum RPM.
9. Bearing: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball or roller type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
10. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

B. FHE-2:

1. Manufacturer:

CARNES	GREENHEC K	LOREN COOK	PENNBARR	TWIN CITY & BLOWER	OR EQUAL
VBBB Series	SWB Series	CPS	Dynamo	BCV	

2. Provide single width, single inlet, backward inclined steel wheel, belt driven centrifugal vent sets of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
 - a. Provide the existing fume hood with airflow measuring device indicating the rate of inward airflow as a quantitative airflow monitor that continuously indicates whether air is flowing into the exhaust system during operation.
3. Certification: Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear AMCA Certified Ratings Seal for Sound, Air Performance and be manufactured with Type C spark resistant construction.
4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be a minimum 14 gage steel with scroll drain and scroll side panels shall be a minimum 12 gage steel. The entire fan housing shall have

Heating, Ventilating and Air Conditioning Equipment
23 8000-27

continuously welded seams for leak proof operation. A performance cut-off shall be furnished to prevent re-circulation of air in fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1 ½-inch outlet discharge flange. Bearing support shall be minimum 10 gage welded steel. Side access inspection ports shall be provided with quick release latches for access to motor compartment without removing weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate.

5. Finish: Steel fan components shall be an electrostatically applied, baked epoxy powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2.5 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method. Interior and exterior parts of the fan exposed to the air being moved shall be coated with minimum 15 mils of baked epoxy.
6. Wheel: Wheel shall be steel centrifugal backward inclined, non-overloading flat blade type. Blades shall be continuously welded to backplate and deep spun inlet shroud. Wheel hub shall be keyed and securely attached to fan shaft. Wheel inlet shall overlap a one piece aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
7. Motor: Motor shall be heavy-duty, explosion proof type with permanently lubricated sealed ball bearings and furnished at specified voltage, phase, and enclosure.
8. Bearing: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty re-greasable anti friction ball or roller type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
9. Shaft: Blower shaft shall be AISI C1045/SAE 1045 hot rolled steel and accurately turned, ground, and polished. Shafting shall be sized for a critical speed of at least 143 percent of maximum RPM.
10. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

2.10 FILTERS

- A. Air filters shall be of pleated, high capacity, disposable type of efficiencies indicated on drawings. Each filter shall consist of a non-woven cotton fabric media, media support grid, and enclosing frame. Filter shall be UL 900 listed, Class 2.
- B. Filter media shall provide an average efficiency as specified on drawings per ASHRAE Standard 52.2.

- C. Initial resistance of air filters shall not exceed following limits for each efficiency level at face velocities indicated. Lower resistance requirements, if indicated on drawings shall have precedence.

30 percent (MERV 8)	0.27 inch water gage at 500 feet per minute
75 percent (MERV 11)	0.28 inch water gage at 500 feet per minute
85 percent (MERV 13)	0.30 inch water gage at 500 feet per minute
95 percent (MERV 14)	0.38 inch water gage at 500 feet per minute

- D. Use standard size Filter Medias only.

- E. Media support shall be a welded wire grid or a rigid frame with an effective open area of not less than 96 percent.

1. Media support shall be bonded to filter media to eliminate possibility of media oscillation and media pull-away.
2. Media support grid shall be formed in such a manner that it effectively forms a radial pleat design, providing total use of filter media.

- F. Enclosing frame shall be bonded to air entering and air exit side of each pleat, to ensure pleat stability. Inside periphery of enclosing frame shall be bonded to filter pack, thus eliminating possibility of air bypass.

- G. Holding frames shall be factory fabricated of 16 gage galvanized steel, or equivalent and shall be furnished with gaskets and spring type positive sealing fasteners. Fasteners shall be capable of being attached or removed without use of tools.

- H. Manufacturers: Camfil Farr, Koch, or AAF.

2.11 LOUVERS, AIR CONDITIONING (use in conjunction with relief damper)

- A. Standard steel louvers shall be furnished complete with frames, blades, finish and construction details per Drawings and manufacturer's recommendations.
- B. Louvers shall be furnished with horizontal blades, 2 inches deep for air through wall installation in conjunction with gravity relief damper for backdraft protection that will open at 0.01 inch wc room static pressure as indicated on Drawings. Blades shall be 16-gage steel, spaced at 1 7/8-inch at 30 degrees angle, and with baked epoxy coating. Panel size shall be as indicated but not less than 24 inches width by 18 inches in height.

PART 3 – EXECUTION

3.01 GENERAL

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

3.02 EQUIPMENT FOUNDATIONS

- A. Provide foundations (housekeeping pads, level platforms or curbs) for mechanical equipment whether indicated on drawings or not. Equipment foundations shall be of

sufficient size and weight, and of proper design to preclude shifting of equipment under operating conditions, or under abnormal conditions imposed upon equipment.

- B. Provide foundations (housekeeping pads, level platforms or curbs) for mechanical equipment whether indicated on drawings or not. Foundations shall meet requirements of equipment manufacturer and, when required by Architect, obtain from equipment manufacturer, approval of foundation design and construction, for equipment to be installed. Equipment vibration shall be maintained within design limits, and shall be dampened and isolated. Isolators shall be bolted to a structural member so as to be readily removable.

3.03 EQUIPMENT DESIGN AND INSTALLATION

- A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.
- B. Application: Only provide equipment as reviewed by Architect.
- C. Equipment Installation: Equipment installation shall be in strict accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on equipment. Flanged joints shall be adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.
 - 1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.
 - 2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.
 - 3. Provide flexible connections for duct, pipe and conduit connections at moving equipment.

3.04 ROOF-TOP EQUIPMENT MOUNTING

- A. Downflow Packaged Units: Install unit on a prefabricated mounting frame or curb secured directly to roof. Follow manufacturers recommended installation manuals. Submit Shop Drawings for review by Architect.
- B. Horizontal Flow Packaged Units: Install unit on platform or prefabricated mounting frame or curb secured directly to roof designed to suit roof conditions and requirements of provided unit. Submit Shop Drawings for review by Architect.

3.05 NOISE AND VIBRATION

- A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.
- B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

3.06 FIELD TESTS AND INSPECTION

Heating, Ventilating and Air Conditioning Equipment
23 8000-30

- A. General: Perform field inspections, field tests, and trial operations as specified in Section 23 0500: Common Work Results for HVAC. Provide labor, equipment and incidentals required for testing. The Project Inspector will witness field tests and trial operations as specified in Section 23 0500: Common Work Results for HVAC.
- B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and materials not tested at place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with reference Specifications and standards.
- C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments as required to provide proper operation and control sequence. Refer to Section 23 0500: Common Work Results for HVAC.
- D. Extent of Field Tests: After installation and before completion, Work of this Section shall be subjected to required field tests, including those specified here and in Section 23 0500: Common Work Results for HVAC.
- E. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 23 0500: Common Work Results for HVAC.

3.07 REFRIGERANT PIPING

- A. Unless otherwise indicated, main liquid and suction lines from condensing unit to evaporator coil shall be of sizes specified by manufacturer.
- B. Refrigeration piping shall be refrigeration grade copper tubing, type L hard-drawn. In instances where refrigeration lines are installed in an inaccessible location and must be snaked through conduit or a trench, that portion of tubing required to complete connections through conduit or trench may be soft drawn. Maintain entire system clean and dry during installation. Pipe shall be sealed until installed.
- C. Refrigeration piping, both hard and soft-drawn, shall be straight and free from kinks, restrictions and horizontal runs shall be sloped towards compressor one inch to 10 feet wherever possible. Vapor line oil traps shall be installed on bottom of vertical risers and inverted oil trap shall be installed on top of vertical risers.
- D. Joints shall be installed with Sil-Fos 15, Silvaloy 15, or equal.
- E. Flare nuts required on suction lines shall be of short forged or frost-proof type. Other fittings shall be standard sweat-soldered type. Ells and return bends shall be long radius type. Install leak lock material.
- F. Refrigeration Piping: Joints shall be silver brazed and leak tested. Field fabricated lines shall be thoroughly flushed and cleaned before connection. Bleed nitrogen through lines during silver brazing, and cap and seal lines when not completed and connected to equipment.
- G. Sleeve penetrations of floors, walls and ceiling to allow for free motion of piping. Provide 24 gage galvanized iron pipe and chrome-plated escutcheon plates. Pack annular space between pipe and sleeve with incombustible material such as fiberglass and seal each end with mastic to provide a waterproof seal.

Heating, Ventilating and Air Conditioning Equipment
23 8000-31

- H. Install insulated couplings at points of connection between dissimilar metals for cathodic protection. Insulate copper tubing from ferrous materials and hangers with 2-inch thickness of 3-inch wide strip, 10 mil polyvinyl tape wrapped around pipe.
 - I. Support piping by iron hangers and supports. Hydra-Zorb cushion clamps, LSP Products Group Acousto Clamp, or equal, on non-insulated piping, and Klo-Shure coupling clamp on insulated piping, or equal.
 - J. Provide saddles to protect pipe insulation.
 - K. Provide connections of copper, copper plated steel, steel, and brass pipe and tubing with Harris Products Group Safety-Silv 56, Lucas-Milhaupt, Inc., or equal, complying with ANSI/AWS A5.8 and NSF 51.
 - L. Insulate refrigerant suction lines.
 - M. On split heat pump systems, insulate both vapor and liquid lines. For insulation materials, refer to Section 23 0700: HVAC Insulation.
- 3.08 CLEANUP
- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.
- 3.09 PROTECTION
- A. Protect Work of this Section until Substantial Completion.

END OF SECTION

SECTION 23 8219
FAN COIL UNITS

1.1 PRODUCTS

- A. Ductless Fan Coil Units:
 - A. Wall Mounted Fan Coil Unit Configurations: Carrie or approved equal.
 - 1. Number of Heating Coils: One.
 - 2. Number of Cooling Coils: One.
 - B. Coil section insulation.
 - C. Main and Auxiliary Drain Pans: Stainless steel.
 - D. Chassis: Galvanized steel where exposed to moisture.
 - E. Cabinets: Steel with factory prime coating.
 - F. Filters: Glass fiber or Pleated, cotton polyester.
 - G. Hydronic Coils: Copper tube, with aluminum fins.
 - H. Fan and Motor Board: Removable.
 - I. Fan: Forward curved, double width, centrifugal; directly connected to motor.
 - J. Motor: Permanently lubricated multispeed; resiliently mounted.
 - K. Fan coil units should not be located over expensive equipment such as electron microscopes, computers, etc. Fan coil units installed in furred spaces or attic should have secondary drain pans beneath it to catch overflow drain in case of primary drain clog. Discharge drain to a point where it can be readily observed.
 - L. Provide access to fan coil units for routine preventive maintenance. This includes replacement of filter and belts, repair of leaks, replacement of motors and controls. Provide all necessary work platforms where units are not directly accessible by a maximum 8 foot step ladder.
 - M. Provide fan coil units with three speed motors wired to a three speed switch. Design and size fan coil unit to operate at mid-speed.
 - N. Wiring Termination: Plug connection.

END OF SECTION

**SECTION 26 0526
GROUNDING AND BONDING**

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Provide and install grounding system as indicated or required.

1.02 QUALITY ASSURANCE

- A. Reference Standards:

1. IEEE 142 Green Book.
2. Underwriter's Laboratories (UL).
3. California Electrical Code.
5. EIA/TIA (Signal and power).
6. Nationally Recognized Testing Laboratory (NRTL) or equal.

1.03 SYSTEM DESCRIPTION

- A. Metallic objects on the Project site that enclose electrical conductors, or that are likely to be energized by electrical currents, shall be effectively grounded.
- B. Metal equipment parts, such as enclosures, raceways, and equipment grounding conductors, and earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.
- C. Metallic systems shall be effectively bonded to the main grounding electrode system.
- D. A separately derived AC source shall be grounded to the equipment grounding conductor, and to separate "made" electrode of building grounding electrode system.
- E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by installation of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of required size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit over six feet in length shall be provided with a green insulated grounding conductor of required size.
- F. Cold water, or other utility piping systems, shall not be utilized as grounding electrodes due to the installation of insulating couplings and non-metallic pipe in such installations. In addition to bonding to cold water pipe provide at least one of the following made grounding electrodes:
1. A dedicated "made" electrode, fabricated of at least 20 feet of galvanized 1/2 inch diameter rebar encased by at least two inches of concrete, and placed next to the bottom of a concrete foundation, or footing in direct contact with earth. A welded extended portion shall surface at the location of the common grounding electrode bus bar and be extended by a 3/0 CAD welded bare copper cable, or be CAD welded directly to the bus. The CAD weld shall be

at least four inches above finished floor in a dry location. The main grounding electrode and associated grounding conductors shall be in an enclosure and in conduit.

2. Grounding electrodes as specified hereafter in this section.
 3. Concrete enclosed electrode, fabricated of at least 20 feet of No. 2 AWG, minimum size, bare copper conductor, encased by at least two inches of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar shall be connected to copper wire with approved connectors. An external electrode, as specified hereafter or as required by the CEC, shall be installed and connected to foundation or footing rebar.
- G. Non-current carrying metal parts of high-voltage equipment enclosures, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded. Provide a CEC sized grounding conductor in every raceway.
- H. Metallic or semi-conducting shields and lead sheaths of cables operating at high voltage; shall be permanently and effectively grounded at each splice and termination.
- I. Neutral of service conductors shall be grounded as follows:
1. Neutral shall be grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service switchboard, or main switch.
 2. Equipment and conduit grounding conductors shall be bonded to that grounding point.
 3. If other buildings or structures on the Project site are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.
 4. Equipment grounding conductor is installed from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to "made" electrode for that building.
 5. Feeder neutrals shall be bonded at service entrance point only, neutrals of separately derived systems shall be bonded at the source only.
- J. If there is a distribution transformer at a building the secondary neutral conductor shall be grounded to "made" electrode serving the building.
- K. Within every building, the main switchboard or panelboard, shall be bonded to the cold water line. Metallic piping systems such as gas, fire sprinkler, or other systems shall be bonded to the cold water line.

1.04 SUBMITTALS

- A. Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furnished yard boxes shall be precast concrete and shall be approximately 14 inches wide by 19 inches long by 12 inches deep or larger, if necessary to obtain required clearances. Boxes shall be furnished with bolt-down, checkered, cast iron covers and cast iron frames cast into boxes. Yard boxes shall be Jensen Precast, Oldcastle Precast, Western Precast, Kistner, or equal.
- B. "Made" electrodes shall be copper-clad steel ground rods, minimum 3/4 inch diameter by ten feet long.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, finish elevation of concrete yard boxes shall be two inches above planting surfaces.
- B. If concrete enclosed electrode is provided, grounding wire shall be terminated to a suitable copper plate with grounding lugs and must be enclosed in a raceway or box..
- C. Grounding rods shall be driven to a depth of not less than eight feet. Permanent ground enhancement material, (GEM) as manufactured by Erico Electrical Products, Loresco Powerset, Tessco Ultrafil or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.
- D. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.
- E. When installing grounding rods, if resistance to ground exceeds 25 ohms, two or more rods connected in parallel, or coupled together shall be provided to meet grounding resistance requirements.
- F. Ground rods shall be separated from one another by not less than ten feet.
- G. Parallel grounding rods shall be connected together with recognized fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 TESTING

- A. Provide the services of an approved independent testing laboratory to test grounding resistance of "made" electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping. Tests shall be performed as follows:
 - 1. Visually and mechanically examine ground system connections for completeness and adequacy.
 - 2. Perform fall of potential tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2.

Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.

3. Perform the two point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal railings at building entrances and at handicapped ramps shall also be tested.

4. Test shall be performed in the presence of the Inspector.

B. Submit 3 copies of test results to the Architect. Test results shall be submitted on an official form from the independent testing laboratory recording Project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

3.03 PROTECTION

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

3.04 CLEANUP

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

END OF SECTION

SECTION 26 0533
RACEWAYS, BOXES, FITTINGS, AND SUPPORTS

PART 1 GENERAL
1.01 SUMMARY

- A. Section Includes:
 - 1. Raceways and wire ways.
 - 2. Conduit installation.
 - 3. Underground requirements.
- B. Applicable Standards and Codes.
 - 1. EIA/TIA 569 Standards.
 - 2. National American Standards Institute (ANSI).
 - 3. National Electrical Manufacturer's Association (NEMA).
 - 4. Nationally Recognized Testing Laboratory (NRTL).
 - 5. California Electrical Code (CEC).
 - 6. Uniform Building Code (UBC).
 - 7. Underwriters Laboratory (UL).

1.02 SUBMITTALS

- A. Materials List: Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 RACEWAYS

- A. Conduit Materials:
 - 1. Metallic conduit, and tubing shall be manufactured under the supervision of an UL, or another NRTL factory inspection and label service program. Each ten-foot length of conduit and tubing shall bear the UL or another NRTL label and manufacturer's name.
 - 2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc-coated, with an inside and outside protective coating manufactured in accordance with ANSI C 80.1. Couplings, elbows, bends, conduits, bushings and other fittings shall be the same materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type, manufactured in accordance with ANSI C 80.1 and UL 6.
 - 3. Electrical metallic tubing shall be steel tubing, zinc-coated with a protective enamel coating inside, manufactured in accordance with NEMA C 80.3. Fittings, couplings, and connectors shall be gland compression type, set screw couplings and connectors not permitted. All parts shall be manufactured in accordance with NEMA C80.3 and UL 6A Electrical metallic tubing is

Raceways, Boxes, Fittings, and Supports
26 0533-1

designated hereinafter as EMT. Steel and rain tight fittings shall be approved and listed for the intended application.

4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips, manufactured in accordance with UL 1.
 - a. Connectors and couplings shall be required fittings of the type, which threads into convolutions of flexible conduit.
 5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
 6. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.
 7. Multi-cell raceway shall be four inch PVC, Type 40, UL or another NRTL listed for underground use with optical fiber and signal system cables. Raceway shall be furnished with 3-1/2 inch factory installed inner ducts with required internal spacers, and required couplers, sweeps, and end bells. Multicell raceway shall be Carlon Multigard, or District approved equal.
 8. Metal Clad (MC) cable system is not allowed.
- B. Sleeves for Conduits: Sleeves shall be adjustable type by Carlon, U.S. Plastic, PEP Plastic or equal.
- C. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, equivalent Cooper Crouse Hinds Thru-Wall, Legrand Thru-Wall, or equal.
- D. Expansion Joints-Seismic Separations between building(s) and other locations as indicated on drawings:
1. Provide Thomas & Betts XJG-TB, O-Z/Gedney. type AX with bonding strap and clamps, Cooper XJGD or equal. At exterior locations, provide Thomas & Betts XJG-TB, O-Z/Gedney type EX, Cooper XJGD, or equal. Provide O-Z/Gedney type AXDX, or equal combination deflection/expansion fittings at all seismic separations. Provide manufacture's internal and external bonding jumpers at all locations. Liquid-tight metal conduit or flexibmetal conduit shall not be approved at expansion joints, separations between buildings or seismic separations.
 2. Provide expansion fittings at intervals not exceeding 100 feet in conduits exposed to direct sunlight. Fittings may be installed in the conduit run or where conduit attaches to junction or pull boxes. OZ/Gedney type AX, TX or EXE series, or equivalent by Thomas and Betts, Crouse-Hinds or approved equal.

E. Conduit Seal Fittings:

1. Provide conduit seal fittings where indicated on the Drawings. Conduit seals shall be of rigid galvanized steel. Seals in horizontal conduit installations shall be Thomas & Betts EYS, Appleton Type ESU, Crouse Hinds Type EYS, or equal. Seals in vertical conduit installations shall be Thomas & Betts EYD, Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain. When installing conduit seals make provision for percent fill space reduction in accordance with CEC.
2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are installed in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.

F. Surface Steel Raceway:

1. The surface steel raceway system for branch circuit wiring, data network, voice, video, and other low voltage wiring shall be as manufactured by the Wiremold Company, Hubbell, or Mono-Systems, Inc. or equal. The raceway system may be supplied pre-wired in accordance with all sections of these specifications and requirements herein, and shall be UL or another NRTL listed. Computer data installation shall be as required by other sections of this Division.
 - a. If furnished pre-wired, the system must be listed in accordance with UL or another NRTL for "Multiple Outlet Assemblies" and so labeled on interior of the assembly. The pre-wired installation must contain no extra wire splices in the raceway as compared to a contractor assembled installation assembled from components. The pre-wired steel raceway shall be Hi-Pot tested at the factory to prevent any potential bare wire or shot circuit defects.
2. The raceway base, cover, and device bracket shall be manufactured of steel and finished in ivory, gray enamel or custom colors suitable for field painting to match adjacent finishes.
3. The raceway shall be a two-piece design with a metal base and snap-on metal cover, except for the Wiremold V700 system, Hubbell HBL750 series and Mono-Systems Inc. S145-700 series that shall be a one-piece design. The base and cover sections shall be a minimum of 0.040 inch wall thickness. The thickness base section shall be available in ten-foot lengths. A hand-operated cutting tool shall be available for the base and cover to ensure clean, square cuts. Wiremold V500, Hubbell V500, and Mono Systems inc. SM500 series are not permitted.
4. A full complement of fittings shall be furnished, including but not limited to, flat internal and external elbows, tees, entrance fittings, wire clips, cover clips, couplings, support clips, C-hangers and end caps. The fitting color shall match the raceway color. Fittings shall be supplied with a base where indicated and/or required. A take-off fitting shall be furnished as required to adapt to existing flush wall boxes.

5. Device brackets shall be furnished for mounting single or two-gang devices within the raceway. Devices shall be provided with the ability of mounting flush or in conjunction with standard steel, stainless steel, or manufacturer's metal faceplates.
 6. The raceway shall be furnished with a complete line of connectivity outlets and modular inserts for unshielded twisted pair including category 5, fiber-optic, coaxial, and other cabling types with face plates and bezels to facilitate installation. Computer data installation shall be as required by other sections of this Division, and Division 27.
 7. Raceway shall be furnished with corner elbows and tee fittings to maintain a cable bend radius which meets the requirements of fiber-optic and copper cables under EIA/TIA 569 for communications pathways.
- H. Wireways shall be 16 gage galvanized steel enclosed hinge/screw wiring troughs, surface metal raceway, wireway, and auxiliary gutter designed to enclose electrical wiring. Wireway fittings shall be furnished with removable covers and sides to permit complete installation of conductors throughout the entire wireway run. Cover shall be furnished with keyhole slots to accept captive screws locking the cover securely closed. Wireways shall be UL or another NRTL listed, and shall be Square D Type LDB NEMA-1 enclosure for interior applications, or Type RDB NEMA-3R enclosure for exterior applications, or equal by Cooper B-line, Hoffman, Wire Guard, or Circle AW.
- I. Penetration in Fire-Rated Structures: Provide 3M, or equal, sealant and fire barriers for installing fire-rated seals around penetrations through floors, walls, and elevator hoistways. Fire stop system must be UL, or another NRTL listed, and classified for through-penetration applications of metallic conduits and busways.
- J. Pull Wires: Install 1/8 inch polypropylene cords in empty or spare conduits.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

- A. General Requirements:
1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and signal systems, except as otherwise specified.
 2. EMT may be installed in interior concealed applications and in areas approved by owner. EMT shall not be installed in concrete, directly buried underground, outdoors, in boiler rooms, elevator pits, or where subject to damage.
 3. Within buildings, flexible steel conduit may be installed instead of rigid steel conduit where permitted by code. Flexible steel conduit shall be installed:
 - a. For continuous lengths not exceeding more than 50 feet between pull points (pull boxes, outlet boxes, etcetera).
 - b. With no maximum total raceway length located within a building interior when the flex is located in concealed locations.
 4. Flexible Steel conduit shall not exceed 1-1/2 inches in size.
 5. Liquid-tight flexible steel conduit shall only be installed, except where otherwise specified, for final connection of motor terminal boxes, shop equipment,

Raceways, Boxes, Fittings, and Supports
26 0533-4

cafeteria equipment, HVAC equipment and other equipment, or for frequent interchange, and shall be of sufficient length, not exceeding 36 inches, to permit full travel or adjustment of motor on its base. Liquid-tight flexible conduit shall not be used for equipment not requiring adjustment or frequent interchange.

6. Connectors for flexible metal conduit shall be made of steel, and of the types which threads into convolutions of conduit. Connectors for watertight flexible metal conduit shall be as required for installation and shall be installed to provide a watertight connection.
7. Exposed conduit shall be installed vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to equipment with suitable iron brackets and one hole pipe strap.
8. If connection is from a flush wall-mounted junction box, install an approved extension box.
9. Underground feeder distribution conduits for systems may be non-metallic conduit instead of rigid conduit except where otherwise specified or indicated.
10. Conduit shall be concealed unless otherwise indicated. Conduits exposed to view, except those in attic spaces and under buildings, shall be installed parallel or at right angles to structural members, walls, or lines of building. Conduits shall be installed to clear access openings.
11. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of metallic conduit to facilitate bending is not permitted. Public telephone conduit bends and offsets shall be provided with a radius which is not less than ten times trade size of conduit unless otherwise permitted. Refer to underground installation, specified in this section, for radius of bends and offsets required for underground installations.
12. Running threads are not permitted. Provide conduit unions where union joints are necessary. Conduit shall be maintained at least six inches from covering of hot water and steam pipes and 18 inches from flues and breechings. Open ends of conduits shall be sealed with permitted conduit seals during construction of buildings and during installation of underground systems.
13. Expansion Joints/Seismic Separations/Separations between buildings/Locations Indicated: Provide Thomas & Betts XJG-TB, O-Z Electrical Mfg. Co. Inc. Type AX with bonding strap and clamps. Crouse Hinds XJGD, or equal. At exterior locations, provide Thomas & Betts XJG-TB, O-Z Electrical Mfg. Co. Inc. Type EX, Crouse Hinds XJGD, or equal. Provide Crouse Hinds, Thomas & Betts, or O-Z Electrical Mfg. Co. Type AXDX, or equal Combination Deflection/Expansion Fittings at all seismic separations. Provide manufactures internal and external Bonding Jumpers at all locations.

Liquid-tight flexible conduit shall not be approved at expansion joints or seismic separations.

14. Where conduits are terminated in groups at panelboards, switchboards, and signal cabinets, etc., provide templates or spacers to fasten conduits in proper position and to preserve alignment. Conduits terminating at signal cabinets shall only enter cabinets in the following locations:
 - a. Conduits entering top, side, and bottom of cabinets shall be aligned in a single row, centered two inches from rear of cabinet.
 - b. Conduits entering back of cabinet shall be aligned in a single row centered two inches from top of cabinet.
 - c. Conduits shall not be spaced closer than three inches on centers.
15. Conduits above metal lath ceilings shall be rigidly suspended with pipe hangers or pipe racks or shall be secured to superstructure with factory fabricated pipe straps. Conduits in metal lath or steel stud partitions shall be tied to furring channels or studs. In ceiling spaces and in partitions, tie wires shall be spaced not more than 5 feet apart, shall fasten conduit tight against channels and studs at point of tie and shall not support any of conduit weight. Tie wire shall be 16 gage galvanized double annealed steel.
16. Where auxiliary supports, saddles, brackets, etc., are required to meet special conditions, they shall be fastened rigid and secure before conduit is attached.
17. Conduit in ceiling spaces, stud walls, and under floors, shall be supported with factory fabricated pipe straps or shall be suspended with pipe hangers or pipe racks. Pipe straps shall be attached to and shall fasten conduit tight at point of support against ceiling and floor joists, rafters, and wall studs, or two-inch x four-inch headers fitted between joists or wall studs.
18. Conduits installed on exposed steel trusses and rafters shall be fastened with factory fabricated conduit straps or clamps, which shall fasten conduit tight against supporting member at point of support.
19. Conduits installed under buildings shall be strapped with factory fabricated conduit straps to underside of concrete floor or joists, or wood floor joists, or shall be suspended with pipe hangers or pipe racks. Conduits under building are not permitted to be placed directly on grade; they shall be suspended from building or shall be buried below surface or ground. 1-1/4 inch and larger conduits under buildings shall be installed with conduit hangers or racks.
20. Pipe hangers for individual conduits shall be factory fabricated. Steel rods shall be 3/8 inch for two-inch conduit hangers and smaller and shall be 1/2 inch for 2 1/2-inch conduit hangers and larger.
21. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapeze type and shall consist of a cross channel, Steel City Kindorf B-900, Unistrut P-1000, equivalent Cooper B-Line or equal, suspended with a 3/8 inch minimum diameter steel rod at each end. Rods shall be fastened with nuts, top and bottom to cross-channel and with square washers on top of channel. Conduits shall be clamped to top for cross-channel with conduit clamps, Steel City Kindorf C-105 or Unistrut P-1111 through P-1124, equivalent Cooper B-Line, or equal. Conduits shall not be

stacked one on top of another, but a maximum of two tiers may be on same rack providing an additional cross-channel is installed. Where a pipe rack is to be longer than 24 inches, or if the supported weight exceeds 500 pounds, submit Shop Drawings of installation to the Architect for review.

22. Conduits suspended on rods more than two feet long shall be rigidly braced to prevent horizontal motion or swaying. Installation shall meet zone 4 seismic requirements.
23. Factory fabricated pipe straps shall be one or two-hole formed galvanized clamps, heavy-duty type, except where otherwise specified.
24. Hangers, straps, rods, or pipe supports under concrete shall be attached to inserts set at time concrete is placed, or with approved concrete anchors. Under wood, install bolts, lag bolts, or lag screws; under steel joists or trusses, install beam clamps. Contractor shall submit size of anchors, bolts, screws, and installation method to Architect for approval prior to start of any work.
25. Conduits shall be supported at intervals required by code, but not to exceed ten feet. One inch and smaller exposed conduits shall be fastened with one-hole malleable iron straps. Perforated straps and plumber's tape is not permitted for the support of conduits
26. Conduits stubbed up through a roof or an arcade shall be flashed with a waterproof flashing. Refer to Division 07 for additional requirements.
27. Bushings and locknuts for rigid steel conduit shall be steel threaded insulating type. Setscrew bushings are not permitted.
28. Flex conduits shall be cut square and not at an angle.
29. Routing of conduits may be changed providing length of any conduit run is not increased more than ten percent of the length indicated on Drawings.

B. Underground Requirements:

1. Conduits and multicell raceways installed underground shall be entirely encased in three inch thick concrete on all sides , except where otherwise specified. Provide required spacers to prevent any deflection when concrete is placed and to preserve position and alignment. Conduits and raceways shall be tied to spacers. Anchors shall be installed to prevent floating of conduits and raceways during placing of concrete. Provide red colored concrete to encase conduits of systems operating above 600 volts.
2. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the concrete envelope, unless otherwise specified.
3. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.
4. Conduits and raceways in a common trench shall be separated by at least three inches of concrete. Electrical power and/or lighting conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking, and clock systems shall maintain a separation of a minimum of six

Raceways, Boxes, Fittings, and Supports
26 0533-7

inches from these types of signal system conduits and raceways. Electrical power, lighting and signal conduits and raceways installed in a common trench with other utility lines such as gas, water, sewer and storm lines shall maintain 12 inches separation from these types of utility lines.

5. The Inspector will observe underground installations before and during concrete placement. A mandrel shall be drawn through each run of conduit in presence of the Inspector before and after placing concrete. Mandrel shall be six inches in length minimum, and have a diameter that is within 1/4 inches of diameter of conduit to be tested.
 6. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1 1/2-inch inclusive shall not be less than 24 inches. Bends at risers and risers shall be PVC-coated rigid steel conduit. Radius of curve of bends or offsets in non-metallic conduit for public telephone system shall be not less than ten times trade size of conduit, unless otherwise specifically permitted.
 7. Furnish and install a six-inch wide, polyethylene, red underground barrier type 12 inches above full length of concrete reading, "CAUTION ELECTRIC LINE BURIED BELOW".
 8. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.
 9. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.
 10. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a four-inch galvanized nipple with ground bushing.
 11. Underground conduit for systems operating above 600 volts shall be a minimum size of four inches.
 12. At portable classroom all stub ups shall be installed with a coupling flush to finish grade.
 13. Underground conduits and raceways shall be swabbed prior to wire pull.
- C. Rooftop conduit shall be supported from channels, stands, clamps, trapezes, rollers, or structures mounted on 100% rubber, UV resistant rooftop supports with reflective strips, Dura-Blok, or equal. Roller type supports shall be provided below and above conduit to prevent its dislodgement. Bottom of conduits shall clear the roof surface by 10 inches.
1. At PVC roofing provide walk tread, polyester reinforced, UV resistant, with surface embossment at rooftop supports. Heat welding of walk pads shall only be done by manufacturer certified installers.
 - a. Sika-Sarnafil and Carlisle: Walk tread shall be no more than one inch larger than the plan area of the pipe support blocks and adhered to the roof membrane with Sika 1A or Carlisle Universal Single-Ply sealant, as applicable.

- b. Johns Manville: Walk tread shall be installed under the pipe support blocks and adhered to the blocks, if possible, and left loose laid on top of the PVC roof system. Walk-pad shall have a minimum of 4 inches of material past perimeter on all 4 sides of block.
 - 2. Built-up roofing: Provide APP granulated modified torch-down at each pipe support block. Torch-down shall extend 2 to 4 inches beyond the edges of the block and adhered by torch application over existing cap sheet membrane. This work shall be performed by a certified roofer.
- D. General Installation Requirements for Computer Network System Conduits:
- 1. Location of outlet boxes and equipment on Drawings is approximate, unless dimensions are indicated. Drawings shall not be scaled to determine position and routing of wireways, drops, and outlet boxes. Location of outlet boxes and equipment shall conform to architectural features of the building and other Work already in place and must be ascertained in the field before start of Work.
 - 2. The maximum pulling tensions of the specified cables shall not be exceeded and proper radius of cable bends shall be maintained.
 - 3. For computer network wiring, conduit types shall be limited to rigid metal conduit, electrical metallic tubing, schedule 40 PVC, multi-cell raceways, and flexible metallic conduit for lengths less than six feet.
 - 4. Interior section of conduit run shall be not longer than 100 feet and shall not contain more than two bends of 90 degrees between pull points or pull boxes.
 - 5. The inside radius of a conduit bend shall be at least six times the internal diameter of the conduit. When the conduit size is greater than two inches, the inside radius shall be at least ten times the internal diameter of the conduit. For fiber-optic cable, the inside radius of a conduit bend shall be at least ten times the internal diameter of the conduit.
 - 6. Conduit shall be sized in accordance with Table 4.4-1 of EIA/ TIA 569 standard.
 - 7. Splicing or terminating cables in pull boxes is not permitted.
 - 8. For indoor application, a pull box shall be provided in conduit run where:
 - a. The length is over 100 feet.
 - b. There are more than two bends of 90 degrees.
 - c. There is a reverse bend in the run.
 - 9. Boxes shall be provided in a straight section of conduit and shall not be installed in lieu of a bend. The corresponding conduit ends are to be aligned with each other. Conduit fittings shall not be installed in place of pull boxes.
 - 10. Where a pull box is provided with raceways, pull box shall comply with the following:
 - a. For straight pull-through, provide a length of at least eight times the trade-size diameter of the largest raceway.
 - b. For angle and U-pulls:

Raceways, Boxes, Fittings, and Supports
26 0533-9

- 1) Provide a distance between each raceway entry inside the box and the opposite wall of the box of at least six times the trade-size diameter of the largest raceway, this distance being increased by the sum of the trade-size diameters of the other raceways on the same wall of the box.
 - 2) Provide a distance between the nearest edges of each raceway entry enclosing the same conductor of at least:
 - a) Six times the trade-size diameter of the raceway; or
 - b) Six times the trade-size diameter of the larger raceway if they are of different size.
 - c) For a raceway entering the wall of a pull box opposite to a removable cover, provide a distance from the wall to the cover of not less than the trade-size diameter of the largest raceway plus six times the diameter of the largest conductor.
11. Drawings generally indicate Work to be installed, but do not indicate all bends, transitions of special fittings required to clear beams, girders or other Work already in place. Investigate conditions where conduits and wireways are to be installed, and furnish and install required fittings.

E. Slabs on Grade:

1. Unless specifically reviewed by the Architect and DSA, conduits 1 ¼-inches and larger are not permitted to be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, slabs shall be thickened at bottom where conduits occur to provide three inches of concrete between conduit and earth. Required excavation shall be part of the Work of this section.
2. If concrete slab is five inches or more in thickness with a moisture barrier plastic sheet between earth and slab, one inch and smaller conduits shall be installed in the slab with a minimum of one inch concrete between earth and conduit.

- F. Concrete Walls, Beams, and Floors: Provide sleeves where conduits pierce concrete walls, beams, and floors, except floor slabs on grade. Sleeves shall provide 1/2 inch clearance around conduits. Sleeves shall not extend beyond exposed surfaces of concrete and shall be securely fastened to forms. Where conduits pass through walls below grade, seal with required sealant and backer materials between conduit and sleeve to provide a watertight joint. Sealant shall be as indicated in Section 07 9200: Joint Sealants.

3.02 STUBS

- A. Panelboard: Install two one inch conduits from each flush mounted panelboard to access under floor space and to access above ceiling space where these conditions occur. Cap conduits with standard galvanized pipe caps.
- B. Floor: At points where floor stubs are indicated in open floor areas, for connections to machines and equipment, conduits shall be terminated with couplings, tops flush with finished floor. Stubs shall extend above couplings the indicated distance.

Raceways, Boxes, Fittings, and Supports
26 0533-10

Where capped stubs are designated, couplings shall be closed with cast iron plugs with screw drive slots.

C. Underground:

1. Underground conduit stubs shall be terminated at locations indicated, and shall extend five feet beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and non-metallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with a permitted plug. Project record drawings shall indicate location of ends of underground conduit stubs fully dimensioned and triangulated with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on project record drawings in presence of the Inspector before backfilling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.
2. Over ends of individual underground conduit stubs or groups of conduit stubs, install four-inch by 18-inch deep PVC filled with concrete, flush with finished grade in asphaltic concrete or lawns, and two inches above finished grade in planting areas. Cast a three-inch by three-inch brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or as indicated on drawings.

3.03 PROTECTION

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

3.04 CLEANUP

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

END OF SECTION

SECTION 26 0543
UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Ducts in concrete-encased duct banks.
 - 2. Handholds and hand hole accessories.
 - 3. Manholes and manhole accessories.
- B. Related Sections include the following:
 - 1. Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding electrodes, counterpoise conductors, clamps and connectors for grounding metallic manhole and hand hole accessories, and testing of grounds.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Manhole and hand hole hardware.
 - 2. Conduit and ducts, including elbows, bell ends, bends, fittings, and solvent cement.
 - 3. Duct-bank materials, including spacers and miscellaneous components.
 - 4. Warning tape.
- B. Shop Drawings: Show fabrication and installation details for underground ducts and utility structures and include the following:
 - 1. For manholes:
 - a. Duct sizes and locations of duct entries.
 - b. Reinforcement details.
 - c. Manholes cover design.
 - d. Step details.
 - e. Grounding details.
 - f. Dimensioned locations of cable rack inserts, pulling-in irons, and sumps.
 - 2. For precast manholes and hand holes, Shop Drawings shall be signed and sealed by a qualified professional engineer, and shall show the following:
 - a. Construction of individual segments.
 - b. Joint details.
 - c. Design calculations.

- C. Coordination Detailing Activity Drawings: Show duct profiles and coordination with other utilities and underground structures. Include plans and sections drawn to scale, and show all bends and location of expansion fittings. Refer to Division 01 Section, "Coordination and Detailing Activity".
- D. Product Certificates: For concrete and steel used in underground precast manholes, according to ASTM C 858.
- E. Product Test Reports: Indicate compliance of manholes with ASTM C 857 and ASTM C 858, based on factory inspection.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories Including Ducts for Communications and Telephone Service: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the University's Representative, and marked for intended use.
- B. Comply with ANSI C2.
- C. Comply with California Electric Code (NFPA 70).

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
- B. Store precast concrete units at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
- C. Lift and support precast concrete units only at designated lifting or supporting points.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied the University or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify the University's Representative fourteen days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without University Representative's written permission.

1.6 COORDINATION

- A. Coordinate layout and installation of ducts, manholes, and handholes with final arrangement of other utilities and site grading, as determined in the field.
- B. Coordinate elevations of ducts and duct-bank entrances into manholes and handholes with final profiles of conduits as determined by coordination with other utilities and underground obstructions. Revise locations and elevations from those indicated as required to suit field conditions and to ensure duct runs drain to manholes and handholes, and as approved by the University's Representative.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish cable-support stanchions, arms, insulators, and associated fasteners in quantities equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Underground Precast Concrete Utility Structures:
 - a. Carder Concrete Products.
 - b. Christy Concrete Products, Inc.
 - c. Elmhurst-Chicago Stone Co.
 - d. Jensen Precast.
 - e. Utility Vault Co.
 - f. Wausau Concrete Co.
 - g. Or equal.
 - 2. Frames and Covers:
 - a. Alhambra Foundry
 - b. Campbell Foundry Co.
 - c. East Jordan Iron Works, Inc.
 - d. McKinley Iron Works, Inc.
 - e. Neenah Foundry Co.
 - f. Or equal.
 - 3. Nonmetallic Ducts and Accessories:
 - a. Arnco Corp.
 - b. Beck Manufacturing Inc.
 - c. Cantex, Inc.
 - d. Certainteed Corp.; Pipe & Plastics Group.
 - e. ElecSys, Inc.
 - f. Electri-Flex Co.
 - g. Lamson & Sessions; Carlon Electrical Products.
 - h. Manhattan/CDT/Cole-Flex.

- i. Spiraduct/AFC Cable Systems, Inc.
 - j. Or equal.
- B. Or Equal: Where products are specified by manufacturers name and accompanied by the term "or equal", comply with provisions in Division 01 Section "Product Requirements", Part 2 "Product Substitutions" Article. Specific procedures must be followed before use of an unnamed product or manufacturer.

2.2 CONDUIT

- A. Conduit and fittings are specified in Division 26 Section "Raceways and Boxes for Electrical Systems."

2.3 DUCTS

- A. Rigid Nonmetallic Conduit: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by the same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.4 HAND HOLES

- A. Cast-Metal Boxes: Cast aluminum, with outside flanges and recessed, gasketed cover for flush mounting and with nonskid finish and legend on cover. Unit, when buried, shall be designed to support AASHTO H10 loading for sidewalk and landscaped areas and HS20 for roadways, parking lots and loading docks.
- B. Precast Handholes: Reinforced concrete, monolithically poured walls and bottom, with steel frame and access door assembly as the top of hand hole. Duct entrances and windows shall be located near corners to facilitate racking. Pulling-in irons and other built-in items shall be installed before pouring concrete. Cover shall have nonskid finish and legend. Unit, when buried, shall be designed to support AASHTO H10 loading for sidewalk and landscaped areas and HS20 for roadways, parking lots and loading docks.
- C. Cover Legend: "ELECTRIC."

2.5 PRECAST MANHOLES

- A. Precast Units: ASTM 478, with interlocking mating sections, complete with accessories, hardware, and features as indicated. Include concrete knockout panels for conduit entrance and sleeve for ground rod.
- B. Diameter: 48 inches minimum.
- C. Design and fabricate structure according to ASTM C 858.
- D. Structural Design Loading: ASTM C 857, Class A-16 (AASHTO HS20).
- E. Base section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
- F. Riser Sections: 4-inch minimum thickness, and lengths to provide required depth Approved by University Representative.

Underground Ducts and Raceways for Electrical Systems
26 0543-4

- G. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
- H. Steps: ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
- I. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.
- J. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
- K. Protective Coating: Plant-applied, coal-tar, epoxy-polyamide paint 15-mil minimum thickness applied to exterior and interior surfaces.
- L. Source Quality Control: Inspect structures according to ASTM C 1037.

2.6 ACCESSORIES

- A. Duct Spacers: Rigid PVC interlocking spacers, selected to provide minimum duct spacings and cover depths indicated while supporting ducts during concreting and backfilling; produced by the same manufacturer as the ducts.
- B. Manhole Frames and Covers: Comply with AASHTO loading specified for manhole; Ferrous frame 36 inch clear ID by 6 inch minimum riser with 4-inch-minimum width flange and 38 -inch-diameter cover.
 - 1. Provide cast covers with cast-in legend:
 - a. "UCI LV-ELECTRIC" for duct systems with power wires and cables for systems operating at 600 V and less.
 - b. "UCI HV-ELECTRIC" for duct systems with medium-voltage cables.
 - c. "UCI COMMUNICATIONS" for communications, data, and telephone duct systems.
 - 2. Cast iron with cast-in legend as indicated above subsection 1. Milled cover-to-frame bearing surfaces.
 - 3. Manhole Frames and Covers: ASTM A 48; Class 30B gray iron, 36-inch size, machine-finished with flat bearing surfaces.
- C. Sump Frame and Grate: ASTM A 48, Class 30B gray cast iron.
- D. Pulling Eyes in Walls: Eyebolt with reinforcing-bar fastening insert 2-inch- diameter eye and 1-by-4-inch bolt.
 - 1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.
- E. Pulling and Lifting Irons in Floor: 7/8-inch- diameter, hot-dip-galvanized, bent steel rod; stress relieved after forming; and fastened to reinforced rod. Exposed triangular opening.
 - 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.

- F. Bolting Inserts for Cable Stanchions: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.
 - 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- G. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
- H. Cable Stanchions: Hot-rolled, hot-dip-galvanized, T-section steel; 2-1/4-inch size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
- I. Cable Arms: 3/16-inch- thick, hot-rolled, hot-dip-galvanized, steel sheet pressed to channel shape; 12 inches wide by 14 inches long and arranged for secure mounting in horizontal position at any location on cable stanchions.
- J. Cable-Support Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
- K. Grounding Materials: Comply with Division 26 Section "Grounding and Bonding for Electrical Systems."
- L. Duct-Sealing Compound: Non-hardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and of adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- M. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification for Electrical Systems."

2.7 CONSTRUCTION MATERIALS

- A. Seal manhole section joints with sealing compound recommended by the manhole manufacturer.
- B. Damp proofing: Comply with Division 07 Section "Bituminous Damp proofing."
- C. Mortar: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.
- D. Brick for Manhole Chimney: Sewer and manhole brick, ASTM C 32, Grade MS.
- E. Concrete: Use 3000-psi- minimum, 28-day compressive strength and 1-inch maximum aggregate size. Concrete and reinforcement are specified in Division 03 Section "Cast-in-Place Concrete." Provide red dye added to concrete during batching for medium voltage as follows:
 - 1. 2.0 lbs. of dye per 94 lb. bag of cement.
 - a. Color: Davis Color No. 1117.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Underground Ducts for Electrical Cables Higher Than 600 V: Type EPC-40-PVC, concrete-encased duct bank.
- B. Underground Ducts for Telephone Utility Service: Type EPC-40-PVC, direct-buried duct bank, except use Type EPC-80-PVC when crossing roads.
- C. Underground Ducts for Communication Circuits: Type EPC-40-PVC, direct-buried duct bank, except use Type EPC-80-PVC when crossing roads.
- D. Manholes: Underground precast concrete utility structures.
- E. Manholes: Cast-in-place concrete.

3.2 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving" but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore all areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Section.
- D. Restore disturbed pavement. Refer to Division 01 Section "Cutting and Patching."

3.3 CONDUIT AND DUCT INSTALLATION

- A. Exercise care in excavating, trenching, and working near existing utilities. Locate any existing buried utilities before excavating.
- B. Duct bank trench shall be shored, framed and braced for installing ducts. Frames, forms, and braces shall be either wood or steel. Variations in outside dimensions of the installed duct bank shall not exceed 2 inches on the vertical or the horizontal from the design. Remove forms and bracing after 24 hours and before backfilling.
- C. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions. Duct banks shall be laid to a minimum grade slope of 4 inches per 100 feet. This slope may be from one manhole to the next or both ways from a high point between manholes, depending upon the contour of the finished grade.
- D. Duct banks shall be installed so that the top of the concrete encasement shall be no less than 36 inches below grade or pavement for primary 12K power, and not less 24 inches below finished grade or pavement for campus-wide communications. As a general rule, depths shall be a minimum of three feet, but not more than six feet.

- E. Curves and Bends: Use manufactured 60 inches minimum elbows for stub-ups at equipment, communication pull boxes or enclosures and at building entrances. Use manufactured long sweep bends with a minimum radius of 25 feet, both horizontally and vertically, at other locations. Manufactured long radius bends may be used in runs of 100 feet or less on approval from the University's representative. Vertical feeder sweep into buildings shall be coated steel.
- F. Use solvent-cement joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.
- G. Duct Entrances to Manholes and Handholes: Space end bells approximately 10 inches o.c. for 5-inch ducts and vary proportionately for other duct sizes. Change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line. Grout end bells into manhole walls from both sides to provide watertight entrances. Where connection to bulkhead of duct bank is made to vaults or existing duct banks, the concrete encasement shall be doweled with on No. 4 reinforcement rod 36 inches long per conduit to the existing encasement.
- H. Building Entrances: Make a transition from underground duct to conduit at least 10 feet outside the building wall. Use fittings manufactured for this purpose. Follow the appropriate installation instructions below:
 - 1. Concrete-Encased Ducts: Install reinforcement in duct banks passing through disturbed earth near buildings and other excavations. Coordinate duct bank with structural design to support duct bank at wall without reducing structural or watertight integrity of building wall.
 - 2. Direct-Buried, Non-encased Ducts at Non-waterproofed Wall Penetrations: Install a Schedule 40, galvanized steel pipe sleeve for each duct. Calk space between conduit and sleeve with duct-sealing compound on both sides for moisture-tight seal.
 - 3. Waterproofed Wall and Floor Penetrations: Install a watertight entrance-sealing device with sealing gland assembly on the inside. Anchor device into masonry construction with one or more integral flanges. Secure membrane waterproofing to the device to make permanently watertight.
- I. Concrete-Encased, Nonmetallic Ducts: Support ducts on duct spacers, spaced as recommended by manufacturer and coordinated with duct size, duct spacing, and outdoor temperature. Install as follows:
 - 1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts and secure separators to earth and to ducts to prevent floating during concreting. Stagger spacers approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
 - 2. Duct joints in concrete may be placed side by side horizontally, but shall be staggered at least 6 inches vertically. Joints shall be made in accordance with manufacturer's recommendations for the particular type of duct and coupling selected. In the absence of specific recommendations, plastic duct connections shall be made by brushing a plastic solvent cement on the inside of a plastic coupling fitting and on the outside of duct's ends. The duct and fitting shall then be slipped together with a quick one-quarter turn to set the joint.
 - 3. Concreting: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of

concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application. Pour each run of envelope between manholes or other terminations in one continuous operation. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope. At connection to manholes, dowel concrete encasement with on No. 4 reinforcing bar 36 inches long per duct.

4. Reinforcement: Reinforce duct banks where they cross disturbed earth and where indicated.
 5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
 6. Minimum Clearances between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and signal ducts.
 7. Depth: Install top of duct bank at least 24 inches below finished grade in no traffic areas and at least 30 inches below finished grade in vehicular traffic areas, unless otherwise indicated.
- J. Direct-Buried Ducts: Support ducts on duct spacers, spaced as recommended by manufacturer and coordinated with duct size, duct spacing, and outdoor temperature. Install as follows:
1. Separator Installation: Space separators not more than 4 feet center-to-center along entire length of duct bank including top pipes.
 2. Install expansion fittings as shown on Shop Drawings.
 3. Trench Bottom: Continuous, firm, and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than 6 inches in nominal diameter.
 4. Backfill: Install backfill as specified in Division 31 Section "Earth Moving." After installing first tier of ducts, backfill and compact. Repeat backfilling after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, complete backfilling normally. Do not place backfill for a period of at least 24 hours after pouring of concrete.
 5. Minimum Clearances between Ducts: 3 inches between ducts for like services and 6 inches between power and signal ducts.
 6. Depth: Install top of duct bank at least 36 inches below finished grade, unless otherwise indicated.
- K. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank.
- L. Stub-ups: Use rigid steel conduit for stub-ups to equipment. For equipment mounted on outdoor concrete bases, extend steel conduit a minimum of 5 feet from edge of base.

Install insulated grounding bushings on terminations. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete. Galvanized steel conduits installed below grade shall be painted with two coats of Koppers Bitumastic paint before installing in ground.

- M. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- N. Pulling Cord: Install 100-lbf- test nylon cord in ducts, including spares.

3.4 MANHOLE AND HANDHOLE INSTALLATION

- A. Elevation: Install manholes with rooftop at least 15 inches below finished grade. Install handholes with depth as indicated. Where indicated, cast hand hole cover frame directly into roof of hand hole and set roof surface 1 inch above grade. Place and align precast manholes to provide horizontal tolerance of 2 inches in any direction and vertical alignment with not greater than 1/8 inch maximum tolerance for 6 foot of depth. Completed manhole shall be rigid, true to dimensions and alignment, and shall be watertight.
- B. Drainage: Install drains in bottom of units where indicated. Coordinate with drainage provisions indicated. Sumps shall be knocked out at time of installation.
- C. Access: Install cast-iron frame and cover.
 - 1. Install precast collars and rings to support frame and cover and to connect cover with roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.
 - 2. Set frames in paved areas and traffic ways flush with finished grade. Set other frames 1 inch above finished grade.
- D. Waterproofing: Apply waterproofing to exterior surfaces of units after concrete has cured at least three days. Apply according to Division 07 Section "Cold-Fluid Applied Water Proofing." After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole and hand hole chimneys after brick mortar has cured at least three days. Seal manhole section joints with sealing compound recommended by the manhole manufacturer. Penetration into manholes and/or boxes shall be sealed. Provide conduit duct plugs for unused terminator openings of spare conduits in manhole. Do not water seal top removable cover until cable pulling has been completed.
- E. Damp proofing: Apply damp proofing to exterior surfaces of units after concrete has cured at least three days. Apply according to Division 07 Section "Bituminous Damp proofing." After ducts have been connected and grouted, and before backfilling, damp proof joints and connections and touch up abrasions and scars. Damp proof exterior of manhole and hand hole chimneys after brick mortar has cured at least three days.
- F. Interior walls and ceiling shall be primed and painted with two coats flat white paint.
- G. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.

- H. Field-Installed Bolting Anchors: Do not drill deeper than 3-7/8 inches for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.
- I. Grounding: Install ground rod through floor in each structure with top protruding 6 inches above floor. Seal floor opening against water penetration with waterproof nonshrink grout. Ground exposed metal components and hardware with bare-copper ground conductors. Train conductors neatly around corners. Use cable clamps secured with expansion anchors to attach ground conductors.
- J. Precast Concrete Manhole Installation: comply with ASTM C 891.
 - 1. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
 - 2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth. Provide a minimum 6-inch level base of $\frac{3}{4}$ inch crushed rock under manhole to ensure uniform distribution of soil pressure on floor.

3.5 FIELD QUALITY CONTROL

- A. Testing: Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
- B. Grounding: Test manhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Duct Integrity: Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of the duct. If obstructions are indicated, remove obstructions and retest.
- D. Correct installations if possible and retest to demonstrate compliance. Remove and replace defective products and retest.

3.6 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.
- C. After the duct line has been completed, a brush with stiff bristles shall be pulled through each duct to make certain that no particles of earth, sand or gravel have been left in the line. (Mandrels not less than 12 inches long, having a diameter approximately $\frac{1}{4}$ inch less than inside diameter of the duct, shall be pulled through each duct). Leave a $\frac{3}{8}$ "-inch minimum polypropylene pull rope in each duct for future use.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.

1.2 PRODUCTS

- A. Power and Control Raceway Identification: Vinyl labels.
- B. Power and Control Cable Identification: Vinyl labels and Metal tags.
- C. Conductor Identification: Color-coding conductor tape.
- D. Floor Marking Tape: Pressure-sensitive vinyl tape.
- E. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, polyethylene tape, with embedded continuous metallic strip or core.
- F. Warning Labels and Signs: Baked-enamel warning signs.
- G. Instruction Signs: Engraved, laminated acrylic or melamine plastic.
- H. Equipment Identification Labels: Engraved, laminated acrylic or melamine plastic.

1.3 APPLICATION

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Printed Legend:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretension, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretension, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

1.4 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

- B. Fabricated Nameplates Shall Clearly State the Following:
 - 1. Manufacturer's name and equipment design ratings including current, voltage, KVA.
 - 2. System nominal voltage, equipment rating KVA, amperes.
 - 3. Panel designation, voltage and phase.
- C. Manufacturer's Device Nameplates: Circuit number; manufacturer and electrical characteristic ratings including the following:
 - 1. Circuit Breakers: Voltage, maximum interrupting current and trip current.
 - 2. Switches: Voltage, horsepower or maximum current switching. If fused, include nameplate stating "Fuses must be replaced with current limiting type of identical characteristics.
 - 3. Contactors: Voltage, continuous current, horsepower or interrupting current, and whether "mechanically held" or "electrically held."
- D. Controllers: Voltage, current.

1.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength: 50lb, minimum
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color coding.
- B. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

1.6 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

- E. Attach signs and plastic labels that are not self-adhesive type with screws and auxiliary hardware appropriate to the location and substrate.

- F. Color Coding for Phase and Voltage Level Identification, 600V and Less:
 - 1. Colors for 208/120V Circuits;
 - a. Phase A: Black
 - b. Phase B: Red
 - c. Phase C: Blue
 - d. Neutral: White
 - e. Ground: Green
 - 2. Colors for 480/277V Circuits;
 - a. Phase A: Brown
 - b. Phase B: Yellow
 - c. Phase C: Purple
 - d. Neutral: Gray

- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

- H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

1.7 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands:
 - 1. Fire Alarm System: Red.

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

- C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

- D. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source and circuit number.

- E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- F. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- G. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Screwed-on engraved white laminated plastic sheet with minimum 3/8 inch to 3/4 inch black lettering for normal systems and red laminated plastic sheet with lettering for emergency systems.
 - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - 2. Equipment to Be Labeled:
 - a. Identification labeling of some items listed below may be required by individual Sections or by CEC.
 - b. Panelboards, electrical cabinets, and enclosures.
 - c. Switchgear.
 - d. Switchboards.
 - e. Transformers:
 - f. Substations.
 - g. Emergency system boxes and enclosures.
 - h. Motor-control centers.
 - i. Enclosed switches.
 - j. Enclosed circuit breakers.
 - k. Enclosed controllers.
 - l. Power transfer equipment.

- m. Contactors.
 - n. Remote-controlled switches, dimmer modules, and control devices.
 - o. Battery-inverter units.
 - p. Battery racks.
 - q. Power-generating units.
 - r. Monitoring and control equipment.
 - s. UPS equipment.
 - t. Fire-alarm control panel and annunciators.
- I. Devices: P-Touch adhesive label on each device plate with 3/16" high block letters in black where noted and as follows:
- 1. Lock switch and switch with pilot light – device controlled.
 - 2. Switch for fan, motor, unit heater – equipment controlled.
 - 3. Switch where lights or equipment are out of sight – equipment controlled.
 - 4. Switches in gangs of three or more – description of lights or equipment switched.
 - 5. All receptacles and switches – panel and circuit number reflecting installed condition.
 - 6. All equipment on the normal and emergency systems – panel and circuit number reflecting installed condition.
 - 7. Receptacles over 150V to ground and/or 30A and higher rating – voltage and ampere rating.
 - 8. Where wording is not indicated, allow for ten letters per device and use wording as directed.
- J. For switch cabinets engrave each device or furnish engraved nameplate.

END SECTION

SECTION 26 2200
LOW-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: This specification covers single-phase and three-phase general purpose individually mounted dry-type transformers, 600 V maximum, for power and lighting applications. It includes transformers as specified and as indicated on Drawings.
- B. Work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.
- C. Codes and Applicable standards: Products and installation shall meet or exceed the latest edition of the following standards.
 - 1. ANSI/IEEE C57.96, Distribution and Power Transformers, Guide for Loading Dry-Type Transformers; Appendix to ANSI C57.12 Standards.
 - 2. Department of Energy, Energy Act of 2005.
 - 3. International Electrical Code adopted by the State of California.
 - 4. ANSI/NEMA 250 Enclosure for Electrical Equipment (1000 Volts Maximum)
 - 5. IEEE C57.12.91, Test Code for Dry-Type Distribution and Power Transformers.
 - 6. IEEE C57.110 – IEEE Recommended Practice for establishing liquid-filled and dry-type power and distribution transformer capability when supplying non-sinusoidal load currents.
 - 7. 1100-IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment.
 - 8. NEMA standard 20, Dry-Type Transformers for General applications.
 - 9. UL 506, Specialty Transformers.
 - 10. UL 1561, Dry-Type General Purpose and Power Transformers.
 - 11. NEMA TP-1, Guide for Determining Energy Efficiency for Distribution Transformers.
 - 12. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.
 - 13. NEMA TP-3, Standard for the Labeling of Distribution Transformer Efficiency.
 - 14. CSA 802.2-00 Minimum Efficiency Values for Dry Type Transformers

- 15. California Building Code (CBC)
- 16. NFPA 70 National Electric Code

D. No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Owner Authorized Representative by the CONTRACTOR.

E. ACRONYMS

ANSI	American National Standards Institute
AOR	Architect of Record
CEC	California Electrical Code
EOR	Engineer of Record
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical manufacturers Association

1.02 DESIGN REQUIREMENTS

- A. Premium Efficiency transformers with internal losses at 35 percent loading reduced by 30 percent when using temperature and material correction factor to 75 degrees C per NEMA Standard TP1
- B. Load Mix: Transformer shall be UL 1561 listed to feed a mix of equipment load profiles such as computer without detracting or significant degradation of efficiency.
- C. The transformer shall be labeled with a K-9 Rating in accordance with UL 1561 35.21 and 34.2.
- D. K-7 rating is not allowed.
- E. Construction: Windings shall be continuous wound copper with brazed or welded terminations.
 - 1. Insulation and Varnish Systems: Epoxy Polyester impregnation
 - 2. Terminals, including those for changing taps must be readily accessible by removing a front cover plate.
- F. Performance of transformers shall meet or exceed the requirements of applicable codes and standards, the DOE Energy Policy Act of 2005 - Public Law 109-58 and the latest requirements of the California Energy Commission Appliance Efficiency Regulations. In addition; transformers shall be designed to an efficiency standard higher than the lowest legal standard for the purpose of contributing to LEED Energy and Atmosphere (Optimized Energy Performance) and Utility Rebates.
- G. Transformers shall be self-cooled type with 220 degrees C. insulation and a maximum temperature rise of 130 degrees C. under continuous full load conditions with an ambient of 40 degrees C.

- H. Transformers shall be furnished with four 2.50 percent (two above and two below normal voltage) taps. Windings shall be of fire-resistant type, designed for natural convection cooling through normal air circulation.
- I. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, installation, and short circuit stresses.
- J. Enclosure cover plates shall be sheet steel, captive bolted to enclosure framework. Enclosure shall provide suitable ventilating openings with rodent-proof screens, NEMA 1 enclosure. Enclosure shall be provided with lifting lugs and jacking plates as required. Transformers installed outdoors shall be provided with weatherproof NEMA 3R enclosure and weather proof kit.
 - 1. Submit rodent-proof screen sample for OWNER's approval.
- K. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, excepting cores and core mounting frames shall be furnished clean, rust-proofed, and provided with a coat of an inert primer.
- L. Transformers up to 35 KVA shall not exceed 40 decibels. Transformers 36 KVA or more shall be a minimum of 5 decibels below NEMA standards per unit. Transformers shall be provided with vibration dampers consisting of California Dynamic, Mason Industries, Korfund or equal neoprene mounting pad and Elastorib sheeting. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.
- M. Transformers shall be UL listed.
- N. Each transformer to be installed under this section shall be sound tested at the factory. CONTRACTOR shall provide two copies of transformers tests reports for EOR's review.
- O. Equipment shown on drawings to scale is approximate only and based upon a general class of equipment specified. The CONTRACTOR shall verify dimensions and clearances prior to commencement of work.
- P. Verify points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. Actual dimensions, weights, clearances and installation requirements shall be verified and coordinated by the CONTRACTOR.

1.03 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Shop Drawings: Include make, catalog number, dimensions, weight, KVA Rating, Percent Impedance, finish, type, insulation class, design temperature, sound levels, efficiency and taps provided. Include regulation at 80 percent and 100 percent of full load, no-load loss, full-load loss, percent efficiency, percent impedance, noise level and continuous capacity rating.
- C. Provide manufacturers data and inspection report that confirms transformers to be UL 1561 listed with K rating equal to that indicated on drawings.
- D. Provide a connection schematic diagram.

- E. Provide the following tests reports: Project Inspector will review the reports for conformance with specified criteria, and compliance with the applicable standards. Submit one copy for each set of shop drawings being submitted.
1. Load Losses: Measurements shall be taken at multiple load levels and plotted to show compliance with specifications and correlated to efficiency curve for the transformer size and type.
 2. Provide No-Load and Total Losses report.
 3. Applied Voltage.
 4. Temperature Rise.
 5. Induced Voltage.
 6. Sound Level.
 7. Impulse Test.
 8. Manufacturer's nonlinear load test representing real world load mix. Transformers not meeting this requirement shall not be installed.
- F. Submit harmonics test plan as follows:
1. NEMA ST-20.
 - a. Open Circuit Test (no load losses):
 - 1) Use for both Linear and non-Linear.
 - 2) Measure Power.
 - b. Short Circuit Test (load losses):
 - 1) Short Primary Winding.
 - a) Linear Test – complete with linear profile through secondary winding.
 - c. Non-Linear Test.

Harmonic Profile (K-7 Load)				
Harmonic Number	Rated % Current	Phase Shift		
		A	B	C
1	100.0	0	120	240
3	81.0	0	0	0
5	60.6	0	240	120
7	37.0	0	120	240
9	15.7	0	0	0
11	2.4	0	240	120
13	6.3	0	120	240
15	7.9	0	0	0

- 1) Complete with non-linear profile through secondary windings.
 - 2) Measure Power.
2. Take data and graph efficiency per NEMA ST-20.
 - a. Graph-1 – Linear Loads 0 to 100 Percent Loads.
 - b. Graph 2 – Non-Linear Profile K-9 0 to 100 Percent loads.
 3. Test Plans measuring Power IN and Power Out will not be accepted since procedures are not covered by any standard.

1.04 WARRANTY

- A. Transformers shall be warranted to be free from defects in materials, fabrication and execution for a period of three years from the date of substantial completion.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Transformers manufactured by Siemens, Square D, General Electric, Power Smiths, MGM, and Cutler Hammer or equal.
- B. There shall be no openings through which foreign objects such as sticks, rods, wires, or the like might enter and contact live parts. Provide means for padlocking compartment doors.
 - a. Connection terminal points shall be bottom fed and located as far as possible below vent openings, or below top connections.
 - b. Terminals shall be protected from external/foreign objects contact.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Deliver, storage, protect and handle products in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

- A. Transformer core frame shall be installed level on shock absorbing pads within enclosure. Comply with seismic requirements of CBC.
- B. Mounting bolts on floor mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.
- C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits or bus ducts where required.
- D. Transformers installed outdoors or below grade shall be mounted on concrete pads as specified in Section 03 3000: Cast-In-Place Concrete.

- E. Install transformer ventilation openings not closer than 6 inches from wall surfaces.
- F. Do not install transformers in corrosive environments such as swimming pool pump and boiler rooms, or similar areas.

3.03 VOLTAGE CHECK

- A. Set taps on transformers to provide satisfactory operating voltages with present loads energized, including new loads and existing loads. A check shall be performed in the presence of the Project Inspector at a panel fed from each transformer, which is farthest from transformer. Voltages at transformers ranging from 118 to 122 volts inclusive, for 120 volt systems and proportionately equivalent for higher voltage systems are permitted.
- B. Provide instruments and accessories required to perform checks. Voltmeters shall be accurate within .075 percent or one percent and shall have scales permitting voltage readings to be performed on upper half of scale. Calibration of the meters shall be observed by the Project Inspector.
- C. Adjust transformer taps under full load operating conditions, to provide normal operating voltages at the loads.

3.04 PROTECTION

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

3.05 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.
- B. Repair scratched or marred surfaces affected during the execution of work. Repair surfaces shall match original finish.

END OF SECTION

SECTION 26 2416
PANELBOARDS AND SIGNAL TERMINAL CABINETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Lighting and power distribution facilities, including panelboards.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 26 0500: Common Work Results for Electrical.
 - 3. Section 26 0513: Basic Electrical Materials and Methods.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.
- C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

- A. Panelboards:
 - 1. Panelboards shall be wall-mounted, enclosed safety type with 120/240 volt, three-wire solid neutral 277/480 volt, four-wire or 120/208 volt, four-wire solid neutral mains as indicated on Drawings or specified. First panelboard of each building shall be provided with main or sub-feeder circuit breakers where so indicated.
 - 2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be fully rated, with ampere rating marked on handle and shall indicate on/off and tripped positions. Ground fault interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL, or other NRTL as ground fault devices. Provide appropriate lug kit of sufficient size to accommodate the feeders.
 - 3. Two- and three-pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, tamper-proof, ambient

Panelboards and Signal Thermal Cabinets
26 2416-1

compensated, single handle, internal common trip, and quick-make, quick-break mechanism with silver alloy contacts. Circuit breakers shall be fully rated or as otherwise indicated on the Drawings.

4. Main and subfeeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion-resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall be furnished with interchangeable trip units. Handles of main and subfeeder circuit breakers shall be provided cabinet door. Voltage rating shall be as indicated on Drawings.
 5. Circuit breakers shall be fully rated and of one-piece, bolt-on type and shall meet short-circuit interrupting capacity requirements indicated on Drawings. Series rated circuit breaker combinations are not acceptable.
 6. Internal connections shall be fabricated with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. Terminals shall be furnished with copper conductors. Panelboards fed by conductors having over-current protection greater than 200 amperes shall be protected on supply side by over-current devices having a rating not greater than that of panelboards. Copper bussing shall be fully rated. Heat rated bussing is not acceptable.
 7. Except where otherwise indicated, circuit breakers shall be in two vertical rows connected to bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on busses. Single pole branches shall be numbered adjacent to its circuit breaker, with odd numbers on left and even numbers on right.
 8. Specified circuit breaker spaces shall be furnished with hardware required for future installation of circuit breakers.
 9. Provide locking devices for individual circuit breakers. Padlocking devices shall be secured to circuit breakers and by panel dead front plates.
- B. Surge Suppressors: Where indicated on Drawings, provide transient voltage surge suppressors as an integral part of panelboards. Panelboards shall be complete with 200 percent rated copper neutral bus, ground bus and isolated ground bus in addition to requirements of this section. Surge suppressors shall be as follows:
1. Surge Capacity:
 - a. Line-to-neutral for wye systems: 80 KA.
 - b. Line-to-ground: 80 KA.
 - c. Neutral-to-ground: 80 KA, three-phase wye.
 - d. Line-to-neutral plus line-to-ground: 160 KA.

Panelboards and Signal Thermal Cabinets
26 2416-2

2. UL 1449 2nd Edition Suppressed Voltage Rating for 208/120 Wye System:
 - a. Line-to-neutral: 400 volts.
 - b. Line-to-ground: 400 volts.
 - c. Neutral-to-ground: 400 volts.
 - d. Maximum continuous over-voltage: 150 volts.
3. EMI/RFI High-Frequency Noise Power Filter (Characteristics):
 - a. 100 KHz at 444 dB.
 - b. 100 MHz at 44 dB.
 - c. 10 MHz at 44 dB.
 - d. 100 MHz at 444 dB.
4. MOVs shall be thermally protected for low current faults and shall be fused with surge-rated fuses. The surge-rated surge current passes and clears the circuit safely if the surge capacity is exceeded. Enhanced diagnostics shall continuously monitor the unit's status and shall include LEDs to signal a reduction in surge capacity or the loss of a suppression circuit. An audible alarm, with test and silence features, shall be furnished in diagnostic package.
5. Each phase or the entire unit shall be replaceable and have bolted-on, tin-plated copper connections. Unit to have UL witnessed fault current rating of 65,000 symmetrical amperes.
6. Surge suppression units shall comply with the following:
 - a. UL certified.
 - b. UL 1283.
 - c. UL 1449.
 - d. IEEE C 62.45.
 - e. IEEE C 62.41.
 - f. Nationally Recognized Testing Laboratory (NRTL) or equal.

C. Panelboard Cabinets:

1. Panelboard cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall be furnished with at least six-inch high gutters at top and bottom where feeder cable size exceeds four gage or where feeder cable passes through cabinet

Panelboards and Signal Thermal Cabinets
26 2416-3

vertically. Cabinets shall be furnished with top and bottom gutters sized as required by inspection department having jurisdiction, but never less than six inches where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than four inches wide. Width of cabinets shall be 20 inches, unless otherwise indicated on Drawings.

2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys.
 3. Where contactors, time switches, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at top of cabinet for such devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors keyed to Corbin No. 60 keys.
 4. Provide and install panelboard manufacturer's permanent circuit number kit option.
 5. Panelboards with control devices in compartment shall arrive at the Project site completely assembled with control devices installed and wired.
 6. Outdoor cabinets shall be NEMA Type 3R. Construction shall be formed from code gage galvanized steel with ANSI No. 61 gray enamel finish. Provide heavy-duty, three point latching, vault type door handles with padlocking provisions. Provide stainless steel or galvanized butt hinges on doors. Padlocks shall be furnished, keyed to Corbin No. 60 keys.
 7. Self-tapping screws and bolts not permitted.
- D. Panelboard Schedule: Provide a neatly typewritten schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names shall be determined at the Project site and shall not necessarily be those indicated on the Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be installed in a frame under transparent plastic 1/32 inch thick on inside of each panelboard cabinet door.
- E. Panelboard nameplate: Provide a nameplate identifying panelboard. Plates shall be black and white plastic nameplate stock, with character cut through black exposing white and shall bare designation of service. Name plate shall be mechanically fastened to switchboard.
- F. Provide additional labeling on dead-front of panelboard. Label shall be a P-Touch or equal with a minimum width of 3/8 inch with black letters on white background. Label shall re-identify panelboard and also identify name and location of power source feeding this panel. Location information shall include building name if located in

different building and name or room location. If power source is installed in same room, label should indicate source name and "In this Room"

- G. Panelboard Standards: Panelboards shall be UL, or other NRTL listed and labeled. Panelboards shall meet latest revisions of following standards:

1. California Electric Code, Article 384.
2. UL 67, Panelboards.
3. UL 50, Cabinets and Boxes.
4. UL 943, GFCI.
5. UL 489, Molded Case Circuit Breakers.
6. NEMA PB1.
7. Federal Specifications W-P- 115C and WC-375B.

- H. Signal Terminal Cabinets:

1. Signal terminal cabinets shall conform to the Specifications for panelboard cabinets, except as modified herein.
2. Terminal cabinets shall be flush type, with two-inch trim or surface mounted type, as indicated on Drawings. Terminal cabinets shall be furnished with sections and barriers to separate each system. Sections over 24 inches in width shall be provided with double doors and locks. Terminal cabinets, or sections of terminals housing separate systems, shall measure 12 inches long by 18 inches high by 5 ¾-inch deep, unless otherwise indicated on Drawings. Trims for sectional cabinets shall be of one-piece construction.
3. Terminal cabinets shall be furnished with ¾ inch thick plywood. Plywood shall be fastened in place with machine screws or factory installed mounting screws.
4. Flush-mounted terminal cabinets shall be finished as specified for flush-mounted panelboard cabinets. Surface and semi-flush mounted terminal cabinets shall be finished as specified for surface-mounted panelboard cabinets.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Panelboards shall be manufactured by Siemens, General Electric, Cutler Hammer, Square D or equal.

PART 3 - EXECUTION

Panelboards and Signal Thermal Cabinets
26 2416-5

3.01 INSTALLATION

- A. Panelboards shall be located so they are readily accessible and not exposed to physical damage.
- B. Panelboards installed outdoors shall be specifically listed for wet locations and shall be weatherproof in NEMA Type 3R cabinets.
- C. Panelboard locations shall provide sufficient working space around panels to comply with the California Electrical Code.
- D. Panelboards shall be securely fastened to structure and mounted on surface by at least four points.
- E. Unused openings in cabinets shall be effectively closed as required by the manufacturer.
- F. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.
- G. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.
- H. Lugs shall be suitable and listed for installation with the conductor being connected.
- I. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- J. Maintain the required bending radius of conductors inside the cabinet.
- K. Clean the cabinet of foreign material such as cement, plaster, and paint.
- L. Distribute and arrange conductors neatly in the wiring gutters.
- M. Use the manufacturer's torque values to tighten lugs.
- N. Before energizing panelboards, the following steps shall be taken:
 - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.
 - 2. Remove shipping blocks from component devices and panelboard interiors.
 - 3. Manually exercise circuit breakers to verify they operate freely.
 - 4. Remove debris from panelboard interior.
- O. Follow manufacturer's instructions for installation.
- P. Do not install in highly corrosive environments, unless rated for the application.

3.02 PROTECTION

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

3.03 CLEANUP

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

END OF SECTION

**SECTION 26 2726
WIRING DEVICES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Receptacles, switches, dimmers, floor outlets, wall box occupancy sensors and other wiring devices.

1.2 SUBMITTALS

A. Product Data:

1. Each device indicating FS number, amperage and voltage rating, materials, color and manufacturer's catalog sheet.
2. Each device plate indicating materials and thickness or gauge of materials, color and manufacturer's catalog sheet.
3. All switches and receptacles shall be of same manufacturer.
4. Occupancy and daylight sensors layout drawings and sensor certification by California Energy Commission.

1.3 PRODUCTS

A. GENERAL

1. All devices shall conform to NEMA standards, shall be UL listed and labeled, and shall be "Specification Grade," meeting the requirements of FS WC-596-F and switches meeting the requirements of FS WS-896-E.

B. SWITCHES

1. Wall switches shall be fully enclosed, quiet type tumbler switches rated 20 amperes, 120 or 277-volt, nylon or composition.
2. Quiet switches, 20 ampere type, may be used in quiet locations at full rating for inductive or non-inductive loads and incandescent or fluorescent lighting loads.
3. Single Pole Quiet Switches.
4. Double Pole Quiet Switches.
5. Three-way Quiet Switches. Four-way quiet switches.
6. Control switches for lighting shall be 3-way, normally open, momentary contact, tumbler switches. The switch shall be wired so that the lights shall be "ON" when the switch is moved to the "UP" position.
7. Remote control motor switches shall be standard duty, momentary contact,

Wiring Devices
26 2726-1

push button, or selector switches, with pilot lights and jewels.

8. Switches in outdoor locations shall have weatherproof plates.
9. Manual motor control switches for single-phase motors shall be flush or surface mounted, as required, full-voltage type with thermal overload protection and with pilot light and jewel where specified.
10. Contactors for the control of lighting circuits shall be mechanically held, NEMA Size 2 or larger, with the number of poles as required by the schedules or diagrams. Contactors shall have coil clearing contacts.

C. RECEPTACLES

1. Single and duplex convenience receptacles shall be U-grounded type, 125 volts, side and back wired with binding screws only. Rating 15 or 20 amperes as indicated.
2. The grounding contact shall be internally connected to the frame with ground terminal for external ground.
3. Special receptacles shall be as indicated on Drawings by NEMA configuration.
4. Ground fault receptacles, self-testing type, shall be 20 amperes, 125 volt, duplex, three wire grounding with pilot lights and test and reset buttons, suitable for self-testing type, suitable for feed-through, color to be as selected by County's Representative from manufacturer's standard colors.
5. Corridor Cleaning Receptacles shall be 20 ampere.
6. Wiring devices in exposed weatherproof boxes shall be the devices specified in this Section, and shall be installed in "FS" or "FD" series condulets with weatherproof cast metal covers, and gaskets as required.
7. Isolated-Ground, Duplex Convenience Receptacles, 125V, 20A, comply with NEMA WD 1, NEMA WD6, configuration 5-20R, and UL 498. Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
8. All receptacles shall have matching plates.

D. FLOOR OUTLETS

1. Where floor outlets are shown, boxes and covers as specified in Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS. Receptacles shall be as specified in this section.
2. Where 120, 208, or 240 volts are used, standard NEMA receptacles, suitable for the service, shall be used. Receptacles shall be Hubbell, or equal, with ampere and voltage ratings as required.

E. PLATES

1. Furnish plates for all switches, occupancy sensors, daylight sensors, photocells, receptacles, junction boxes, telephone and other outlets.
2. Furnish labeled plates for all lock switches, pilot switches, switches from which equipment or circuit controlled cannot be readily seen, three or more switches under a common plate and for switches as indicated, and for each receptacle and switch, indicating panel and circuit number.
3. Where outlets are indicated to be weatherproof, furnish a AISI Type 302 stainless with double hinged covers.
4. Furnish plates equipped with close fitting openings for the exact device to be used.

F. SENSORS

1. General
 - a. One year manufacturer's warrantee.
 - b. Coordinate exact locations of sensors with all trades, and submit plans indicating sensor locations and coverages, confirmed by sensor manufacturer, for review by County's Representative.
 - c. Furnish occupancy sensors, including switch power packs, control/units, relays, to suit function of rooms.
2. Occupancy Sensors
 - a. Furnish California Energy Commission approved, UL listed, dual-technology, (passive infrared and ultrasonic) occupancy sensors in individual rooms, at locations indicated on drawings, with no interference with hearing aid devices. Locate sensors in locations recommended by manufacturer, and as approved by County's Representative. Each sensor shall be furnished with switch/power pack.
 - b. Wall Sensor.
 - 1) Automatic on-off control of lighting loads in rooms as indicated, rated for both incandescent and fluorescent lighting. Maximum load of 600 VA at 120V and up to 1200 VA at 277V with Adaptive Technology, with zero prent switching, capable of switching electronic fluorescent ballasts which are to be installed.
 - 2) Area covered – minimum 800 square feet with 9 foot ceiling.
 - 3) Two position switch; automatic mode, and override of the automatic mode to turn lights off even if room is occupied.
 - 4) Delayed automatic "off" (time-out) adjustable from minimum of 1 minute to a maximum of 20 minutes. Movement in the room during the time-out period to reset the time delay.
 - 5) An ambient light override that may be set so that when sufficient ambient light (daylight) is present, the lighting shall not turn on.

Adjustable from full daylight to less than 40 foot candles. Built-in photocell with normal super-saver mode for daylight.

- 6) Ivory (unless otherwise noted) injection molded thermoplastic device body for mounting on a single gang plaster ring, with panel and circuit number.
- 7) Sensor with bi-level switches where indicated on Drawings.
- 8) Sensor to have adaptive technology that continuously analyses occupancy patterns, and adjusts the time and sensitivity providing a setting to ensure that sensor is providing a zone maintenance-free sensor.

3. Ceiling Sensor

- a. Automatic on-off control of lighting loads in rooms as indicated. Unit complete with low voltage power supply, relay for switching multiple circuits with local manual switches, single or multiple sensors as indicated on drawings.
- b. Each sensor to have a field of range minimum of 1000 square feet area. Multiple sensors to double the range.
- c. Sensor to have on-auto switch, adjustable time delay between 1-20 minutes, adjustable sensitivity and normally closed relay to leave lights "on" on sensors failure.
- d. Housing made of rugged high impact injected molded plastic colored white.

1.4 INSTALLATION

- A. Mount switches 4' above finished floor and vertically in all locations unless indicated otherwise. Refer to Architectural elevations.
- B. All convenience and telephone/data/CATV outlets mounted 18" above the floor shall be installed vertically. Install receptacle with the grounding terminal up. Outlets required to be located above casework counters or back splashes shall be mounted horizontally at 4" above top of counter or backsplash. Receptacles with the ground slot to the left.
- C. CEC sized (#12 minimum) bonding jumper shall connect grounded outlet box to receptacle grounding terminal on all flush mounted units.
- D. Align and plumb all devices and plates. Plates shall fit flat against wall and tight against device surface without strain on plate.
- E. Each class of device shall be furnished by one manufacturer for total Project. Mixing devices of different suppliers shall not be permitted.
- F. Coordinate exact placement of occupancy sensors with other trades, and per manufacturer's recommendations.
- G. Manual dimmers shall be installed in individual outlet boxes. Do not install in

ganged boxes with other devices.

- H. Contractor shall furnish the services of the manufacturer's trained employee in adjusting the

END SECTION

SECTION 26 2813 FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Low-voltage cartridge fuses rated 600volts AC and less.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
 - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 2. Current-limitation curves for fuses with current-limiting characteristics.
 - 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 4. Coordination charts and tables and related data.
 - 5. Fuse sizes for elevator feeders and elevator disconnect switches.

1.3 PRODUCTS

- A. Quality Standards: NEMA FU 1 for cartridge fuses.
- B. Cartridge Fuses: Nonrenewable.
- C. Spare-Fuse Cabinet: Wall-mounted steel unit with fuse pullers for each size of fuse.
- D. Cartridge Fuses Rated 600 Volts Or Less:
 - 1. Characteristics: Nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages. Refer to Drawings for ratings.
 - a. 600 Ampere or Less: Class J, time delay.
 - b. Fuses Protecting Control Circuits: Class CC, time delay.

1.4 INSTALLATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and

other conditions affecting performance, such as rejection features.

- C. Examine utilization equipment nameplates and installation instructions. Install
- D. Fuses of sizes and with characteristics appropriate for each piece of equipment.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

1.5 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 26 0553 and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END SECTION

SECTION 26 2816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Indoor enclosed dead-front switchboards rated 600V and below.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers on emergency power systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7, Seismic Zone 4.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. Coordinate AIC and fuse ratings with contractor furnished Over current Protective Device Coordination study.

1.3 SUBMITTALS

- A. Shop Drawings and Product Data: The following list includes the required shop drawings that shall be submitted.
 - 1. Complete equipment shop drawings for each type of enclosed switch, accessory and component indicated. Include dimensioned elevations, sections, weights and manufacturer's technical data on features, performance, electrical characteristics, ratings accessories and finishes.
- B. Seismic calculations shall be by Structural Engineer, registered in State of California, for the support of disconnect switches, and drawings, indicating intended installation.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches and circuit breakers, over current protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Comply with CEC.
- D. Comply with Federal Specification W-S-865.
- E. Comply with UL 98 and NEMA KS1 for fusible and non-fusible switches.

- F. Comply with UL 489, NEMA AB1, and NEMA AB3, for enclosed molded-case circuit breakers.
- G. Comply with ASME A17.1 for shunt trip switches.
- H. Comply with Federal Specification W-S-865.

1.5 PRODUCTS

- A. All disconnect switches shall be the "Heavy Duty" type and shall meet the latest edition of FS W-S-865.
- B. Type HD heavy duty single throw 600V AC 30A unless otherwise noted on drawings, horsepower rated, lockable handle with capability to accept three padlocks and interlocked with cover in closed position.
- C. Furnish all disconnect switches with devices enabling the switch to be locked in the open and closed positions.
- D. Manual motor starters shall be motor rated tumbler switches rated 3 HP 208 or 480 volts, three-phase with overload heaters as specified or shown to protect equipment served.
- E. Externally operable safety switches shall have quick-make, quick-break mechanism, capable of switching 10 times the switch rating, and with cover interlocks with defeat mechanism for maintenance.
- F. Furnish switches with number of poles, ampere, voltage and HP rating, types of enclosures and fusible or non-fusible as indicated and as required for the particular application. Disconnect switches shall be heavy duty type unless otherwise indicated.
- G. Furnish NEMA 1 enclosures for interior locations and NEMA 3R enclosures for exterior or wet locations unless otherwise indicated. Switches having a dual rating when used with dual element fuses shall have rating so indicated on the metal plate. Fuses, where required, shall be UL listed current limiting type RK5.
- H. For disconnect between variable speed starters and the motor served, furnish auxiliary contact in switch, wired to disconnect the starter coil in OFF position. Auxiliary contact to open before disconnect.
- I. Fuses, where indicated to be used, shall be current-limiting type, with rejection type fuse holders. And fuse adaptors as needed.
- J. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
 - 2. Neutral Kit: Internally mounted, insulated, capable of being grounded and bonded, labeled for copper neutral conductors.
 - 3. Auxiliary Contact Kit: Two normally open/normally closed Form C auxiliary contacts arranged to activate before switch blades open.

K. Lugs: Mechanical type suitable for number and size of copper conductors indicated.

L. Enclosures:

1. Enclosed Switches and Circuit Breakers: NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - a. Indoor, Dry and Clean Locations: Type 1.
 - b. Outdoor Locations: Type 3R.

1.6 FIELD QUALITY CONTROL

A. Testing: By Contractor.

1. Visual and mechanical
 - a. Inspect for physical damage and code violations.
 - b. Ensure all nameplates and labels are correct and in place.

1.7 INSTALLATION

- A. Install switches, disconnects and safety, where indicated on the Drawings, or required by applicable code requirements.
- B. Securely fasten to structural members or channel support. In outdoors, mount on epoxy coated unistrut support, at plus 42 inches AFF. Comply with restrictions on penetrating of roofing material.
- C. Install manual motor starters flush mounted for switching motors 3 HP and smaller in finished areas.
- D. Install manual motor starters, surface mounted, in equipment rooms and non-finished areas.
- E. Where installed above ceilings, access panels shall be furnished.

1.8 ADJUSTING

- A. Set field-adjustable circuit-breaker trip ranges.

END SECTION

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. See Division 1 for description of work.
- B. In general, the contract documents (drawings and specifications) describe a low voltage communication system and infrastructure which includes:
 - 1. Communication Systems (27 00 00)
 - 2. Common Work Results (27 05 00)
 - 3. Grounding and Bonding for Communication Systems (27 05 26)
 - 4. Pathways for Communications Systems (27 05 28)
 - 5. Identification for Communication Systems (27 05 53)
 - 6. Communications Equipment Room Fittings (27 11 00)
 - 7. Communications Backbone Cabling (27 13 00)
 - 8. Communications Horizontal Cabling (27 15 00)
- C. It is the intent of the specifications and construction documents that the Contractor shall include all necessary items for the complete and fully-operational system. In addition to complete and fully-operational, the system must also meet the design intent with regards to special features and functionality mentioned in the specifications or drawings.
 - 1. Work or product not specifically indicated in the specifications or on the drawings, but which is required for a complete and fully-operational system as defined above, shall be provided by the Contractor at no additional cost.
 - 2. The specification of certain products in the specifications or drawings shall not be construed as a release from furnishing such additional products and materials necessary to furnish a complete and fully-operational system as defined above.
- D. Work shall be complete, certified, tested, and ready for operation.
 - 1. This includes all necessary items and labor not specified but necessary for a complete and working system.
 - 2. Contractor shall provide at his or her expense all labor, material transportation, accommodations, tool and utilities necessary for the completion of the project.
- E. Any item shown in the drawings but not in the specifications or vice versa shall be treated as though shown in both.
- F. Contractor shall be responsible for repair of any base building structure or finishes that are damaged by the installation of any work specified in this section.
- G. No cutting or patching of existing work shall be permitted without prior written consent of the owner. Request for permission to do cutting, drilling or chipping shall include explicit details and description of work, the proposed schedule, and shall not under any

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

circumstances diminish the structural integrity, functional capabilities, or aesthetic appearance of the building components or systems.

- H. Except where the Architect, Engineer or Manufacturer has specifically indicated dimensions, technology drawings are diagrammatic and shall not be scaled. Visit project site, survey existing conditions, and coordinate work to comply with documents.

1.2 PROJECT CONDITIONS

- A. The contractor shall within 5 days of award, coordinate with owner and GC a visit to the site. Contractor shall be responsible for reviewing all related drawings and ensuring site conditions do not pose any conflicts with the design shown. Any clarifications needed or conflicts realized, shall be sent in writing no later than (10) days after site visit.
- B. The contractor may be performing some work in areas of the facility that are owner occupied. The contractor shall coordinate all work with the owner to occur at times necessary to minimize impact to normal operations, including after hours, night shift and weekends. The contractor shall supply all necessary materials to minimize noise, dust, and interruption to normal operations. Work done in these areas will not constitute a change order from the contractor due to scheduling conflicts, materials, or other requirements to perform the stated work.

1.3 DEFINITIONS

- A. Provide: Furnish, install and connect complete.
- B. Work: Materials completely installed.
- C. Review of shop drawings: A service by the engineer to reduce the possibility of materials being ordered which do not comply with contract documents.
- D. Engineer: Exante360
- E. Contractor: Successful bidder of these documents

1.4 ADMINISTRATION

- A. The Contractor shall attend all job progress meetings as required by the owner, General Contractor and the Engineer as soon as notice to proceed is given. The Contractor shall furnish to owner a list of his employees, all subcontractors' key personnel and the project representative.
- B. The contractor is responsible for all quantities necessary to complete the project and is urged to do a complete review.

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

- C. Where any conflict or discrepancy occurs within these documents, or any conflict or discrepancy occurs between these documents and any other contractual documentation, the stricter standard and greater quantity shall be deemed to apply.
- D. The contractor shall familiarize themselves with the local conditions under which the work is to performed, and its relationship to existing conditions, other trades, and any obstructions that may affect the proper execution and completion of the work. It is the contractor's responsibility to ascertain any and all conditions. Failure to understand or discover any condition that will result in a change order that increases the contract amount; that should have been discovered in the due diligence of reviewing the site and contract documents may result in denial of the change order.
- E. The Contractor shall call the attention of the Authorized Representative to any error, conflict, or discrepancy in Plans and/or Specifications. Do not proceed with any questionable items of work until a resolution or clarification has been made. Supplemental Plans and Specifications may be supplied as required and shall become part of the Contract Documents.
- F. The Contractor shall coordinate installation with other crafts employed on this project.
- G. The Contractor shall arrange work to reduce interruption on any existing service to a minimum. When interruptions are unavoidable, consult the Owner or Authorized Representative and agree to a mutually satisfactory time and duration. Submit in writing to the Authorized Representative the time and duration agreed upon.
- H. During the course the Project, any questions, notifications, requests or any other communications with the Owner or Consultant shall be in writing.

1.5 SUPPLEMENTAL BID SUBMITTAL REQUIREMENTS

- A. These requirements are meant to supplement any bidding requirements provided by the bid administrator. The purpose of the additional documentation is for bid analysis and to help the Owner and Consultant verify the bidder has a complete understanding of the construction documents. The failure of the Contractor to include in the submittal any items called for in the Contract Documents shall not in any way relieve the Contractor from the responsibility of providing said items.
- B. Submit the following additional documentation for each section (Grounding and Bonding, Cabling, Paging, Integrated Audiovisual, Distributed Communications, etc....) with the bid submittal to the Bid Administrator:
 - 1. Provide itemized pricing for all equipment. Include quantity, extended pricing, manufacturer, model, version (if applicable) and specification number. Provide in order by specification number. Connectors and miscellaneous small hardware may be listed in total.
 - 2. Total for taxes, including all applicable local, state and federal taxes.
 - 3. Total for installation, including, but not limited to, all labor, expenses, shipping, hardware, software, consumables, etc.

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

4. Total for Engineering, including, but not limited to, CAD, shop drawing preparation and any other labor not directly related to installation.
 5. Total cost for the required warranty as described in the Contract Documents.
- C. Submit the following additional documentation for the complete project with the bid submittal to the Bid Administrator:
1. Totals for each bid section
 2. Bid Bond and Performance Bond as required
 3. Any add/deduct alternates
- D. During any bidding period, any questions, notifications, requests or any other communications with the Consultant shall be compiled into a single document and submitted to the Consultant through the designated Bid Administrator. While the Consultant shall make a reasonable effort to respond to any questions before the bid submission deadline, the Consultant cannot guarantee such response.

1.6 SUBSTITUTION OF MATERIALS

- A. Submit base bid on equipment, products and materials specified or approved. Equipment, products and/or materials by manufacturers not specified but performing the same function will be acceptable if all of the following conditions apply:
1. Submitted for approval along with base price and alternate price for submitted items;
 2. Engineer considers the item equivalent to that specified.
 3. The substitution does not void or downgrade the manufacturer's Total Solution Warranty.
- The engineer, at their discretion, may issue an addendum to accept the item should the substitution create a situation that warrants an addendum.
- B. Contractor assumes responsibility for all changes in cabling, system components, equipment capacity or other additional changes caused by substitution of materials. The Contractor shall assume all expenses for all additional design and construction due to such substitutions.
- C. The Contractor assumes the responsibility of all costs of design and construction resulting from any modifications required to any building equipment or system due to substitution of data/voice materials.

1.7 CONTRACTOR'S COORDINATION

- A. The Contractor is responsible for overall coordination of the work.
- B. Note that contract drawings shall not be considered as fabrication or installation drawings. In some cases, they only indicate intent; they may be diagrammatic, and they may show only typical conditions; they do not indicate every item required to complete the work.

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

- C. Prior to the installation and connection of mechanical, electrical and technology for work of other sections, or of other contractors, verify the requirements indicated in those divisions with the requirements and characteristics of the other contractors' equipment.
 - 1. Coordinate layout of mechanical, electrical and technology work before fabrication and installation begins.
 - 2. Bring deviations and conflicts to the attention of the Project Design Team.
- D. Mechanical and electrical drawings show the general arrangement of the work. Follow as closely as actual building construction and the work of other system permit.
 - 1. Electrical drawings are diagrammatic and do not show all offsets, fittings, and accessories which may be required.
 - 2. Investigate the structure and finish conditions affecting the work and arrange the work accordingly.

1.8 COORDINATION DRAWINGS

- A. The Contractor is responsible for coordination required for use of space. BIM model can be used for clash detection.
- B. The following coordination drawing requirements shall apply only where the BIM model is not used via clash detection for use of space coordination.
- C. Prepare and submit coordination drawings where close and careful coordination is required:
 - 1. Show the interrelationship of components shown on separate shop drawings.
 - 2. Indicate required installation sequences.
 - 3. Prepare as required and submit coordination drawings for areas of the work listed below:
 - a. Where utilities cross over
 - b. Refer to the mechanical, electrical and technology divisions for specific coordination drawing requirements for mechanical and electrical installations.
 - c. Coordinate information indicating locations and elevations of the associated power, control, and data, fire protection piping, HVAC ductwork, plumbing piping, electrical and low voltage rough-in and fixtures.
 - d. Mechanical and electrical rooms.
 - e. Penetrations through fire rated walls with all mechanical, electrical, plumbing, fire protection, communications and security, and other such systems, coordinated for locations of all floor, wall, and beam penetrations, sleeves, and embeds.
- D. All other work areas where congestion might necessitate a change in the ceiling heights, lighting, and diffuser locations, structure, or finishes.

1.9 SHOP DRAWINGS AND EQUIPMENT DATA SUBMITTALS

- A. All shop drawings, change orders, and where applicable, materials must be reviewed by engineer and/or owner and approved in writing prior to start of construction. The engineer's review shall not relieve the Contractor of responsibility for dimensions or

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

compliance with the contract documents. The reviewer's failure to detect an error does not constitute permission for the Contractor to proceed in error. Any change orders must be approved by owner in writing prior to start of the change order work. Any work performed by Contractor, not directed in writing by owner, will result in Contractor removing all materials installed by Contractor that were not approved in writing at the Contractor's cost.

- B. Submit at one time within 14 days of contract awarding, drawings and product data on all equipment. This includes all equipment for all specification sections. Provide submittals in 3-ring binder and hard copy, separated by tabs between each spec section and organizing equipment in the order it appears in each spec section. Check for compliance with contract documents. No substitutions to be submitted on without prior written acceptance by engineer.
- C. Support all submittals with descriptive materials, i.e., catalog sheets, product data sheets, diagrams, performance curves, and charts published by the manufacturer. These materials shall show conformance to specification and drawing requirements. Model view shall contain all information to indicate compliance with equipment specified.
- D. Where multiple products are listed on a single cut-sheet, ensure each piece of equipment (including size and color type) being submitted on is clearly identified on each page with an arrow, circle, or some other method that allows for documents to be scanned while still being able to identify equipment being submitted on.
- E. Where applicable; provide all inter-equipment wiring diagrams and drawings necessary to install the equipment being supplied. These drawings will show all wiring by wire gauge, conductors, and wire manufacturer. These drawings must be updated prior to completion of any work to reflect changes that may have been made during actual installation.
- F. After the award of contract, the Contractor shall prepare a detailed schedule using "Microsoft Project" software or equivalent. It shall be prepared in the time scaled precedence diagram format. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships for all sections as outlined in the specifications. All related work shall be performed by a single contractor. It will also detail manpower usage throughout the project. Provide an updated schedule each week, noting any changes that impact overall project schedule. Include the following key milestones start dates and durations for each system in Division 27:
 - 1. Pre-construction meetings
 - 2. Site Mobilization
 - 3. Material delivery
 - 4. Telecommunications Equipment/Data Room build-outs
 - 5. Copper backbone installation
 - 6. Fiber backbone installation
 - 7. Structured cabling installation (by floor/area)
 - 8. Structured cabling termination

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

9. System installation (name each system in Division 27 and breakout by floor/area)
10. Testing and commissioning (by system and by floor/area)

1.10 SAMPLES

- A. The owner/specifying authority reserves the right to request one each, samples of terminal (station) equipment for the purpose of coordinating colors, aesthetics, trim plate sizing, etc. These samples would be supplied at no-cost to the owner by awarded contractor.

1.11 REFERENCE STANDARDS

- A. In addition to those referenced in Division 1, all work shall conform to the following standards and codes (most current edition, revisions, and addenda), where applicable. When a conflict occurs, follow the most stringent requirements:
 1. National Fire Protection Association
 - a. NFPA 70
 - b. National Electrical Code
 2. Electronic Industries Association (EIA)
 3. Telecommunication Industry Association (TIA)
Including, but not limited to:
 - a. TIA 568
 - b. TIA 569
 - c. TIA 598
 - d. TIA 606
 - e. TIA 607
 - f. TIA 758
 4. American National Standard Institute (ANSI)
 5. American Society for Testing and Materials (ASTM)
 6. Underwriters Laboratories, Inc. (UL)
 - a. UL 1069
 7. BICSI
 - a. Telecommunication Distribution Methods Manual
 - b. Information Transport Systems Installation Manual
 - c. Customer-Owned Outside Plant Manual
 - d. Network Design Reference Manual
 8. Local, state and federal regulations
- B. If any portion of the Contract Documents is observed by the Contractor to be in variance with said laws, ordinances and regulations, the Contractor shall notify the Owner immediately and shall not proceed until changes required for compliance with said laws, regulations and ordinances have been effected.

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

- C. The Contractor bears full responsibility for any work performed contrary to said laws, regulations and ordinances and shall fully indemnify Owner against loss and bear all costs and penalties arising there from.

1.12 CODES AND PERMITS

- A. Provide all necessary permits and schedule all inspections in a timely manner, so that all specified systems are ready for operation on a date directed by the Owner.

PART 2 – PRODUCTS

2.1 GENERAL

- A. The use of a manufacturer's name and model or catalog number herein is for the purpose of establishing the product set, which the Contractor is to supply and install.
- B. Quantities are to be determined by Contractor unless specified.
- C. Products shall be UL listed for the purpose they are to be used.

PART 3 – EXECUTION

3.1 GENERAL

- A. Before installation of cabling and/or equipment, the contractor shall field-investigate the facility and ascertain if physical and electrical conditions within the contractor's work are present.
- B. Any discrepancies, questions or concerns noted at that time should be brought to the immediate attention of the Owner or Engineer.

3.2 USE OF SITE

- A. Use of site shall be at the General Contractor direction. Building access shall be directed by the General Contractor.
- B. Coordinate with the General Contractor for lay-down areas for material storage and administrative work areas.
- C. Contractor shall coordinate with the General Contractor and their subs-contractors whether or not the Contractor's contract is with the General Contractor or not.
- D. Contractor shall be required to follow all General Contractor safety rules and regulations and shall be held responsible for violation of said rules and regulations.

SECTION 27 00 00

COMMUNICATIONS SYSTEMS

3.3 PROJECT RECORD DOCUMENTS (AS BUILTS)

- A. Throughout progress of the Work, maintain an accurate record of changes in Contract Documents. Upon completion of Work, transfer recorded changes to a set of Project Record Documents. Project Record Documents shall include As-Built drawings in electronic format (Autodesk Revit BIM and PDF).
- B. The attached communication drawings shall be marked in pen during the course of the project to include but not limited to the following:
 - 1. Cable routing
 - 2. Conduit locations
 - 3. Cable labeling number
 - 4. Penetration locations, quantities, sizes
 - 5. Coordinate all as-built requirements with Designer and Owner.
- C. Submit Project Record Documents to the engineer.

3.4 PROJECT CLOSE-OUT

- A. Prior to final inspection and acceptance of the work, remove all debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from the project site and thoroughly clean your work area.
- B. Before the Project Closeout date, the Contractor shall submit:
 - 1. Operation and Maintenance Data.
 - 2. Certification and Warranties.
 - 3. Deliver evidence of compliance with requirements of governing authorities.
 - 4. Certificates of Inspection:
 - a. Low Voltage
 - b. Test Data Reports. Deliver test data in electronic format.
 - c. Service Contracts.
 - d. Project Record Documents.
- C. Project Closeout: Contractor shall submit written notice that:
 - 1. Contract Documents have been reviewed.
 - 2. Project has been inspected for compliance with Contract.
 - 3. Work has been completed in accordance with the Contract.
- D. The Engineer will make final inspection after receipt of notice.

END OF SECTION

COMMON WORK RESULTS

PART 1 - GENERAL

1.1 SUMMARY

- A. 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 Division 01.
- B. Structured Cabling System (SCS) to support all low-voltage systems including: data networking and video surveillance systems.
- C. Horizontal Cabling
 - 1. Furnish and install plenum-rated Category 6, 4-pair UTP cables for all horizontal voice and data links from the cross-connect in the Telecommunications Data Room (TDR) or Telecommunications Equipment Room (TEC) to each telecommunications outlet and provide quantities as shown on drawings.
 - 2. The maximum horizontal cable distance from the telecommunications outlet to the horizontal cross-connect within the telecommunications rooms shall be 295 feet.
 - 3. All horizontal cables shall be routed through an approved pathway such as basket tray, J-hooks, conduits, sleeves, EZ Path, speed sleeve, or furniture pathway.
- D. Telecommunication outlets
 - 1. All telecommunications outlets shall consist of 8-position, 8-wire modular RJ-45 Category 6 jack(s) as noted locations on drawings. Drawings note the quantity to provide at the outlet.
 - 2. Terminate all horizontal voice/data cables per the TIA/EIA 568B wiring scheme unless otherwise noted.
- E. Telecommunications Rooms
 - 1. The primary function of the Telecommunications Rooms is the location of technology systems, equipment and the distribution of copper horizontal cables and termination of copper and fiber backbone cables.
 - 2. Furnish and install equipment racks as shown on drawings. Field verify locations and requirements with the Technology Designer, Architect/Engineer and Owner prior to installation.
 - 3. Telecommunications Rooms shall be built and provisioned according to the requirements in TIA/EIA Standard 569B and the general provisions of the Contract, including General, Supplementary and other conditions, and the requirements of other Divisions apply to the work of this Division.

SECTION 27 05 00

COMMON WORK RESULTS

F. Other Systems Cabling.

1. Furnish and install cabling to support video surveillance as called out in the specifications and drawings.

1.2 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General, Supplementary, and other conditions, and the requirements of other Divisions apply to the work of this Division.
- B. 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.

1.3 SCOPE OF WORK

- A. The work covered under this section of the specifications consists of furnishing all labor, equipment, supplies and materials, tools, services and facilities in performing all operations, including installation of wire and cable, telecommunication outlets, and all other functions necessary for the complete installation of a structured cabling system supporting data networking, telecommunications, integrated audiovisual, video surveillance and access control systems in accordance with the specifications and drawings, except as specifically noted otherwise.
- B. The Cable Contractor shall coordinate with other trades and vendors prior to the start of work.
- C. The work of this section shall include, but not be limited to furnishing and installation of the following:
 1. Category 6 unshielded twisted-pair horizontal cables.
 2. Singlemode and multimode fiber optic backbone cables.
 3. Telecommunications outlets/connectors and faceplates.
 4. Build out of TDR/TEC rooms.
 5. Basket tray, ladder rack, and J-hooks including all necessary support hardware and fittings.
 6. Firestopping systems.
 7. Grounding and bonding.
 8. Video surveillance cable.
 9. Fire stopping of telecommunications pathways that penetrate fire-rate wall, floors, and ceiling.
 10. Category 6 UTP patch cables for voice/data cross-connects in telecommunications rooms and at device locations.
 11. Category 6 patch cables for security cross-connects in telecommunications rooms.
 12. Multimode and single mode fiber optic jumper cables.

SECTION 27 05 00

COMMON WORK RESULTS

13. All materials necessary for complete and proper cable management.

1.4 REVIEW OF CONTRACT DOCUMENTS

- A. The Contractor shall carefully study the Contract Documents and report to the consultant and project manager any error, inconsistency, or omission they may discover. If contractor performs any construction activity knowing it involves a recognized error, inconsistency, or omission in the Contract Documents without such notice to the consultant or project manager, the contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable cost for correction.
- B. The Contractor must verify all dimensions locating the work and its relation to any existing work, all existing conditions and their relation to the work, and all man-made obstructions and conditions, etc., affecting the completion and proper execution of the work as indicated by the Contract Documents.

1.5 EXAMINATION OF THE PREMISES

- A. The Contractor shall visit the site to familiarize themselves with the local conditions under which the work is to be performed and correlate observations with the requirements of the Contract Documents. No allowance will be made for claims of concealed conditions which contractor, in exercise of reasonable diligence in the observation of the site and the review of the local conditions under which the work is to be performed, has learned, or should have learned, unless otherwise specifically agreed by owner and consultant in writing.
- B. Before ordering any materials or performing any work, the contractor shall verify all measurements. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in the drawings. Any discrepancies shall be submitted in writing to the Project Manager and Consultant for consideration before proceeding with the work.

1.6 RELATED SECTIONS

- A. All Division 27 Specification Sections in this Bid Package
- B. The applicable portions of the Governing Requirements (see "Part 1 - General: 1.08 Governing Requirements," herein) shall be incorporated by reference into each related Specification Section.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.
- D. Division 26 – Electrical.

SECTION 27 05 00

COMMON WORK RESULTS

E. Division 28 - Electronic Safety and Security.

1.7 COMMUNICATIONS CABLING SYSTEMS

A. The following communications systems are included within this Division:

1. Communications Cabling System: Includes (but is not limited to) copper and fiber cables, patch cables, stations and station connectors, termination blocks, splices and splice enclosures, protectors, patch panels, rack and distribution equipment, equipment required for the build-out of telecommunications rooms and spaces, and other incidental and miscellaneous product and labor as required.
2. New products installed shall meet the requirements of the Owner's Information Technology.

1.8 INTENT AND INTERPRETATIONS

A. It is the intent of the Construction Documents that the Contractor shall include all items necessary for the proper execution and completion of the Work by the Contractor, resulting in complete and fully operational system(s) ready for the Owner's use, in full compliance with all applicable standards, codes, and ordinances.

1. Work or product not specifically indicated in the Construction Documents, but which is necessary to result in complete and fully operational system(s) ready for the Owner's use, shall be provided by the Contractor.
2. The specification of certain products in the Construction Documents shall not be construed as a release from furnishing such additional products and materials necessary to furnish complete and fully operational system(s) ready for the Owner's use.

B. In the event that discrepancies exist or required items or details have been omitted in the Construction Documents, the Contractor shall notify the Engineer in writing a minimum (10) working days prior to the bid date. Failure to do so shall be construed as willingness to provide a complete and fully operational system within the amount bid by the Contractor. Where such discrepancies are not brought to the attention of the Engineer, the most stringent requirements shall be construed to be the basis for the Contractor's bid.

C. Prior to bidding the project, the Contractor shall visit the site to determine all existing conditions affecting the work, the type of construction to be used, and the nature and extent of work provided by other trades. Failure to do so shall be construed as willingness to provide complete and fully operational system(s) within the amount bid by the Contractor. Site visit to be coordinated with owner/general contractor.

D. Drawings and Specifications are complementary. Items required by either are binding as though both require them. In the event of conflict between the requirements of the Drawings and the Specifications:

1. With regards to the preparation of proposals and/or bids, the Contractor shall assume the more stringent (costly) condition shall prevail. The Contractor shall

COMMON WORK RESULTS

notify the Engineer of such discrepancy a minimum ten (10) working days prior to the bid date.

2. With regards to actual construction, the Contractor shall notify the Engineer and await the Engineer's instruction prior to proceeding with procurement and installation.
 3. The drawings are diagrammatic unless detailed dimensions are included. Drawings show close approximate locations of equipment and devices. Exact locations are subject to the approval of Owner and Owner's representative.
 4. Anything mentioned in the specifications and not shown in the drawings, or shown in the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the specifications and drawings, the stricter provision, as determined by the project coordinator, shall govern. Omissions from the drawings or specifications, or the incorrect description of details of work, which are evidently necessary to carry out the intent of the drawings and specifications, shall not relieve the contractor from performing such work.
- E. The Construction Documents include certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions include:
1. Abbreviated Language: Language used may be abbreviated. Implied words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpreted as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable and where the full context so dictates.
 2. Imperative and Streamlined Language: Imperative and streamlined language is used generally. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
 3. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context.
 4. Unless otherwise stated, words which have well known technical or construction industry meanings are used in accordance with such recognized meanings.
 5. The terms "directed," "required," "permitted," "ordered," "designated," or "prescribed," as well as similar words shall mean the direction, requirement, permission, order, designation, or prescription of the Engineer.
 6. The terms "approved," "acceptable," "satisfactory," and similar words shall mean approved by, acceptable, or satisfactory to the Engineer.
 7. The terms "necessary," "reasonable," "proper," "correct" and similar words shall mean necessary, reasonable, proper, or correct in the judgment of the Engineer.

SECTION 27 05 00

COMMON WORK RESULTS

1.9 ASSIGNMENT OF SPECIALISTS

- A. The individual Specification Sections may require that certain specific construction activities be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and such assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling the contract requirements shall remain with the Contractor.
- B. This requirement shall not be interpreted to conflict with the enforcement of local building codes and similar regulations governing the work.
- C. Drawings:
 - 1. Drawings are diagrammatic and approximate in character, are not intended to show all features of required work, and do not necessarily indicate every required component.
 - 2. Symbols used on the Drawings are defined in the legend on the Drawings. Symbols indicated on the legend may not necessarily be required.

1.10 DEFINITIONS

- A. The definitions below are applicable to the Division 27 specifications. These definitions expand upon and/or supplement the definitions specified in Division 01. In the event of discrepancies between these definitions and those defined in Division 01, the definitions in Division 1 shall take precedence.
- B. Accepted/Acceptable: Work or materials conforming with the intent of the project, and in general, conforming to the pertinent information in the Construction Documents.
- C. Approved/Approval: The written approval of the Engineer.
- D. Accessible: Easy access. Access attained without requiring extensive removal of other materials to gain access.
- E. Accessible Ceiling: Acoustical tile hanging ceilings ("Hard-lid" ceilings [concealed spine or sheetrock/gypsum ceilings], even when provided with access panels, are not considered an Accessible Ceiling.)
- F. Agreement: The contractual agreement between the Owner and the Contractor.
- G. As Called for: Materials, equipment including the execution specified/shown in the contract documents.
- H. Cable Contractor: Contractor furnishing and installing telecommunications, security, or other cable called out as part of the specifications and drawings. May also be referred to as TC (telecommunications contractor).
- I. Code Requirements: Follow minimum code requirements.

SECTION 27 05 00

COMMON WORK RESULTS

- J. Communications Infrastructure System: A Communications Cabling System (see Communications Systems, herein) combined with a Communications Raceway System (see Communications Systems, herein).
- K. Concealed: Hidden from sight in interstitial building spaces, chases, furred spaces, shafts, crawl spaces, etc.
- L. Construction Documents: Collective term for the entire set of bound or unbound material describing the construction and services required, including all Drawings, Specifications, addenda issued prior to execution of the contract, and modifications issued after execution of the Contract (such as change orders, construction change directives, supplemental instructions, etc.).
- M. Contract Documents: The Agreement (including other documents listed in the Agreement), Conditions of the Contract (General, Supplementary, and other conditions), and the Construction Documents.
- N. The Contract: The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the Owner and the Contractor and supersedes any prior negotiations, representations, or agreements, either written or oral. The Contract shall not be construed to create a contractual relationship of any kind (1) between the Engineer and the Contractor, (2) between the Owner and a Subcontractor, or (3) between any persons or entities other than the Owner and Contractor.
- O. Contractor: The party responsible for providing the system(s) as indicated herein.
- P. Drawings: The graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, and dimensions of the Work, generally including (but not limited to) plans, elevations, sections, details, schedules and/or diagrams.
- Q. EC: Electrical Contractor.
- R. Engineer/Consultant: The party responsible for producing the communications system(s) Construction Documents.
- S. Equal/Equivalent: Equally acceptable as determined by Owner's Representative.
- T. Existing: Equipment, device, and material present in an installation location prior to new work.
- U. Exposed: Not concealed (see above) and not installed underground.
- V. Final Completion: The date when the Engineer confirms in writing that the Contractor has completed the work in accordance with the Construction Documents, including completion of all punch list items, cleanup work and delivery of all required guarantees, warranties, licenses, releases, and other required deliverables.

SECTION 27 05 00

COMMON WORK RESULTS

- W. Furnish: To purchase, supply, and deliver to the project materials in new and operable condition, ready for installation.
- X. Governing Requirements: Collective term for regulations, laws, ordinances, codes, rules, standards, requirements, and guidelines that govern the installation and inspection of the work defined in the Contract Documents. See "Part 1 – General, 1.8 Governing Requirements" herein.
- Y. Governing Authorities: Entities or their representatives charged with formation and/or enforcement of Governing Requirements, such as the Authority Having Jurisdiction (AHJ).
- Z. Install: To place in final position in fully operable, tested condition.
- AA. Inside Plant (ISP): Infrastructure within a building.
- BB. Or Equal: Materials approved for use by the Engineer and which are dimensionally suitable and operationally identical to the specified item.
- CC. Owner: The Owner and the Owner's designated representative(s).
- DD. The Project: The total construction of which the Work performed under the Contract Documents may be the whole or a part, and which may include construction by the Owner and/or separate contractors.
- EE. Provide: To furnish and install, complete, tested and ready for intended use.
- FF. Substantial Completion: The date when all work required by the Construction Documents shall be complete (subject to the final punch list to be prepared by the Engineer) and on which the applicable jurisdictional authorities have issued a temporary certification of occupancy.
- GG. Section: An individual section of the Specifications.
- HH. Shown on Drawings: Noted, indicated, scheduled, detailed, or any other written reference made on the Drawings.
- II. Specifications: The portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work and performance of related services.
- JJ. Specification Section(s): One or more sections of the Specifications.
- KK. Section(s): An abbreviated form of Specification Section(s).
- LL. Structured Cabling System (SCS): Alternative term for Communications Cabling System
- MM. The Work: The construction and services required by the Contract Documents, whether completed or partially completed, and all other labor, materials, equipment, and services

COMMON WORK RESULTS

provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

1.11 ABBREVIATIONS

- A. Refer to the individual Specification Sections and Drawings for abbreviations and their definitions.

1.12 GOVERNING REQUIREMENTS

- A. All work shall be executed in compliance with the latest version and applicable portions of the codes, regulations, standards, guidelines, and/or recommendations of the following (hereinafter referred to as Governing Requirements):

- B. General:

1. ACI: American Concrete Institute (www.aci-int.org)
2. AHJ: Authority Having Jurisdiction
3. ANSI: American National Standards Institute (www.ansi.org)
4. ASTM: American Society for Testing and Materials (www.astm.org)
5. BICSI: A Telecommunications Association (www.bicsi.org)
6. IBC: International Building Code
7. ICEA: Insulated Cable Engineers Association (www.icea.net)
8. IEEE: Institute of Electrical and Electronic Engineers (www.ieee.org, standards.ieee.org)
9. IES: Illuminating Engineering Society of North America (www.iesna.org)
10. FCC: Federal Communications Commission Rules and Regulations
11. NAB: National Association of Broadcasters
12. NFPA: National Fire Protection Association (www.nfpa.org)
13. NEC: National Electrical Code (NFPA Article 70) (www.nfpa.org, www.necdirect.org)
14. NESC: National Electrical Safety Code (<http://standards.ieee.org/nesc/>)
15. NEMA: National Electrical Manufacturers Association (www.nema.org)
16. OSHA: Occupational Safety and Health Administration (www.osha.gov)
17. RUS: Rural Utilities Service (<http://www.usda.gov/rus/>)
18. TIA/EIA: Telecommunications Industry Association/Electronics Industries Alliance (www.tiaonline.org, www.eia.org)
19. UBC: Uniform Building Code
20. UFC: Uniform Fire Code (www.nfpa.org)
21. UL: Underwriters Laboratories, Inc. (www.ul.com, ulstandardsinfo.net.ul.com)
22. State and local codes, ordinances, and regulations
23. Requirements and guidelines of local utility companies
24. Applicable state, local and/or federal specifications
25. Manufacturer installation guidelines and recommendations

SECTION 27 05 00

COMMON WORK RESULTS

- C. Communications Specific:
1. ANSI/TIA-568-C: Commercial Building Telecommunications Cabling Standard
 2. ANSI/TIA-569-C: Commercial Building Standard for Telecommunications Pathways and Spaces
 3. ANSI/TIA-606-B: Administration Standard for Commercial Telecommunications Infrastructure
 4. ANSI/TIA-607-C: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 5. ANSI/TIA-758-B: Customer-owned Outside Plant Telecommunications Infrastructure Standard
 6. TIA-942: Telecommunications Infrastructure Standard for Data Centers
 7. TIA: Technical Service Bulletins (TSBs) (related to the above TIA standards)
 8. IEEE 802.3: Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit and 802.3ae 10 Gigabit Ethernet Standard
 9. IEEE 802.11: Wireless Local Area Network Standard, including the IEEE 802.11a, 802.11b, 802.11g, and 802.11n standards
 10. BICSI: BICSI Customer Owned Outside Plant Design Manual
 11. BICSI: BICSI LAN and Internetworking Design Manual
 12. BICSI: BICSI Telecommunications Distribution Methods Manual
 13. BICSI: BICSI Telecommunications Cabling Installation Manual
 14. NEC: NFPA 70
 15. NFPA 75: Protection of Electronic Computer and Data Processing Equipment
 16. NFPA 78: Lightning Protection Code
 17. California Title 24
 18. FCC Part 68: Connection of Terminal Equipment to Telephone Network.
 19. FCC Part 76.611: CFR Title 47 Radiation Leakage Standards
- D. Work shall comply with the Governing Requirements in effect at the time of construction, including all addenda, errata, annexes, and technical service bulletins (TSBs), etc., except where a specific date or version is otherwise indicated, or where otherwise mandated by a Governing Authority.
- E. In the event of conflict between the Governing Requirements and/or conflict between the Governing Requirements and the Construction Documents:
1. With regards to the preparation of proposals and/or bids, the Contractor shall assume the more stringent (costly) condition shall prevail. The Contractor shall notify the Engineer of such discrepancy a minimum ten (10) working days prior to the bid date.
 2. With regards to actual construction, the Contractor shall notify the Engineer and await the Engineer's instruction prior to proceeding with procurement and/or installation.
- F. In the event of conflict between a code and a non-code Governing Requirement, or between a code and the Construction Documents, the code shall govern. However,

SECTION 27 05 00

COMMON WORK RESULTS

compliance with code requirements shall not be construed as relieving the Contractor from complying with any requirements of the non-code Governing Requirement or Construction Documents which may be in excess of code requirements and not contrary to same.

- G. If the requirements of this section or the Project Drawings exceed those of the governing codes and regulations, then the requirements of this section and the Drawings shall govern. However, nothing in this section or the Drawings shall be construed to permit work not conforming to all governing codes and regulations.
- H. Errors or omissions in the Construction Documents do not relieve the Contractor from executing the work in accordance with the Governing Requirements.
- I. The Governing Requirements are incorporated by reference into these Specifications.

1.13 QUALITY ASSURANCE

- A. All equipment shall equal or exceed the minimum requirements of NEMA, ASME, ANSI, and Underwriters Laboratories.
- B. All material and equipment furnished shall be new, unused, and free from defects. Equipment shall be clean and free of damage and corrosion, and shall be of the best quality obtainable for the purpose intended.
- C. Where more than one of any specified item of equipment or material is required, such items shall be the product of one manufacturer throughout the facility.
- D. All materials used shall bear labels attesting to Underwriters Laboratory approval, provided a standard is established for the material in question.
- E. All materials shall conform strictly to the standards and specifications set forth in this document. Unless otherwise specified, all products furnished shall be designed, built, and installed in accordance with the latest and best practice of the electrical and telecommunications industry, and shall conform to the standards of the NEMA, ANSI, TIA/EIA, ICEA, IEEE, NEC, and this Specification wherever they apply.

1.14 CONTRACTOR QUALIFICATIONS

- A. The Cable Contractor shall have a full working knowledge of low voltage applications such as, but not limited to data, voice, wireless, video surveillance, access control and audio/visual systems. The contractor shall have the following qualifications:
- B. Possess those licenses/permits required to perform telecommunications and other low voltage installations in the specified jurisdiction.
- C. Have personnel trained and certified in the design and installation of the manufacturer's structured cabling system and equipment.

SECTION 27 05 00

COMMON WORK RESULTS

- D. The Cable Contractor shall provide proof of current certification in the design and installation of the manufacturer's structured cabling system and equipment.
- E. The Cable Contractor shall provide the resume of the project manager assigned to oversee the installation.
- F. The Cable Contractor shall have a minimum of five (5) years of experience and five (5) years in business in this specialized field and shall have completed a minimum of three (3) projects similar in scope and size to this project.
- G. Have personnel knowledgeable in local, state and national codes and the latest BICSI and Telecommunications Standards.
- H. Provide proof of insurance for liability and workmen's compensation for all personnel on the jobsite.
- I. Contractor personnel will be required to provide and use the proper tools in the performance of each activity. The tools must be in good working order. The Owner reserves the right to review the tool lists and tool maintenance procedures of the Contractor.
- J. Other contractor qualifications as described in Division 27 & 28.

1.15 SITE SAFETY AND ACCESS

- A. Determine from General Contractor all job site requirements such as site access, parking, and material storage areas.
- B. The Contractor working on the job site must follow all safety rules set by the General Contractor. All technicians must furnish their own safety equipment including but not limited to hard hats, safety glasses, proper footwear (confirm if steel toed boots/shoes are required), fall arrest equipment, gloves, and safety vests. All safety equipment must be in good working order.
- C. If required by General Contractor, attend all safety orientations and meetings.
- D. Provide to General Contractor an up to date MSDS binder listing materials planned for use on the job site that require MSDS information. Provide the number of copies requested.

1.16 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all licenses, permits and inspections required by the laws, ordinances and rules governing work specified herein. Such fees shall be included in the bid amount.
- B. The Contractor shall schedule and coordinate all inspections of the work as required, and shall provide all assistance as required by the inspector(s) during their inspection(s).

SECTION 27 05 00

COMMON WORK RESULTS

1.17 SUBSTITUTIONS AND DEVIATIONS

- A. Substitutions and deviations shall be in accordance with the applicable portions of Division 1. The requirements below expand upon and/or supplement the requirements in Division 1. In the event of discrepancies between these requirements and those defined in Division 1, the requirements of Division 01 shall take precedence.
- B. Prior to award of contract:
 - 1. Bids shall be based on products and methods of construction as specified.
 - a. Substitution of product and deviations from the methods of constructions specified which are used in the Contractor's bid shall be at the sole risk of the Contractor, and as such are subject to rejection without consideration during submittal review, should the Contractor be awarded the contract.
- C. After award of contract:
 - 1. Proposed substitution and deviation requests shall be reviewed during the time of Submittal review.
 - 2. Conditions for Consideration: Substitution and deviation requests will be received and considered only when one or more of following conditions are satisfied:
 - a. The specified product or method of construction cannot be provided within the contract period.
 - b. The specified product or method of construction cannot receive necessary approval by a Governing Authority, and the requested substitution can be approved.
 - c. The specified product or method of construction cannot be provided in a manner that is compatible with other materials.
 - d. A substantial advantage is offered to the Owner, in terms of cost, time, or other considerations of merit.
 - e. The product as specified includes the statement "Or Equal."
 - 3. Conditions for Rejection: Substitution and deviation requests will be rejected for the following reasons, among others:
 - a. The conditions for consideration (see above) have not been met.
 - b. Extensive revisions to the Construction Documents are required to support the proposed changes.
 - c. The proposed changes do not comply with the general intent of the Construction Documents.
 - d. The substitution request is for product which does not include the statement, "Or Equal," or is specified as "no substitute," "substitutions are not acceptable," "provide as specified" or similar.
 - e. The proposed change is solely for the convenience or economic gain of the Contractor.
- D. Approval of substitution and deviation requests:
 - 1. The Contractor shall not proceed with a substitution or deviation without written approval.

SECTION 27 05 00

COMMON WORK RESULTS

- a. The Contractor shall be responsible for fees incurred by the Engineer for any redesign resulting from the proposed changes, and for the updating of the Construction Documents to reflect such changes.

1.18 SUBMITTALS

- A. Submittals shall be in accordance with the applicable portions of Division 01 and 27. The requirements below expand upon and/or supplement the requirements in Division 01. In the event of discrepancies between these requirements and those defined in Division 01, the requirements of Division 01 shall take precedence.
- B. Submittals shall include product data literature and adequate descriptive literature, catalog cut sheets, and other data necessary for the Technology Designer and Architect/Engineer to ascertain that the proposed equipment and materials comply with the specification requirements.
- C. The Cable Contractor shall not purchase any materials or equipment for incorporation into the project prior to receipt of reviewed Submittals from the Technology Designer and/or Architect/Engineer.
- D. Review of product data shall not relieve the Cable Contractor from responsibility for deviations from the drawings or specifications, unless the Contractor has, in writing, called attentions to such deviations at the time of submission and secured written approval.
- E. General:
 1. Submittal review is a courtesy extended to the Contractor for the limited purpose of checking for general conformance with the design concept and the information shown in the Construction Documents.
 2. The Contractor shall provide submittal information as soon as practicable after the date of Notice to Proceed, but no later than 60 days after contract award and prior to the purchase, delivery, fabrication, and installation of product.
 3. In the event of discrepancies or conflict between Submittals and the Construction Documents, either prior to or after review, the requirements of the Construction Documents shall prevail.
 4. Submission of material for review, regardless of the outcome of the review, does not alter the Contractor's obligation to follow the intent of the Construction Documents, nor the Contractor's responsibility to comply with the Construction Documents.
 5. Submittals will not be reviewed and will be returned to the Contractor without review for the following reasons:
 - a. Submittal package does not conform to the requirements listed herein.
 - b. Submittal is for a product or method of construction not required by the Construction Documents.
 - c. Submittal is partial or incomplete.
 - d. Submittal contains information concerning the proposed implementation of means, methods, procedures, sequences or techniques, temporary aspects of the

SECTION 27 05 00

COMMON WORK RESULTS

- construction process, or other items, which are the sole responsibility of the Contractor.
- e. Submittal was not carefully reviewed by the Contractor prior to submission, as evidenced by poor organization, obvious or numerous errors, lack of correlation or cross-referencing, lack of clarity in presentation, or containing Shop Drawings which do not meet the standard of the Construction Drawings.
 - f. Submittal was submitted directly from the Contractor's subcontractor(s) or vendor(s).
 - g. Subcontractor and/or vendor submittal information was not carefully reviewed and/or approved by the Contractor.
 - h. Submittal does not bear the Contractor's approval stamp, and/or contains subcontractor and/or vendor submittal information which does not bear the Contractor's approval stamp.
- F. Submittal contains substitution and/or deviation requests, which are not clearly identified as substitution or deviation requests in a separate "Substitution and Deviation Requests" section of the Submittal.
- 1. Submittals shall be submitted as a single package and shall include subcontractor and vendor submittal information.
 - 2. Each submittal (or re-submittal) set shall bear a unique Contractor's submittal sequence number.
 - 3. Requests for substitution shall only be included under the "Substitution and Deviation Requests" section of the submittal (see below) and shall comply with the requirements of "Part 1 – General, 1.10 Substitutions and Deviations" herein. Submission of substitution requests in any other portion of the Submittal does not constitute an acceptable or valid request for substitution, nor will review of such information constitute approval in any manner.
 - 4. Submittals and shop drawings are required per the submittals schedule at the end of this Section.
- G. Submittal Format:
- 1. Submittals shall be in a letter-sized (8-1/2 x 11 inch) 3-ring binder with hardboard covers and under separate cover from submittals furnished under other Divisions.
 - 2. Front cover of Submittal shall indicate the name of the project, the project number, the name of the Owner, year of completion, the title "Telecommunications Submittals," and the names of the Engineer and Contractor, as well as the General Contractor.
 - 3. Submittals shall include a table of contents identifying sections, specification sections, and page numbers.
 - 4. Information provided in the submittal shall follow the same general order of the Specifications.
 - 5. Submittals shall be sectionalized and indexed with titled tab dividers (by section name – not numbered and not handwritten).
 - 6. Sections shall be (see Submittal Sections below for more detail regarding each section):

SECTION 27 05 00

COMMON WORK RESULTS

- a. Product Data
 - b. Shop Drawings
 - c. Technical Drawings (if applicable)
 - d. Samples (if applicable)
 - e. Substitution and Deviation Requests (if applicable)
 - f. Other Information (if applicable)
7. Within each section, information shall be organized by Specification Section and/or Drawing to which the information applies.
- H. Pages shall be numbered.
- I. Drawings (except for full and half-size Shop Drawings or Technical Drawings), if not in 8-1/2 x 11-inch size, shall be bound and accordion folded to 8-1/2 x 11-inch size.
- J. Quantity: Submit copies in quantities per the requirements of Division 01.
- K. Submittal Sections: Submittals shall be sectionalized and shall include sections for Product Data, Shop Drawings, Technical Drawings, Samples, Substitution and Deviation Requests, and Other Information (see Submittal Format herein).
1. Product Data: Submit Product Data information as called for in the individual Specification Sections. Product Data shall include:
 - a. For product which is being provided as specified, do not provide product data. Instead, provide a list of all products to be provided as specified and state in writing that each product in the list is being provided as specified.
 - b. For all other product other than that specified, provide the following product information (as applicable):
 - 1) Specification Section to which the product applies.
 - 2) Catalog cut sheets, manufacturer data sheets, and/or specification sheets detailing the product, item, assembly, and installation.
 - 3) Manufacturer's printed recommendations (if not included in the above).
 - 4) Written description.
 - 5) Notation of dimensions verified by field measurement.
 - 6) Notation of coordination requirements.
 - 7) Compliance with recognized trade association and testing agency standards.
 - 8) Highlighted details within the product data that identifies compliance with the Construction Documents or the intent of the Construction Documents.
 - 9) Highlighted details within the product data that identifies deviations from the Construction Documents or the intent of the Construction Documents.
 - c. For products for which the Contractor is proposing a substitution, include the product as specified in the submittal per the above requirements and list the reference to the proposed substitution in the "Substitution and Deviation Requests" section of the submittal (see below).
 - d. Do not provide product quantities – quantities are the sole responsibility of the Contractor and will not be reviewed.

SECTION 27 05 00

COMMON WORK RESULTS

2. Shop Drawings: Submit Shop Drawings as called for in the individual Specification Sections. Shop Drawings shall include:
 - a. Shop drawings shall contain design details, fabrication installation drawings, detailed drawings, schedules, diagrams, templates, and other drawings that show adaptation or installation of products. Shop Drawings shall include the following information:
 - 1) Specification Section(s) to which the Show Drawing applies.
 - 2) Dimensions.
 - 3) Identification of products and materials included.
 - 4) Compliance with specified standards.
 - 5) Notation of coordination requirements.
 - 6) Notation of dimensions established by field measurement.
 - 7) Notation of details that identify compliance with the Construction Documents or the intent of the Construction Documents.
 - 8) Notation of deviations from the Construction Documents or the intent of the Construction Documents.
 - 9) Indication of sectionalized manufacturing of equipment (i.e. for oversized equipment that cannot be installed as a single component).
 - 10) Shop drawings shall be provided in form, format, and size identical to that of the Construction Drawings (the Construction Drawings set the standard). Shop Drawings that do not meet this standard shall be rejected without review.
 - 11) Title Block: May be the Contractor's Title Block, but shall indicate Project name, manufacturer's name and logo, date of submittal, content of sheet, and sheet number.
 - 12) Floor Plans: Plan titles, scales, north arrows, column lines, line types, fonts, and room names and numbers shall match that of the Construction Drawings.
 - 13) For methods of construction for which the Contractor is proposing a deviation, include the method of construction as specified per the above requirements and list the reference to the proposed deviation in the "Substitution and Deviation Requests" section of the submittal (see below).
3. Technical Drawings: Submit Technical Drawings as called for in the individual Specification Sections.
4. Samples: Submit Samples as called for in the individual Specification Sections.
 - a. Samples shall be indexed in this section and provided as an attachment to the Submittal.
5. Substitution and Deviation Requests: For each substitution and/or deviation request, include the following:
 - a. Whether the request is for substitution of product or deviation from a construction method.
 - 1) The Specification Section(s) or Drawing to which the request applies.
 - 2) Reason for the request (Note: the reason must conform to the requirements of "Part 1 – General, Substitutions and Deviations" herein)
 - b. If a substitution, provide:

SECTION 27 05 00

COMMON WORK RESULTS

- 1) Specified product to which the proposed substitution applies.
- 2) Product data for the substituted product.
- 3) Notation of differences between the proposed substitution and the specified item.
- c. If a deviation, provide:
 - 1) Specified method of construction to which the proposed deviation applies.
 - 2) Shop Drawing data for the deviation.
 - 3) Notation of differences between the proposed deviation and the specified construction method.
- d. Written statement signed by the Contractor stating that the proposed substitution or deviation is equivalent or superior in function, appearance, and quality to the specified product or construction method and that the proposed substitution or deviation will be at no additional cost to the Owner.
6. Other Information:
 - a. Contractor Statement of Qualifications.
 - b. Submit Other Information as called for in the individual Specification Sections.
- L. Submittal review:
 1. The submittal review will not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of work with other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor.
 2. Corrections or comments made on the Submittal by the reviewer during the submittal review do not relieve the Contractor from compliance with the requirements of the Construction Documents.
 3. Review of a specific item shall not indicate that the reviewer has reviewed the entire assembly of which the item is a component.
 4. Review does not relieve the Contractor from responsibility for errors, which may exist in the submitted data.
 5. Review of substitutions and deviations:
 - a. The reviewer shall not be responsible for review of substitutions and/or deviations that were not brought to the attention of the reviewer by specific inclusion of the substitution and/or deviation in the Substitution and Deviation Requests section of the Submittal.
 - b. Where a substitution and/or deviation is not included in the Substitution and Deviation Requests section of the Submittal, the procurement and installation of the substitution and/or deviation is at the sole risk of the Contractor.
 - c. If the Reviewer does not specifically note substitutions and/or deviations, it remains the Contractor's responsibility to comply with the Construction Documents.
- M. After review, submittals shall be returned together with review comments and specific actions (if required) to be taken by the Contractor. Typical comments and actions will be:

SECTION 27 05 00

COMMON WORK RESULTS

1. No Exceptions Taken
 2. Revise and Resubmit - Re-Submittal Required
 3. Make Corrections Noted - Re-submittal not Required
 4. Submit Specified Items
 5. Rejected
 6. Submittal Not Required & Not Reviewed
- N. The Contractor shall perform no portion of the Work requiring a submittal until the respective submittal has been approved by the Architect/Engineer/General Contractor. Such Work shall be in accordance with the approved submittal.
- O. Re-submission of submittals:
1. Submittals shall continue to be re-submitted and reviewed until all submitted items are marked by the Engineer as "No Exceptions Taken" or "Make Corrections Noted (Re-submittal Not Required)."
 2. Re-submittals shall be clearly identified as a re-submittal and shall identify changes on a separate Revisions page inserted after the Table of Contents page(s).
 3. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of re-submittals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.

1.19 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in full compliance with the manufacturer's recommendations and/or instructions, using means and methods that will prevent damage, deterioration, and loss (including theft).
- B. The Contractor shall protect product until final acceptance.
- C. Protection of product is the sole responsibility of the Contractor. The Contractor shall be responsible for replacing damaged, deteriorated, or lost product at no additional cost to the Owner.
- D. Products subject to damage by the elements shall be stored above ground, under cover, in a weather tight enclosure, with ventilation adequate to prevent condensation. Temperature and humidity shall be maintained within the manufacturer's recommendations.
- E. The Contractor shall make provisions for receiving and storing product, including Owner furnished product to be installed by the Contractor as part of the work.
- F. Product shall be carefully inspected for damage upon delivery. Defective or damaged product shall be marked "Rejected," removed from the site, and shall not be installed.

SECTION 27 05 00

COMMON WORK RESULTS

- G. The Contractor shall arrange product deliveries in accordance with the construction schedule. Deliveries shall be scheduled to maintain the progress of work, to avoid conflict with the work of other Trades, and to accommodate site conditions.
- H. Product shall be delivered to the site in the manufacturer's original containers, complete with labels and instructions for the proper handling, storage, unpacking, protection and installation.
- I. The Contractor shall ensure that product to be installed is not temporarily used as steps, ladders, platforms, scaffolds, or for storage by the Contractor or by other Trades during the construction process. Equipment found used in such a manner will be considered "damaged," shall not be installed, and shall be replaced at no additional cost to the Owner.

1.20 COORDINATION

- A. The Contractor shall contact the Exante360 project manager once project is awarded and prior to construction to discuss project approach, schedule, and coordination.
- B. The Contractor shall thoroughly examine the Construction Documents, including Drawings and specification Sections of other Divisions, for construction details and methods that are dependent upon or will affect the work of other trades. The Contractor is responsible for identifying coordination issues and dependencies, and for preparing Shop Drawings, work plans and schedules to accommodate and/or mitigate coordination issues and dependencies before they arise.
 - 1. Changes necessitated by the failure of the Contractor to coordinate with the work of other trades shall be at no additional cost to the Owner or project.
- C. The Contractor shall confer and cooperate with the other trades, throughout the entire construction process, in order to coordinate the work in the proper sequence. Typical coordination issues include but are not limited to:
 - 1. Electrical work, including electrical receptacles, power panels, transformers, telecommunications grounding system, and the installation of raceway, device boxes, conduits, and sleeves for the Communications Cabling System.
 - 2. Location of cabinets, counters, and doors so that communications outlets, other system outlets and equipment are clear from and in proper relation to these items.
 - 3. Mechanical work, including HVAC systems and ductwork, piping, and mechanical chases.
 - 4. Ceiling cavity spaces.
 - 5. Installation of acoustical ceiling tiles and similar finishes that may conceal the work.
 - 6. Build-in of oversized equipment during structure construction.
 - 7. Required separation distances.
 - 8. Access routes for equipment through the construction
 - 9. Cutting/coring of floor, ceiling, or wall structures.

SECTION 27 05 00

COMMON WORK RESULTS

- D. Digital format copies of bid drawings will be furnished to the successful bidder. Augment bid documents with additional information to ensure coordination between trades. Provide digital format communications systems drawings showing all ceiling devices, raceways and cable tray locations and routing to mechanical contractor to be used for coordination drawings provided by mechanical contractor. Include dimensions and elevations of devices, raceway, and cable tray.
- E. The Contractor shall coordinate communications service installations with the Owner, Owner Vendors and with the Service Provider(s) as required.
- F. Existing communications service outages shall be coordinated and scheduled in advance with the Owner at a time and duration acceptable to the Owner. Outages scheduled at times other than the normal working hours shall not entitle the Contractor to additional compensation beyond the original amount bid. Outages without advance notice and prior approval by the Owner are not acceptable.
- G. The Contractor shall review the Drawings and Specifications of other Divisions for locations of devices and equipment requiring communications connectivity not specified in this Division or shown on the Communications Drawings. The Contractor shall coordinate the locations of these items with the other trades, and shall verify locations with the Engineer and Owner prior to rough-in.
- H. Verify that the physical dimensions of each item of equipment fit the available space, promptly notify the Engineer of any potential conflicts, and await the Engineer's direction prior to purchase and rough-in of the equipment.
- I. Coordinate locations of devices, outlets, etc. with field conditions, unless such locations are specifically dimensioned or otherwise noted in the Construction Documents. If so noted, verify location with other affected trades and against existing field conditions, promptly notify the Engineer of any potential conflicts, and await the Engineer's direction prior to purchase and rough-in of the equipment.
- J. Consult the architectural drawings for the exact height and location of all communications and nurse call equipment not specified herein or shown on the drawings. Make any minor changes (less than 6" horizontal) in the location of the raceways, outlets, boxes, devices, cabling, etc., from those shown on the drawings without extra charge, where coordination requires or if so directed by the Architect before rough-in.
- K. Coordinate locations for chases, slots, sleeves, and openings in the building structure. For new concrete coordinate, locate and provide chases, slots, sleeves, and openings prior to the pouring of the concrete.

1.21 RECORD DOCUMENTS

- A. The Contractor shall maintain a set of Record Documents showing all additions, changes, and deletions that have been made to the original Drawings and Specifications throughout the course of construction, as well as reviewed Submittal data.

SECTION 27 05 00

COMMON WORK RESULTS

1. Items to be noted shall include but shall not be limited to:
 - a. Routing of concealed raceways/pathways;
 - b. Raceways/pathways located more than 2 feet from where shown on the original Contract Documents;
 - c. Raceways and main pathways (pathways with more than 30 cables) not shown on the Contract Documents;
 - d. Concealed equipment;
 - e. Stub-outs; actual equipment locations, sizes and dimensions;
 - f. Building outline changes;
 - g. Addenda, accepted Alternates, Change Orders, other document revisions which occurred after the award of the Contract and/or the start of construction activities;
 - h. System component labels and identifiers for all major components.
 - i. Telecom Room detail sheets
 2. Notations shall be handwritten in a neat and legible manner and shall be noted as follows:
 - a. Red – for additions and changes
 - b. Green – for deletions
 - c. Blue – for notes
- B. Record Documents shall:
1. Be kept current (i.e. no more than one week behind actual construction) throughout the course of construction.
 2. Be retained at the job site until Final Acceptance.
 3. Be made readily available at all times to the Owner's representative.
 4. Not be the Contractor's working documents.
 5. Be protected from deterioration and loss in a secure, fire-resistive location.
 6. Be made readily available to the Engineer for review of completeness and accuracy throughout the course of construction.
 7. At project closeout, be updated with the items on the Known Exceptions/Deviations List per the requirements of subsection "3.10 Project Close-Out" herein. Include only those items marked "Approved" by the Engineer.
- C. Submission: The Record Drawings shall be submitted to the Engineer as part of the Operating and Maintenance Manual (see subsection "1.014 Operating and Maintenance Manual" herein).
1. Handwritten notations on the Record Drawings shall be REVIT drafted by the Contractor onto a final, fresh set of Construction Drawings prior to submission. Record Drawings shall be provided in form, format, size, and REVIT version identical to that of the Construction Drawings (the Construction Drawings set the standard). Record Drawings that do not meet this standard shall be rejected without review.
 2. The Record Drawings shall be reviewed by the Contractor for accuracy and completeness prior to submission.

COMMON WORK RESULTS

1.22 OPERATING AND MAINTENANCE (O&M) MANUALS

A. General:

1. O&M Manuals shall be submitted in accordance with the applicable portions of Division 1.
2. O&M Manuals shall be submitted as a single package and shall include subcontractor and vendor O&M information.
3. Catalog pages and data included in O&M Manuals shall be originals. Where not possible to obtain original copies in sufficient quantity, catalog pages and data shall be neat, clean copies of the originals.
4. O&M Manual Requirements: O&M Manuals shall include Product Data, Service, Spare Parts, Tests/Measurements/Calibration Settings, Record Drawings, Warranty information, and Other Information as required.
5. Product Data: Include the product data provided in the Submittal reflecting product as supplied and installed, as well as additional information such as installation, operation, and routine maintenance information.
6. Service: Assemble service information (cleaning, adjustments, frequency, etc.) for each device requiring service. For devices requiring qualified service, compile an index of qualified service providers (and their contact information) able to service these devices.
7. Tests: Assemble all test documentation made for each system and/or device requiring testing.
8. Record Drawings: Provide Record Drawings per the requirements of – subsection “V” herein.
9. Warranty: Provide warranty documentation per the requirements of the individual Specification Sections.
10. O&M Manual contents shall also be submitted in soft/electronic copy on compact disc.

B. O&M Manual format:

1. O&M Manuals shall be bound in one letter-sized (8-1/2 x 11 inch) hard cover (hard back or loose leaf) binder.
2. Front cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, year of completion, the title “Communications O&M Manual,” and the names of the Engineer and Contractor, as well as the General Contractor.
3. Side cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, and the title “Telecommunications O&M Manual.”
4. O&M Manual shall include the following sections, indexed (with tab dividers) accordingly.
 - a. Product Data
 - b. Service
 - c. Spare Parts
 - d. Tests

SECTION 27 05 00

COMMON WORK RESULTS

- e. Calibration/Configuration Settings
 - f. Record Drawings
 - g. Final Punch list
 - h. Certificates of Inspection
 - i. Warranty
- C. Contractor's Warranty Certificate
- 1. Manufacturer's Warranty Certificate (as applicable)
- D. Other Information (as applicable)
- 1. O&M Manuals shall include tab dividers, titled (not numbered) for each section. Tab dividers shall not be handwritten.
 - 2. O&M Manuals shall include a table of contents identifying sections and page numbers.
 - 3. Pages within each section shall be numbered.
 - 4. Drawings (excluding full size Record Drawings) shall be bound and accordion folded to 8-1/2 x 11-inch size.
- E. O&M Manual submission:
- 1. The Contractor shall submit one draft copy of the O&M Manual for review and approval by the Engineer.
 - a. The submission will be reviewed for accuracy, completeness, and compliance to the requirements herein. A submission which fails to meet these requirements will be rejected and returned to the Contractor together with review comments and specific actions to be taken by the Contractor. The Contractor shall revise the O&M Manual and re-submit for review and approval.
 - b. The O&M Manual shall continue to be re-submitted and reviewed until such time as the O&M Manual is approved by the Engineer.
 - c. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of O&M Manuals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.
- F. Upon approval of the draft copy, the Contractor shall submit final copies in quantities per the requirements of Division 01.

Final payment to the Contractor will not be authorized until the final copies of the O&M Manuals (including Record Documents) have been received and approved by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide materials that meet the following minimum requirements:

SECTION 27 05 00

COMMON WORK RESULTS

1. Cabling and components shall be by the manufacturer specified or an approved equal unless no substitutions are allowed. Where no manufacturer is specified, components shall meet or exceed the performance specifications given.
 2. Electrical equipment and systems shall meet UL standards and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
 3. Equipment shall meet all applicable FCC regulations.
 4. All materials, unless otherwise specified, shall be new, unused and the standard products of the manufacturer. Used equipment or damaged material will be rejected.
 5. The listing of a manufacturer as "acceptable" does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications and meet the quality of the design make.
 6. Where applicable, all materials and equipment shall bear the label and listing of Underwriters Laboratory. Application and installation of all equipment and materials shall be in accordance with such labeling and listing
 7. The Contractor is responsible for providing all incidental and/or miscellaneous tools, scaffolding, consumable items, testing equipment appliances, and other hardware not explicitly specified or shown on the Drawings required for the installation of a complete and operable telecommunications infrastructure system ready for the Owner's use.
- B. Products shall be:
1. New (except as otherwise indicated) and free from defects.
 2. Standard products of manufacturers regularly engaged in the production of such products.
 3. Of the manufacturer's latest standard design.
 4. Designed to ensure satisfactory operation and life in the environmental conditions that prevail in their installation location.
- C. Where systems are indicated, provide component products manufactured by a single system manufacturer.
- D. Prior to ordering and delivery of equipment, the Contractor shall:
1. Verify that the equipment shall adequately pass through building openings and passageways with unobstructed access to the final equipment location. When building openings and passageways will not permit the equipment to pass through unobstructed, equipment shall be manufactured and shipped in sections for final assembly at the equipment location. Submittals shall indicate sectionalized manufacturing of equipment.
 2. Verify that the equipment shall properly fit the space allocated, that required clearances could be maintained, and that the equipment can be located without interference from other systems, structural elements, or the work of other trades.

SECTION 27 05 00

COMMON WORK RESULTS

2.2 WORKMANSHIP, SUBSTITUTIONS, AND WARRANTY

- A. Materials and workmanship shall meet or exceed industry standards and be fully eligible for the maximum guarantee offered by the manufacturer. All components, material, and workmanship not covered by the manufacturer's system warranty shall be guaranteed for two years after the date of final acceptance. Cable integrity and associated terminations shall be thoroughly inspected, fully tested, and guaranteed as free from defects, transpositions, opens, shorts, kinks, damaged jacket insulation, or similar conditions that may compromise system performance.
- B. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.
- C. Cable Contractor shall be responsible for and make good, without expense to the Owner, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation, or poor workmanship.
- D. Approval of alternate or substitute equipment or material in no way voids Contract document requirements.
- E. Under no circumstances shall the Owner be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Cable Contractor submit to the Owner all evidence to support his contention that the item proposed for substitution is equal to the contract specified item. The Owner's decision as to the equality of substitution shall be final and without further recourse.
- F. The Contractor is to be certified by the manufacturer to install the cabling system and to furnish to the Owner a system warranty that has a minimum period of 25 years. Such warranty will cover all cable and components installed as part of the manufacturer's cabling system and shall include a performance warranty that guarantees the horizontal and backbone cabling system will support the performance specifications as stated in ANSI/TIA/EIA 568-B. Copper links shall be warranted to the link performance minimum expected results defined in ANSI/TIA/EIA-568-B.2-1. Fiber-optic links shall be warranted to the link and segment performance minimum expected results defined in ANSI/TIA/EIA-568-B.1.
- G. The Contractor at the time of Bid is not required to be certified.
- H. The Cable Contractor shall provide a certified warranty for both parts and labor for a minimum period of 25 years upon final acceptance of the system by Owner. The Contractor shall provide a copy of the warranty certificate to the Architect/Engineer and Owner for review.

PART 3 - EXECUTION

3.1 STRUCTURED CABLING

- A. All material and equipment shall be installed in a neat and workmanlike manner.

SECTION 27 05 00

COMMON WORK RESULTS

- B. All material and equipment shall be installed per manufacturer's specifications, using methods and tools approved by the manufacturer.
- C. All material and equipment shall be installed per the drawings.
- D. The installation shall be in compliance with the requirements of the NEC, OSHA and the rules, regulations, and requirements of the FCC.
- E. The installation shall be in compliance with federal, state, county and city laws, regulations, ordinances, and codes applicable to the installation.
- F. The locations of floor boxes, stub-ups, outlets, panels, equipment racks and other related equipment as indicated on the drawings are approximate and are understood to be subject to such revision as may be found necessary at the time of installation. The Contractor should have exact and definite locations accepted by the Owner before proceeding with the installation.
- G. For telecommunications outlets in wall mounted applications, the Electrical Contractor shall furnish and install electrical backboxes with a single-gang mud ring reducer for flush mounting single gang faceplates in the wall space along with conduit from the gang box to wire ways located in accessible spaces. See backbox and conduit schedule in Drawings for sizing requirements.
- H. For telecommunications outlets in floor mounted applications, the Electrical Contractor shall furnish and install floor boxes within the floors and any floor duct or conduits necessary to convey cable to wire ways in accessible spaces.
- I. The Contractor shall furnish and install wire pathways to fully support all installed cable. Pathways may consist of J-hooks rated for Category 6 cable, basket tray or ladder rack as called out in the drawings and/or specifications. The Contractor shall coordinate wire raceway installation with other trades so as not to impede their work.
- J. The Contractor shall furnish and install ladder rack and wire raceways within the TDR(s) and TEC. The ladder rack and wire raceways shall include all accessories for a complete routing system.
- K. The Contractor shall furnish and install equipment racks, frames or cabinets as called out in the drawings and/or specifications.
- L. Provide all cable hangers, horizontal and vertical wire managers, cross-connect managers, and other cable management hardware for a neat and orderly installation.
- M. Horizontal cabling shall not be spliced and must be continuous from the cross-connect to the workstation outlets.
- N. All copper backbone cabling shall not be spliced but must be continuous from termination point to termination point.

SECTION 27 05 00

COMMON WORK RESULTS

- O. All fiber optic backbone cables shall be plenum rated armored terminated with LC connectors unless otherwise specified.
- P. The proximity of horizontal and backbone cabling to electrical facilities that generate high levels of electromagnetic interference (EMI) shall be taken into account. These facilities include, but are not limited to copiers, motors, transformers, and fluorescent lighting. TIA/EIA 569-C standards shall provide separation requirements.
- Q. All horizontal cables shall be terminated according to the T568-B wiring scheme unless otherwise specified.

3.2 GROUNDING AND BONDING

- A. Grounding shall meet the requirements as noted in the Division 27 specifications and practices of applicable authorities and codes. In addition, telecommunications grounding and bonding shall conform to ANSI/TIA Standard 607-B.
- B. A telecommunications grounding bus bar (TGB) shall be installed by the electrical contractor in each telecommunications data/equipment room. The TGB shall be connected to the main building ground system.
- C. The Contractor shall ground all equipment racks, frames, cabinets, ladder rack and basket tray to room TGB using minimum #6 AWG wire with green sheath. Use bonding jumpers between each section of ladder rack or basket tray and between ladder racks or basket trays and equipment racks, frames, and cabinets.

3.3 FIRESTOP

- A. All telecommunication pathways that penetrate fire-rated walls, floors or ceilings shall be properly fire stopped, per the applicable codes, Division 27 specifications and Drawing and be the responsibility of the Contractor.
- B. Provide fire-resistant UL approved fire stopping systems to restore fire ratings to all wall, floor, or ceiling penetrations. Fire stopping systems must be UL classified and meet NEC and local codes.
- C. All penetrations through fire rated floors and walls shall be sealed to prevent the passage of smoke, fire, toxic gas, or water through the penetration, before, during, or after a fire. The fire rating of the penetration seal shall be at least that of the floor or wall into which it is installed, so the original fire rating of the floor or wall is maintained as required by Article 300-21 of the NEC.
- D. No flammable material may be used to line the chase or hole in which the firestop material is to be installed.
- E. All fire stopping materials shall be installed in accordance with the manufacturer's directions and recommendations.

SECTION 27 05 00

COMMON WORK RESULTS

- F. The sealant shall remain resilient and pliable to allow for the removal and/or addition of cable without the necessity of drilling holes. It shall adhere to itself in order to allow any and all repairs to be made with the same material. It shall allow for vibration, expansion and/or contraction without affecting the seal, cracking, crumbling and spilling.
- G. The firestop sealant shall comply with the fire-exposure and hose-stream endurance requirements of ASTM E-119.

3.4 LABELING

- A. Cable labels shall provide a unique identification scheme that shall ease cable tracing. The Contractor shall coordinate with Owner to determine any Owner required labeling schemes prior to administering cable management techniques. If Owner does not furnish a cabling administration scheme, the Contractor shall submit intended labeling scheme to the Technology Designer, Architect/Engineer and Owner for approval.
- B. Labels shall be permanent, waterproof, and readable from one foot with permanent lettering and shall not be removable by normal cable handling or normal operations. As part of the final installation, no hand-written labels will be allowed. All labels shall be typed or computer generated.
- C. Verify labeling for all cables, termination blocks, patch panels, and racks with Owner prior to installation.
- D. All cables shall be computer generated labeled at each end, for proper administration, additional cable labeling may be required on the cable at intermediate locations such as conduit ends and along cable tray and cable support runs.

3.5 TESTING

- A. The Contractor shall test 100% of all cables installed. Telecommunications cables shall meet or exceed the ANSI/TIA-568-C specifications for the category of cable installed. All test reports shall be printed and included in the final record documentation package.

3.6 UTP COPPER CABLING

- A. The Cable Contractor shall be responsible for recording all test data and per the specifications.
- B. Copies of all test results are to be submitted to the Owner or authorized representative for review as part of the final record documentation package and remain with the Owner for their records.
- C. Category 6 cabling systems shall be performance verified using an automated test set. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment

COMMON WORK RESULTS

manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved. The test shall be a permanent link test and test for the following performance parameters:

1. Wire Map
2. Length
3. Insertion Loss
4. Pair-to-Pair Near End Crosstalk (NEXT)
5. Power Sum Near End Crosstalk (PSNEXT)
6. Equal Level Far End Crosstalk (ELFEXT)
7. Power Sum Equal Level Far End Crosstalk (PSEFFEXT)
8. Return Loss (RL)
9. Propagation Delay
10. Delay Skew

3.7 FIBER OPTIC BACKBONE CABLING

- A. Follow procedures described in TIA/EIA TSB-140 for Tier 1 tests when testing intra-building fiber optic backbone cables. Multimode links are to be tested at 850 nm and 1300 nm in accordance with ANSI/TIA/EIA-526-14-A, Method B, One Reference Jumper. Single-mode links are to be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, One Reference Jumper. Test fibers in one direction unless otherwise directed.
- B. Test for system attenuation using a power meter and light source set to the same wavelength. Power meter must be calibrated and traceable to the National Institute for Standards and Technologies (NIST).
- C. Test jumpers must be of the same optical fiber core size as the cabling system (e.g. test 50/125µm systems using 50/125 µm jumpers).
- D. Test 100% of installed fiber. Provide printed test reports for inclusion in final record documentation package. Test reports will show measured loss for each fiber in dB and length of each fiber in feet.
- E. End to end testing is considered to be from the equipment end through the cross-connect to the terminal end.
- F. TSB 140 Tier 2 to include OTDR testing.

3.8 OTHER CABLES

- A. Other cables include:
 1. Security and Access control cables.
 2. Video surveillance UTP cables.
 3. Camera power and control cables other than UTP.

SECTION 27 05 00

COMMON WORK RESULTS

4. Intercom and paging cables.
5. Coaxial cables.
6. Audio and Visual cables.
7. Elapsed Timer cables.
8. Other systems defined on drawing and specs.
9. Test all cables for continuity.
10. Test cables per manufacture specifications.
11. Test cables per Division 27 specifications

3.9 IDENTIFICATION

- A. All contractor personnel shall be clearly identified by uniform and/or company badge with photo ID, employee's name, and company name. Contractor vehicles shall be equipped with signs on both sides of vehicle identifying the Contractor's company name.
- B. All Owner provided Contractor IDs shall be returned at or before project closeout.
- C. Completed work shall present a neat and professionally installed appearance. The appearance of the work shall be of equal importance to its operation. Failure to present a neat and professionally installed appearance shall be considered sufficient reason for rejection of the system in part or in whole.
- D. Completed work shall demonstrate quality workmanship. Quality workmanship shall be of equal importance to its operation. Failure to demonstrate quality workmanship shall be considered sufficient reason for rejection of the system in part or in whole.

3.10 PERMITS AND FEES

- A. The Contractor shall make arrangements to obtain and pay for necessary permits, licenses, and inspections.
- B. No work shall be started prior to obtaining necessary permits and payment of required fees. Work installed prior to obtaining proper permits shall, if required by the Governing Authority (AHJ), be redone in compliance with requirements at no additional cost to the Owner.

3.11 ACCESS

- A. Install equipment such that it is readily accessible for operation and maintenance.
- B. Access to equipment shall not be blocked or concealed by conduits, supporting devices, boxes, or other items.
- C. Do not install equipment such that it interferes with the normal operation or maintenance requirements of other equipment.

SECTION 27 05 00

COMMON WORK RESULTS

- D. Place equipment labels and/or other identification where the label and/or identification can be easily seen and read without difficulty.

3.12 BUILDING ATTACHMENTS

- A. Equipment shall be installed level, plumb, parallel, and perpendicular to building structures and to other building systems and components, except where otherwise indicated.
- B. Equipment shall be securely fastened. Select fasteners so that the load applied to any one fastener does not exceed 25 percent of the proof-test load.
- C. Attachment of hanger rods, support cables, diagonal wall bracing, and any other connections made to the building structure after the fireproofing contractor has completed his work, shall be made with minimal impact to the existing fireproofing. The Contractor making such connections is responsible for:
 - 1. Removal of fire stopping where attachment is required.
 - 2. Scorings and over-cut as required for connection only. Contractor shall be held responsible for costs associated with the patch back of excessively removed fire stopping material by the General Contractor.
- D. Due to the nature of the site, all surface mounted/exposed conduit (EMT and liquid-tight flex) and backboxes shall be fixed to the buildings with no hanging parts.

3.13 SUPERVISION

- A. The Contractor shall appoint a Project Manager who will be the single point of contact for all work accomplished under this Project and will be vested by the Contractor with the authority to make decisions on behalf of the Contractor.
- B. The Project Manager will be responsible to represent the Contractor and coordinate all aspects of this Project, including but not limited to:
 - 1. Overall and specific project responsibility
 - 2. Thorough knowledge of Project Specifications and Drawings
 - 3. Creation and maintenance of a project schedule, including milestones, task definitions and resource allocations
 - 4. Attendance at all Project Management meetings
 - 5. Supervision and direction of all Contractor personnel
 - 6. Documentation, including submittals and change orders
 - 7. Quality assurance of Project
- C. The Project Manager initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Project Manager shall not be changed by the Contractor without Engineer and Owner approval.

SECTION 27 05 00

COMMON WORK RESULTS

- D. The Contractor shall assign a qualified Foreman to the Project and shall keep the Foremen on site and in charge of the work at all times. The Foreman shall be equipped with a mobile phone during project working hours.
- E. The Foreman initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Foreman shall not be changed by the Contractor without Engineer and Owner approval.

3.14 DRAWINGS

- A. Unless specifically dimensioned or detailed, Drawings indicate approximate locations, arrangement, and general character. To avoid interference with structural members and equipment of other trades, or for the convenience of the Owner, it may be necessary to adjust the locations shown on the Drawings prior to installation. Unless specifically dimensioned or detailed, and with the exception of locations of equipment and raceway in Telecommunications Data/Equipment Rooms, the Contractor may make minor location adjustments without obtaining the Engineer's prior approval. All other adjustments require prior approval from the Engineer.
- B. Minor adjustments are defined as distances not to exceed:
 - 1. 1 foot at grade, floor ceiling, and roof level in any direction in the horizontal plane.
 - 2. 1 foot on walls in a horizontal direction within the vertical plane.
 - 3. Particular attention shall be paid to door swings, piping, ductwork, and structural steel:
 - 4. In general, waste and vent lines, large pipe mains, and ductwork shall be given priority for the locations and spaces shown.
 - 5. In general, electrical lighting fixtures shall be given priority for ceiling space.
 - 6. Where minor location adjustments are required, such adjustments shall be made at no cost to the Owner or project.

3.15 PENETRATIONS, PATCHING, AND PAINTING

- A. Penetrations (openings, holes, chases, sleeves, slots, cuts, etc.):
- B. Properly size and locate penetrations required as construction progresses. For new concrete or masonry, the Contractor shall coordinate, locate, and provide required openings prior to the pouring of concrete or construction of masonry.
- C. Obtain written approval from the Structural Engineer/Architect for penetration of structural elements prior to penetration.
- D. Penetration of concrete and structural elements shall be avoided where possible. Where not possible, penetrations shall be performed in a manner that will not reduce structural element load-carrying capacity or load-deflection ratio.
- E. Penetrations shall be performed by workers qualified and skilled in the trades involved.

SECTION 27 05 00

COMMON WORK RESULTS

- F. Penetrations shall not be exposed on the exterior or in occupied spaces in a manner that would, in the Engineer's opinion, reduce the aesthetic qualities of the structure or result in visual evidence of penetration and patching.
- G. Penetrations shall be constructed using methods least likely to damage elements to be retained or adjoining construction.
- H. Provide temporary support for the work to be penetrated.
- I. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not for hammering or chopping. Cut holes and slots neatly to required size with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- J. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring of existing finished surfaces.
- K. Cut through concrete and masonry using a cutting device such as a Carborundum saw or diamond core drill.
- L. Voids around penetrations shall be properly sealed, caulked or grouted as required.
- M. Fire stopping: Penetrations (through and membrane) of fire rated barriers shall be fire stopped and sealed.
- N. The fire rating of the barrier shall be maintained.
- O. Material shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test in a configuration that is representative of the actual field conditions.
- P. Existing elements:
 - 1. The Contractor shall be responsible for identifying, locating, and protecting existing embedded conduits, pipe, ductwork, etc. when penetrating existing structures.
 - 2. Cap, valve, plug or seal remaining portions of cut pipes or conduit to prevent entrance of moisture or other foreign matter.
 - 3. The Contractor shall be responsible for repairing and/or replacing existing conduits, pipe, ductwork, etc. damaged by the Contractor during construction of penetrations. Repair and/or replacement shall be at no additional cost to the Owner.
 - 4. Penetrations (and subsequent patching) resulting from the Contractor's failure to properly coordinate penetrations shall be at no additional cost to the Owner.
- Q. Patching:
 - 1. Patching in every instance consists of completing the work to match and blend with the adjoining existing work insofar as methods, materials, colors, and workmanship are concerned
 - 2. Patching shall be performed by workers qualified and skilled in the trades involved.

SECTION 27 05 00

COMMON WORK RESULTS

3. The Contractor shall be responsible for replacing improperly matched, blended, or poorly constructed patches at no additional cost to the Owner.

R. Painting:

1. Painting shall consist of cleaning, surface preparation, painting (primer, intermediate, and finish) and finishing surfaces and items, new and existing, affected by the work of the Contractor.
2. Surface painting shall match and blend with existing adjoining surfaces.
3. Scratched, chipped, or otherwise marred equipment shall be repainted to match original finish.
4. The areas around penetrations, once sealed, shall be painted.
5. Painting shall be performed by workers qualified and skilled in the trades involved.
6. The Contractor shall be responsible for refinishing and repainting improperly matched, blended, or poorly painted surfaces and items at no additional cost to the Owner.

3.16 HOUSEKEEPING

A. During the course of construction:

1. At the conclusion of each day's work, remove empty boxes, crates, and other debris, and sweep clean all work areas affected by the Contractor's work of the day.

B. At project completion:

1. Remove all tools and scaffolding.
2. Equipment and facilities shall be thoroughly cleaned inside and out and residue removed.
3. Remove temporary labels and adhesives.
4. Thoroughly vacuum the interior of enclosures to remove debris.
5. Surplus product, materials and debris shall be cleared from the job site.
6. The Contractor is solely responsible for the appropriate disposal of all surplus product, materials and debris.

3.17 SUBSTANTIAL COMPLETION

A. Pre-Substantial Completion Submittal: Three weeks prior to Substantial Completion, the Contractor shall prepare and submit the following:

1. Station References and Labels Spreadsheet per the requirements of Division 27 05 53 Identification for Communications Systems

B. Known Exceptions/Deviations List:

1. A thorough list of known exceptions/deviations (in materials, construction, and/or workmanship) from that specified in the Contract Documents, and for which there was not associated documentation in the form of Change Orders (CO), Construction

COMMON WORK RESULTS

Change Directives (CCD), Architects Supplemental Instructions (ASI), or responses to a Request for Information (RFI).

2. The Contractor shall submit the list to the Engineer for review. The Engineer shall review each item and mark as either Accepted or Not Approved.
3. Items marked "Not Approved" shall be corrected by the Contractor to conform with the intent of the Contract Documents at no additional cost to the Owner.
4. The Contractor shall perform corrective action for "Not Approved" items prior to notifying the Engineer that the work is Substantially Complete.

- C. Notice of Substantial Completion: When the Work nears Substantial Completion, the Contractor shall notify the Engineer in writing the date that the work will be Substantially Complete and ready for review by the Engineer.

3.18 PROJECT CLOSE-OUT

A. Punch List:

1. Once notice of Substantial Completion is received, the Engineer shall visit the site to review the Work, and shall prepare a punch list of items determined to be incomplete, deficient, or otherwise not in compliance with the intent of the Contract Documents.
2. During the review of the Work, if the Engineer finds that the Known Exceptions/Deviations List provided by the Contractor was insufficiently thorough, that the Work is not Substantially Complete, or that deficiencies in the work are excessive, the Engineer will cease review and inform the Contractor that the work is not Substantially Complete. The Contractor shall be responsible for fees incurred by the Engineer for this partial review.
3. The Contractor shall perform corrective action for each item noted in the punch list. When complete, the Contractor shall submit the original punch list with each item initialed attesting to the fact that the item was corrected.
4. If necessary, the Engineer will perform a subsequent review after receipt of the Contractor initialed punch list.
5. Should additional reviews beyond the original punch list review be required of the Engineer due to the Contractor's failure to correct all incomplete, deficient, or non-compliant work, the Contractor shall be responsible for fees incurred by the Engineer for the additional reviews.

- B. Provide O&M Manuals per the requirements of subsection "1.014 Operating and Maintenance (O&M) Manuals" herein.

3.19 FOLLOW UP

- A. After the system(s) and facility have been placed in operation and are in use by the Owner, provide technical assistance for the first two months of operation on a standby basis for troubleshooting, education, and problem solving.

SECTION 27 05 00
COMMON WORK RESULTS

END OF SECTION

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section provides the minimum requirements for the grounding, bonding and protection for all communication systems included within Division 27 and Division 28.
- B. This section includes the minimum requirements for the equipment and cable installations in telecommunications rooms, server rooms, and communications equipment rooms.
- C. Provide grounding and bonding for all communication system components in accordance with references listed in the "Reference Standards" section of these specifications.
- D. Provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.
- E. This section includes minimum requirements for the following:
 - 1. Telecommunications Grounding Busbar (TGB)
 - 2. Telecommunications Main Grounding Busbar (TMGB)
 - 3. Telecommunications Bonding Backbone (TBB)
- F. All cables and related terminations, support and grounding/earthing hardware shall be furnished, installed, wired, tested, labeled, and documented by the telecommunications contractor as detailed in this document.
- G. Product specifications, general design considerations, and installation guidelines are provided in this document. If the bid documents are in conflict, this stricter document shall take precedence. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

1.2 RELATED SECTIONS

- A. Communications Systems (27 00 00)
- B. Security Systems General Requirements (28 05 00)

1.3 SUBMITTALS

- A. Provide product data for the following:
 - 1. Manufacturer's cut sheets, specifications and installation instructions for all products.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

1.4 DEFINITIONS

A. Bonding

1. The permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

B. Mesh Common Bonding Network (MCBN)

1. The mesh CBN (MCBN) can be readily utilized for efficient direct bonding of equipment and other apparatus to the grounding system. Such an arrangement provides efficient grounding and inter/intra-unit bonding of metal cabinets, racks and miscellaneous metal objects (especially when they are not powered). Additionally, the MCBN ensures grounding reliability of the equipment in the event the equipment grounding conductor of the serving power circuit is compromised or disconnected during maintenance. Electrostatic charge buildup and dissipation is also greatly aided by the multiple grounding paths of the CBN. See Figure 1.

C. Ground/Earth

1. A conducting connection, whether intentional or incidental, by which an electric circuit or equipment is connected to earth, or to some conducting body of relatively large extent that serves in place of the earth.

D. Retrofit Rack Grounding/Earthing

1. The application of grounding/earthing products and technology where equipment is already deployed and functioning within the equipment rack.

E. Retrofit Cabinet Grounding/Earthing

1. The application of grounding/earthing products and technology where equipment is already deployed and functioning within the equipment cabinet.

1.5 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufactures listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

- B. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

- C. Material and work specified herein shall comply with the applicable requirements of:

1. ANSI/TIA-568-C Generic Telecommunications Cabling for Customer Premises
2. ANSI/TIA-569-C Telecommunications Pathways and Spaces

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

3. ANSI/TIA- 606-B Administration Standard for Telecommunications Infrastructure
4. ANSI/TIA-607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
5. CSA C22.1 – Canadian Electrical Code, 2012
6. BICSI – Telecommunications Distribution Methods Manual, 13th Edition, 2014

PART 2 - GENERAL

2.1 GENERAL

- A. All materials shall be UL listed and new, free from damage or defects. Furnish any associated material needed for proper installation of all materials required to complete the project.
- B. All grounding/earthing conductors shall be copper.
- C. Lugs, HTAPs, grounding strips, and busbars shall be UL Listed and made of premium quality tin-plated electrolytic copper that provides low electrical resistance while inhibiting corrosion. Antioxidant shall be used when making bonding connections in the field.
- D. Two-hole lugs shall be used. All lugs shall be irreversible compression and meet NEBS Level 3 as tested by Telcordia. Lugs with inspection windows shall be used in all non-corrosive environments so that connections may be inspected for full conductor insertion
- E. Die index numbers shall be embossed on all compression connections to allow crimp inspection.
- F. Cable assemblies shall be UL Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
- G. Telecommunications Main Grounding Busbar (TMGB)
 1. The primary starting point for the grounding system is the Telecommunications Main Grounding Bus (TGMB). Where practical, it should be located as close as practical to the telecommunications service entrance or Minimum Point of Entrance (MPOE). However, it must also be in close proximity to the building's Main Electrical Ground (MEG) point. The TGMB shall be bonded to the MEG with a Building Conductor for Telecommunications (BCT) equal in size to the building's ground conductor, or up to a maximum of 4/0 AWG. All mating surfaces shall be coated with anti-oxidant compound. The TMGB shall be sized to allow for a minimum of 30% additional capacity.
 2. Outside plant protector blocks shall be bonded to the TMGB along with any shield isolation gap (building side) conductors. All mating surfaces shall be coated with anti-oxidant compound.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

3. All equipment and metal structures located in the space with the TGMB/TGB shall be bonded to the TGMB with a minimum of a # 6 AWG. This would include: Electrical Panel Board, Building Steel (if in close proximity), HVAC equipment (if present), Ladder Rack and Cable Tray, Equipment Racks and Cabinets, Conduit and Pipes (except for short "sleeves").

H. Telecommunications Grounding Busbar (TGB)

1. All Telecommunication Spaces shall be provided with a Telecommunications Ground Busbar (TGB). The TGB shall be bonded to either the TMGB or the TBB with a conductor sized in accordance with Figure 1 or by engineered calculations. Only irreversible crimp or exothermic welds shall be used. All mating surfaces shall be coated with anti-oxidant compound. The TGB shall be sized to allow for a minimum of 30% additional capacity.

I. Telecommunication Bonding Backbone (TBB)

1. From the TGMB, a Telecommunication Bonding Backbone (TBB) shall extend to all telecommunications spaces. This conductor shall be sized in accordance with Table 1, or by other engineered calculations. Where possible the TBB should be a single unbroken conductor. If a splice is required, only irreversible crimps or exothermic welds shall be used. Where possible, the TBB should follow the same pathway as the rest of the telecommunication infrastructure. Where two parallel TBBs are used, they shall be connected at the furthest point by a Grounding Equalizer (GE) conductor which shall be sized the same as the largest TBB. In addition, a GE shall be installed at every third floor (if applicable).

J. Rack Bonding Conductor

1. Individual sections of Ladder Rack may be bonded together using a # 6 AWG jumper to minimize the number of connections back to the TMGB/TGB. In normal sized spaces, all racks and cabinets shall be bonded individual with a Rack Bonding Conductor (RBC) to the TMGB/TGB. No "daisy chaining" is permitted. For larger spaces, a Telecommunication Equipment Bonding Conductor (TEBC) may be used, with individual RBCs connected via irreversible crimp connections. Any surface that is painted or coated must be scraped or sanded to bare metal to insure a sound electrical connection. All mating surfaces shall be coated with anti-oxidant compound.

K. Lugs and Crimps

1. Each lug shall have two (1/4" for #6 - 5/8" centers and 3/8" for #2 lugs - 1" centers)

2.2 WALL MOUNT BUSBARS

A. Telecommunications Grounding Busbar (TGB) – 12"

1. Telecommunications Grounding Busbar (TGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
2. The busbar shall be 2" (50 mm) high and 12" (300 mm) long and shall have 9 attachment points (one row) for two-hole grounding lugs.
3. The busbar shall be pre-assembled with BICSI/ANSI/TIA-607-C hole spacing.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

4. Manufacturer: Panduit, Part/Model No. GB2B0306TPI-1
 - B. Telecommunications Grounding Busbar (TGB) – 24”
 1. Telecommunications Grounding Busbar (TGB) shall be constructed of .25” (6.4 mm) thick solid copper bar.
 2. The busbar shall be 2” (50 mm) high and 24” (600 mm) long and shall have 19 attachment points (one row) for two-hole grounding lugs.
 3. The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-B and shall accept 6 lugs with 5/8” (15.8 mm) hole centers and 3 lugs with 1” (25.4 mm) hole centers.
 4. The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4” (100 mm) standoff from the wall.
 5. The busbar shall be UL Listed as grounding and bonding equipment.
 6. The busbar shall be pre-assembled with BICSI/ANSI/TIA-607-C hole spacing.
 7. Manufacturer: Panduit, Part/Model No. GB2B0514TPI-1
 - C. Busbar Label Kit
 1. The wall mounted busbar label kit shall include printed tag and one flame retardant cable tie.
 2. Manufacturer: Panduit, Part/Model No. LTYK
- 2.3 Rack Mount Grounding Bus Bar
- A. Telecommunications Grounding Busbar (TGB) – 19” Rack Mount
 1. Mounts to 19” rack rails.
 2. Includes twenty #12-24 x 1/2” hex head screws installed; mounting hole sets have 5/8” (15.9mm) spacing; provided with two cage nut bonding studs and four #12-24 bonding nuts.
 3. The busbar shall be UL Listed as grounding and bonding equipment.
 4. Manufacturer: Panduit, Part/Model No. RGRB19CN
- 2.4 Bonding accessories
- A. Armored Cable Grounding Kit
 1. The armored cable grounding shall be #6 AWG (16mm²) jumper for armored cable diameter up to 0.84” (21.3mm).
 2. The armored cable grounding shall be 24” (609.6mm) length.
 3. The armored cable grounding shall be factory terminated on one end with LCC6 two-hole copper compression lug and the other end with grounding terminal.
 4. The armored cable grounding shall be provided with two each #12-24 and M6 thread-forming screws and a black polypropylene terminal cover.
 5. Manufacturer: Panduit, Part/Model No. ACG24K

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

- B. Two Mounting Hole Ground Terminal Block
 - 1. Ground terminal block shall be made of electroplated tin aluminum extrusion.
 - 2. Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
 - 3. The conductors shall be held in place by two stainless steel set screws.
 - 4. Ground terminal block shall have two 1/4" (6.4 mm) holes spaced on 5/8" (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
 - 5. Ground terminal block shall be UL Listed as a wire connector.
- C. Two-Hole Compressing Lugs
 - 1. Compression lugs shall have two-holes with spacing per standards.
 - 2. Compression lugs shall be manufactured from electroplated tinned copper.
 - 3. Compression lugs shall have two holes spaced on 5/8" (15.8 mm) or 1" (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
 - 4. Compression lugs shall be sized to fit a specific size conductor, sizes #6 to 4/0, as stated below.
 - 5. Compression lugs shall be UL Listed as wire connectors.
 - 6. Manufacturer: Panduit, LCC Series
- D. HTAPs
 - 1. HTAPs
 - a. HTAPs shall be selected according to AWG size of run and tap conductors.
 - b. Manufacturer: Panduit, HTCT Series
 - 2. HTAP cover
 - a. Clear covers for HTAPs shall be selected according to HTAP being covered.
 - b. Manufacturer: Panduit, CLRCVR series
- E. Vertical Grounding Busbar
 - 1. The vertical grounding busbar strip shall be 78.65" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws
 - 2. Manufacturer: Panduit, Part/Model No. RGS134-1Y
- F. Rack Grounding Jumper Kits
 - 1. Rack Grounding Jumper Kit – 60"
 - a. The 60" (1.52m) length jumper kit shall be used for bonding individual racks or cabinets into grounding backbone.
 - b. The jumper shall be #6 AWG (16mm²) jumper; 45° bent lug on grounding strip side; provided with .16 oz. (5cc) of antioxidant, two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread forming screws and a copper compression HTAP* for connecting to a #6 to #2 awg sized bonding backbone.
 - c. Manufacturer: Panduit, Part/Model No. RGCBNJ660P22
 - 2. Rack Grounding Jumper Kit – 72"

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

- a. The 72" rack jumper (and cabinet) kits shall be used for smaller TDR (5 bays or less) to bond individual rack or cabinet directly back to wall mounted busbar.
 - b. One 72" length #6 AWG green wire with yellow horizontal stripe.
 - c. Jumper is pre-terminated on one end with LCC6-14JAWH-L and the other end with LCC6-14JAW-L.
 - d. Manufacturer: Panduit, Part/Model No. GJ672UH
- G. ESD Wrist Strap
1. ESD Wrist Strap
 - a. Adjustable fabric ESD wrist strap with 6' coil cord, banana plug, 1 mega-ohm resistor and 4mm snap.
 - b. The ESD wrist strap shall be located within reach of all equipment.
 - c. Manufacturer: Panduit, Part/Model No. RGEDSWS
 - d. Works with ESD Port Panduit RGEDS2-1
 2. ESD Port for Wrist Strap
 - a. The two-hole ESD port shall have 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, and two each #12-24 x 1/2" and M6 x 12mm thread-forming screws.
 - b. The ESD port for wrist strap shall be located within reach of all equipment.
 - c. The ESD port for wrist strap works with wrist strap Panduit RGEDSWS.
 - d. Manufacturer: Panduit, Part/Model No. RGEDS2-1
- H. Bonding Screws
1. Bonding screws shall be Green thread-forming bonding screws for use to mount equipment that does not have a built-in grounding pad (terminal).
 2. Manufacturer: Panduit, Part/Model No RGTBSG-C
- I. Antioxidant Joint Compound
1. Oxide inhibiting joint compound shall be utilized for copper-to-copper, aluminum-to-aluminum, or aluminum-to-copper connections.
- J. C-Type, Compression Taps
1. Compression taps shall be manufactured from copper alloy.
 2. Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
 3. Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
 4. Compression taps shall be UL Listed.
- K. Pedestal Clamp with Grounding Connector
1. Pedestal clamp shall be made from electroplated tinned copper or bronze. Installation hardware will be stainless steel.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

2. Pedestal clamps shall be sized to fit a specific size conductor, size #6 and/or 2/0, as stated below.
 3. Pedestal clamp installation hardware shall be sized to attach to round and/or square raised access floor pedestals that are 1-1/8" to 1-3/4" in diameter, as stated below.
 4. Pedestal clamp shall provide straight (in-line) or cross (intersection) support for up to two conductors.
 5. Pedestal clamp shall be UL Listed as grounding and bonding equipment.
- L. Pipe Clamp with Grounding Connector
1. Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
 2. Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 to 250 MCM; conductors must be the same size.
 3. Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1" to 6" (.75" to 6.63" in diameter), as stated below.
 4. Pipe clamp shall be UL Listed as grounding and bonding equipment.
- M. Equipment Grounding Jumper
1. Equipment Grounding Jumper Kit – 24"
 - a. The equipment grounding jumper kit shall include one 24" long pre-terminated equipment grounding jumper with #10 AWG (6mm²) jumper, bent lug on grounding strip side to straight lug on equipment.
 - b. The equipment grounding jumper kit shall provide .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws.
 - c. Manufacturer: Panduit, Part/Model No. RGEJ1024PHY
 - d. Jumper will be made with UL Listed components
 2. Equipment Grounding Jumper Kit – 36"
 - a. The equipment grounding jumper kit shall include one 36" long pre-terminated equipment grounding jumper, with #10 AWG (6mm²) jumper, bent lug on grounding strip side to straight lug on equipment.
 - b. Provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws.
 - c. Manufacturer: Model/Part/Model No. RGEJ1036PFY
 - d. Jumper will be made with UL Listed components

PART 3 - EXECUTION

3.1 GENERAL WORKMANSHIP

- A. Provide qualified and skilled workmanship. All installations shall be of the highest quality using proper installation methods and per manufacturer's instructions and industry standards.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

- B. A licensed electrical contractor shall perform installation and termination of the main bonding conductor to the building service entrance ground.
- C. Avoid routing grounding/earthing conductors in metal conduits. If the grounding/earthing conductor must be routed through a metal conduit, bond each end of the conduit to the grounding/earthing conductor.

3.2 INSTALLATION

- A. Telecommunication Grounding Busbar (TGB)
 - 1. The TGB will be grounded/earthed to the Telecommunications Main Grounding Busbar (TMGB).
 - 2. Each TGB shall be bonded to building steel and the electrical panel serving equipment in the telecommunications space.
- B. Rack Grounding Busbar
 - 1. AWG #6 jumpers shall be routed between the electronic equipment and the vertical busbar from each piece electronic device. The busbar shall be connected to the room ground busbar through a home run designed AWG #6 stranded conductor, or larger as required.
- C. Cable Tray/Equipment Racks/Cabinets
 - 1. Attach #6 AWG cable, stranded ground wire with a crimped two-hole lug to the busbar to the following (where applicable):
 - 2. To cable tray
 - 3. To each equipment rack using ground lugs.
 - 4. To each equipment cabinet using ground lugs.
 - 5. To provide electrical continuity between rack elements, paint piercing grounding washers, shall be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.
 - 6. Patch panels will be bonded to racks using bonding screws.
 - 7. Other components as necessary.
- D. Riser Cable
 - 1. Ground all riser cable using grounding spade.
- E. Wall-Mount Busbars
 - 1. Attach busbars to the wall in approved location with appropriate hardware according to the manufacturer's installation instructions.
 - 2. Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
 - 3. Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

4. The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.

F. Ground Terminal Block

1. Every rack and cabinet shall be bonded to the TMGB or TGB.
2. Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
3. Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.

G. Pedestal Clamp

1. At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
2. If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar non-reversible bonding component sized to fit both conductors.
3. Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.
4. Remove insulation from conductors where wires attach to the pedestal clamp.

H. Pipe Clamp

1. Bond metal pipes located inside the TDR with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer's recommendations.
2. Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond.
3. Remove insulation from conductors where wires attach to the pipe clamp.

I. Fire Penetrations

1. Bond fire penetration systems (STI EZ Path & Hilti Speed Sleeve) entering or located inside the TDR with a minimum #6 AWG conductor to the TMGB or TGB according to the manufacturer's recommendations.

J. Equipment Ground Jumper Kit

1. Bond the equipment to a vertical rack-mount busbar or ground bar using ground jumper as per the manufacturer's recommendations.
2. Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or ground bar to help prevent corrosion at the bond.

END OF SECTION

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 General

- A. This section provides the minimum requirements for pathways for all communication systems for sections related to communications included within Division 27 and Division 28.

1.2 Related sections

- A. Communications Systems (27 00 00)

1.3 Summary

- A. This section provides minimum requirements for the OSP and ISP pathways.
- B. Provide all materials and labor for the installation of a pathway system for communications infrastructure.
- C. Firestopping
 - 1. Backboxes
 - 2. Penetrations
 - 3. Conduit
 - 4. Innerduct
 - 5. Sleeves
 - 6. Cable hangers
- D. Firestopping
 - 1. Quality Assurance
 - a. Installer Qualifications
 - 1) Requires an experienced installer who has completed penetration fire stop systems similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
 - 2) Requires an experienced contractor who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell fire stop system products to the contractor or to an installer engaged by the contractor does not in itself confer sufficient qualification on the buyer.
 - b. Source Limitations
 - 1) Obtain fire stop systems for each kind of penetration and construction condition indicated from a single manufacturer.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- 2) Products may be in the form of caulk, putty, strip, sheet, or devices that shall be specifically designed to fill holes, spaces, and voids at communications penetrations.
- 3) Firestopping materials shall also provide adhesion to substrates and maintain fire and smoke seal under normal expected movements of substrates, conduits and cables.
- c. Fire Test Response
 - 1) Provide fire stop systems that comply with the following requirements:
 - 2) Fire stopping tests are performed by a qualified testing and inspecting agency such as Underwriters Laboratories (UL), or another agency performing testing and follow-up inspection services for fire stop systems acceptable to the authorities having jurisdiction.
 - 3) Through penetration fire stop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - 4) Through penetration fire stop system products bear classification marking of a qualified testing and inspecting agency.
 - 5) Through penetration fire stop systems correspond to those indicated by reference in UL's "Fire Resistance Directory."
2. Delivery and Handling
 - a. Deliver fire stop system products to the project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying:
 - 1) Product and manufacturer
 - 2) Date of manufacturer
 - 3) Lot number
 - 4) Shelf life, if applicable
 - b. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
3. Project Conditions
 - a. Environmental Limitations
 - 1) Do not install fire stop systems when ambient or substrate temperatures are beyond the limits permitted by the system manufacturers, or when substrates are wet due to rain, frost, condensation, or other causes.
 - b. Ventilation
 - 1) Ventilate per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
4. Fire Stopping Products and Accessories
 - a. Provide fire stop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through penetration fire stop systems, under conditions of service and application, as demonstrated by the system manufacturer based on testing and field experience.
 - b. Accessories
 - 1) Provide all components that are needed to install fill materials. Use only components specified by the fire stop system manufacturer and approved by

PATHWAYS FOR COMMUNICATIONS SYSTEMS

the qualified testing and inspecting agency for the systems indicated.
Accessories include, but are not limited to, the following items:

- 2) Permanent forming/damming/backing materials, including the following:
- 3) Slag-rock/wool-fiber insulation
- 4) Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state
- 5) Fire-rated form board
- 6) Temporary forming materials
- 7) Substrate primers
- 8) Collars
- 9) Steel sleeves

5. Mixing

- a. For those products requiring mixing before application, comply with the fire stop system manufacturer's written instructions for accurate combination of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for the application indicated.

6. Implementation

a. Examination

- 1) Examine substrates and conditions with installer present to check for: compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- 2) Proceed with installation only after unsatisfactory conditions have been corrected.

b. Surface Cleaning

- 1) Clean out openings immediately before installing through penetration fire stop systems. Comply with written recommendations of the fire stop system manufacturer and the following requirements:
- 2) Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of the fire stop system.
- 3) Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with the fire stop systems. Remove loose particles remaining from cleaning operation.
- 4) Remove laitance and form-release agents from concrete.

c. Priming

- 1) Prime substrates where recommended (in writing) by the system manufacturer. Use that manufacturer's recommended products and methods. Confine primers to the areas of bond. Do not allow spillage and migration onto exposed surfaces.

7. The Contractor shall submit a list of firestopping products and procedures. The submittal shall include:

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- a. The manufacturer's technical data for each product including product description, specifications including labeling or listing by an agency acceptable to the Owner or Authorized Representative, and storage requirements.
 - b. The firestop design documentation shall include type of each penetration, type of building construction being penetrated, the hourly resistance rating of floor, wall, or other partition of building construction and firestop device or system proposed for use.
 - c. The manufacturers Installation Procedure sheets that outlines how and which specific products are to be used.
- E. Fire Rated Pathway Assembly
- 1. STI EZ Path
 - a. Assembly shall have UL Classification markings
 - b. Use only firestop products that have been ASTM E 814 (ANSI/UL1479) tested for specific fire-rated construction conditions conforming to construction assembly type, annular space requirements and fire-rating involved for each separate instance.
 - c. Cables passing through fire-rated walls shall pass through fire-rated assemblies which contain an intumescent material that adjusts automatically to cable additions or subtractions.
 - d. EZPath (preferred method over conduit sleeves) or metallic conduit sleeves may be used when cable tray has to penetrate fire or smoke barriers.
 - e. Use 50% fill ratio to determine the number of metallic sleeves/conduits required. Use EZ Pathway cable capacity charts for the cable capacity for appropriate model device
 - f. The assembly shall have an F Rating equal to the rating of the barrier in which the Assembly is installed.
 - g. Assemblies shall be capable of allowing a 0 to 100-percent visual fill of cables.
 - h. Assemblies shall be of a sufficient size to accommodate the quantity and size of low voltage cables required.
 - i. Assemblies shall be provided with steel wall plates allowing for single or multiple Assemblies to be ganged together. Multi-gang plates shall be used where applicable.
 - 2. Hilti Speed Sleeve (CP 653)
 - a. Assembly shall have UL Classification markings
 - b. Use only firestop products that have been ASTM E 814 (ANSI/UL1479) tested for specific fire-rated construction conditions conforming to construction assembly type, annular space requirements and fire-rating involved for each separate instance.
 - c. Cables passing through fire-rated floors or masonry walls shall pass through fire-rated assemblies which contain an intumescent material that adjusts automatically to cable additions or subtractions.
 - d. Speed Sleeve (preferred method over conduit sleeves) or metallic conduit sleeves may be used when cable tray has to penetrate masonry fire or smoke barriers.

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- e. Use 50% fill ratio to determine the number of metallic sleeves/conduits required. Use Speed Sleeve cable capacity charts for the cable capacity for appropriate model device.
- f. The assembly shall have an F Rating (and T rating for floor penetrations) equal to the rating of the barrier in which the Assembly is installed.
- g. Assemblies shall be capable of allowing a 0 to 100-percent visual fill of cables.
- h. Assemblies shall be of a sufficient size to accommodate the quantity and size of low voltage cables required.

F. EMT Conduit

- 1. Electrical Metallic Tubing shall be hot galvanized steel O.D. with an organic corrosion resistant I.D. coating and shall be produced in accordance with U.L. Safety Standard #797 and ANSI C80.3 and shall be listed by a nationally recognized testing laboratory with follow-up service.
- 2. Each length of tubing shall be labeled containing UL Listing and the letters "EMT" clearly and durably marked once per 10 foot (3.05 m) length,
- 3. The letters "EMT" shall be at a minimum of 1/8 inch (3 mm) high.

G. Backbox

- 1. All backboxes shall be 4 inch square double-gang flush mount box with single gang reducer ring for outlet plate.

1.4 SUBMITTALS

A. Comply with Section 27 05 00 for additional submittal requirements and procedures.

B. Product Data

- 1. Pullbox hardware.
- 2. Conduit and ducts, including elbows, bell ends, bends, fittings, and solvent cement.
- 3. Miscellaneous components.
- 4. Warning tape.

C. Shop Drawings: Show fabrication and installation details for underground ducts and utility structures and include the following:

- 1. For precast manholes and pullboxes, Shop Drawings shall be signed and sealed by a qualified professional engineer, and shall show the following:
 - a. Construction of individual segments.
 - b. Joint details.
 - c. Design calculations.
 - d. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation.
 - e. Conduit and cable pathways shall be shown accurately based on field coordination.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- D. Coordination Detailing Activity Drawings: Show duct profiles and coordination with other utilities and underground structures. Include plans and sections drawn to scale, and show all bends and location of expansion fittings.

1.5 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the owner or owner representative.
- B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated or a substitution is requested, equipment shall be equivalent in every way to that of the equipment specified. All substitutions are subject to the control and approval of the owner or the owner representative.
- C. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
- D. Material and work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA-568-C Generic Telecommunications Cabling for Customer Premises
 - 2. ANSI/TIA-569-C Telecommunications Pathways and Spaces
 - 3. ANSI/TIA- 606-B Administration Standard for Telecommunications Infrastructure
 - 4. ANSI/TIA-607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
 - 5. NFPA 70 – National Electric Code, current edition
 - 6. BICSI – Telecommunications Distribution Methods Manual, current edition

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall consist of tray sections, tray fittings, connectors, supports, expansion joints, blind end plates, barrier strips, radius drops, bonding conductors and other incidentals and accessories as required. Provide all incidental and/or miscellaneous hardware not explicitly specified or shown on the Contract Documents that is required for a fully operational and warranted system.

2.2 Outside (OSP) Pathways

- A. CONDUIT

PATHWAYS FOR COMMUNICATIONS SYSTEMS

1. APPLICATIONS

- a. Conduit and associated fittings shall only be used for applications as permitted by CEC and product listing.
- b. The minimum size of conduit shall be $\frac{3}{4}$ inch unless otherwise specified.
- c. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- d. Underground:
 - 1) Under Slab on Grade (within structure slabs only where approved by Structural Engineer): Use rigid PVC conduit.
 - 2) Exterior, Direct-Buried: Use rigid PVC conduit.
 - 3) Exterior, Embedded within Concrete: Use rigid PVC conduit.
 - 4) Transition to galvanized steel rigid metal conduit where emerging from underground.
 - 5) Provide locating tape 12 in. below grade along all underground conduit routes.
 - 6) Conduit shall be encased in red dyed slurry.
- e. Embedded Within Concrete Walls:
 - 1) Use galvanized steel rigid metal conduit (RMC), intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal (P-RMC), or rigid PVC conduit.
 - 2) Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- f. Concealed Within Masonry: Use galvanized steel rigid metal conduit (RMC), intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal (P-RMC), or electrical metallic tubing (EMT).
- g. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC), intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- h. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- i. Exposed, Interior, Not Subject to Physical Damage:
 - 1) Use galvanized steel rigid metal conduit (RMC) or intermediate metal conduit (IMC). or electrical metallic tubing (EMT).
 - 2) Locations Not subject to Physical Damage shall include electrical rooms, control rooms, data / telephone rooms, and offices, and protected locations in Processing plant rooms, industrial process, and utilization equipment where conduits are 9 feet above finished grade.
- j. Exposed, Interior, Subject to Physical Damage:
 - 1) Use galvanized steel rigid metal conduit (RMC) or intermediate metal conduit (IMC).
 - 2) Locations subject to Physical Damage areas shall include, but not limited to processing plant rooms, industrial process, and utilization equipment. Conduits for these rooms, 0 to 9 feet above finished grade, or where exposed

PATHWAYS FOR COMMUNICATIONS SYSTEMS

to damage due to operations and maintenance activity, are considered to be the subject to physical damage.

- k. Exposed, Exterior, outdoor areas: Use galvanized steel rigid metal conduit (RMC), intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal (P-RMC).

2. Products

a. GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- 1) Description: CEC, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- 2) Fittings
- 3) Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 4) Material: Use steel or malleable iron.
- 5) Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

b. INTERMEDIATE METAL CONDUIT (IMC)

- 1) Description: CEC, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- 2) Fittings
- 3) Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 4) Material: Use steel or malleable iron.
- 5) Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

c. FLEXIBLE METAL CONDUIT (FMC)

- 1) Description: CEC, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- 2) Fittings:
- 3) Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B,
- 4) Material: Use steel or malleable iron.

d. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- 1) Description: CEC, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- 2) Fittings:
- 3) Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 4) Material: Use steel or malleable iron.

e. ELECTRICAL METALLIC TUBING (EMT)

- 1) Description: CEC, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- 2) Fittings:
- 3) Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 4) Material: Use steel or malleable iron.
- 5) Connectors and Couplings: Use compression (gland).
- 6) Do not use indenter type or set-screw connectors or couplings.
- f. RIGID POLYVINYL CHLORIDE (PVC) CONDUIT
 - 1) Description: CEC, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
 - 2) Fittings
 - 3) Manufacturer: Same as manufacturer of conduit to be connected.
 - 4) Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
 - 5) Paint PVC conduits and fittings exposed to sun light. Paint to be rated for outside usage and color shall be approved by the engineer before application.
- g. LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)
 - 1) Description: CEC, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
 - 2) Fittings
 - 3) Manufacturer: Same as manufacturer of conduit to be connected.
 - 4) Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.
- B. PULLBOXES
 - 1. Cast-Metal Boxes: Cast aluminum, with outside flanges and gasketed cover. This unit is to be used for above ground surface mount applications. A keylock is required for all above ground pull boxes. Box shall be NEMA 4X rated and vandal resistant.
 - 2. Precast Pullboxes: Polymer concrete, monolithically poured walls and bottom, with steel frame and access door assembly as the top of pullbox. Duct entrances and windows shall be located near corners to facilitate racking. Pulling-in irons and other built-in items shall be installed before pouring concrete. Cover shall have nonskid finish and legend. Unit, when buried, shall be designed to support AASHTO H10 loading for sidewalk and landscaped areas and AASHTO M306 HS-20 for roadways, parking lots and loading docks. Pullboxes must be placed on a layer of aggregate.
 - 3. Cover Legend: "COMMUNICATIONS", as necessary and as shown on plans.
 - 4. Traffic Hinged Pull Box
 - a. Design
 - 1) 3'-0" x 5'-0" x 48" deep
 - a) Jensen Precast, or approved equivalent
 - 5. Fiber Optic Handhole/Pull Box
 - a. Design

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- 1) 4'-0" x 4'-0" x 4'-0" deep
 - a) Jensen Precast, or approved equivalent
- b. 2'-0" x 3'-0" x 3'-0" deep
 - 1) Jensen Precast, or approved equivalent

2.3 Inside (ISP) Pathways

A. Firestop Devices - EZ-Path Series 44+

- 1. Wall Plate – Single Gang
 - a. The single wall plate shall be used to allow a single EZ-Path 44 fire-rated pathway device to be installed in a 6" round opening or 4-1/8" x 4-5/8" opening.
 - 1) Manufacturer: STI, Part/Model No. EZP144W
- 2. Pathway Device (without Wall Plate) EZ-Path 44+ Fire-Rated
 - a. The pathway device shall be used through walls up to 12" thick.
 - b. Manufacturer: STI, Part/Model No. EZD44S2
- 3. Wall Bracket/Plate - Multi-Gang
 - a. The wall bracket shall be used between studs up to 24"
 - b. The inside dimensions shall be 20" wide x 4-5/8" high x 6" long.
 - c. Manufacturer: STI, Part/Model No. EZP544W
- 4. Radius Control Module
 - a. The radius control module shall clip into ends of 44+ series and shall maintain the bend radius of exiting cables.
 - b. The module shall have a min. 1" Bend radius control.
 - c. Manufacturer: STI, Part/Model No. EZRCM44S
- 5. Extension Module
 - a. The extension modules shall connect to the ends of the 44+ series to increase the assembly length to penetrate barriers up to 24" thick.
 - b. Up to (2) modules can be added to a 44+ series device.
 - c. Manufacturer: STI, Part/Model No. EZD44ES

B. Firestop Devices - EZ-Path Series 33

- 1. Wall Plate
 - a. The single wall plate shall be used to allow a single EZ-Path 33 fire-rated pathway device to be installed in a 4 in. (102 mm) round opening or 3 in. (76 mm) x 3 in. (76 mm) square opening.
 - b. Manufacturer: STI, Part/Model No. EZP133CW
- 2. Pathway Device (without Wall Plate) EZ-Path 33 Fire-Rated
 - a. The pathway device shall be used through walls or floors up to 9" thick.
 - b. Manufacturer: STI, Part/Model No. EZD33FWS
- 3. Wall Bracket/Plate - Multi-Gang
 - a. The wall bracket shall be used between studs up to 24"
 - b. Manufacturer: STI, Part/Model No. EZP*33W

PATHWAYS FOR COMMUNICATIONS SYSTEMS

4. Radius Control Module
 - a. The Radius Control Modules (RCMs) snap into the ends of pathways and provide a 1 in. (25 mm) minimum bend radius for cables.
 - b. Manufacturer: STI, Part/Model No. RCM33
- C. Firestop Devices - EZ-Path Series 22
 1. EZ Path Device (with kit)
 - a. The pathway device (with kit) shall be installed in a 2 in. round opening.
 - b. Manufacturer: STI, Part/Model No. EZD22
- D. Firestop Devices – EZ-Firestop Grommets
 1. Split Grommet for small cable penetrations (up to 0.27 in.)
 - a. Manufacturer: STI, Part/Model No. RFG1
 2. Split Grommet for small cable penetrations (up to 0.53 in.)
 - a. Manufacturer: STI, Part/Model No. RFG2
- E. Firestop Devices – Hilti Speed Sleeve
 1. Pathway Device
 - a. The pathway device shall be used through masonry walls or floors up to 12" thick.
 - b. 2" or 4" model options
 - c. Manufacturer: Hilti, Part/Model No. CP 653
- F. Cable Hangers
 1. J-Hook (1" Cable Support)
 - a. Nonconductive Plenum Rated 2" wide polypropylene Comfort Cradle with Locking Restraint Latch
 - b. UL listed hardware
 - c. UL listed for use in plenums
 - d. Fill capacity for 1" cradle: Up to 21ea CAT5E or 16ea CAT6A. (100% Fill)
 - e. The J-hook shall be TIA/EIA 569 Compliant, UL2043 Approved.
 - f. The J-hook shall be white in color.
 - g. Manufacturer: CEAS, Part/Model No. Stiffy Fig 200/Fig 201
 2. J-Hook (2" Cable Support)
 - a. Nonconductive Plenum Rated 2" wide polypropylene Comfort Cradle with Locking Restraint Latch
 - b. UL listed hardware
 - c. UL listed for use in plenums
 - d. Fill capacity for 2" cradle: Up to 87ea CAT5E or 66ea CAT6A. (100% Fill)
 - e. The J-hook shall be TIA/EIA 569 Compliant, UL2043 Approved.
 - f. The J-hook shall be white in color.
 - g. Manufacturer: CEAS, Part/Model No. Stiffy Fig 200/Fig 201
 3. J-Hook (3-1/2" Cable Support)

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- a. Nonconductive Plenum Rated 2" wide polypropylene Comfort Cradle with Locking Restraint Latch
- b. UL listed hardware
- c. UL listed for use in plenums
- d. Fill capacity for 3-1/2" cradle: Up to 267ea CAT5E or 202ea CAT6A. (100% Fill)
- e. The J-hook shall be TIA/EIA 569 Compliant, UL2043 Approved.
- f. The J-hook shall be white in color.
- g. Manufacturer: CEAS, Part/Model No. Stiffy Fig 200/Fig 201
4. J-Hook Cable Support Tree
 - a. Tree supports multiple J-hooks.
 - b. J-hook widths vary
 - c. Max load for support rod with footprint: 70#
 - d. Max load for cradle: 50#
 - e. Manufacturer: CEAS, Part/Model No. Stiffy Fig 206
5. All Threaded Rod (ATR)
 - a. ATR shall be one continuous piece
 - b. Size: 3/8"
 - c. Threads per Inch: 16
 - d. Standard Finish: Zinc-plated, stainless steel type 304

PART 3 - EXECUTION

3.1 General

- A. No conduit bend shall be greater than 90 degrees.
- B. No length of conduit shall exceed 150 feet and shall not contain more than two 90-degree bends. If either of the criteria cannot be met due to field conditions, then a pull box must be installed to alleviate tension on the cable when it is installed to avoid signal degradation. Pull box must be sized to meet TIA/EIA standards.
- C. Conduit bends should be new, smooth, even, and free of kinks or other discontinuities that may have a detrimental effect on cable installation.
- D. All pull-boxes must be installed in accessible locations, no closer than 4" to the ceiling tile grid and no higher than 24" above the ceiling tile grid, with the cover of the pull-box easily accessible as well. If the cover of the pull-box is located on the side of the pull-box, 18" inches of clearance is required from the pull-box cover to the nearest pipe, duct, conduit, etc.
- E. All communication pathways that penetrate fire-rated barriers must be firestopped in accordance with applicable codes.
- F. Provide fire-stopping material for all conduits used and set aside for future use for low-voltage cabling, including riser and security cables.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

- G. Use only materials and methods that preserve the integrity of the firestopping system and its rating.

3.2 INSTALLATION

- A. Ground one or both ends of conduit runs in accordance with all applicable codes and requirements.
- B. Ream all conduit ends and fit them with bushings.
- C. Install pull cord in each conduit run. Tie off pull cord at both ends of the conduit run.

3.3 FIRESTOPPING

A. Installation

1. Install through penetration fire stop systems in a manner that complies with the manufacturer's written installation instructions and published drawings for products and applications indicated.
2. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of fire stop systems.
3. Install fill materials for fire stop systems using proven techniques to produce the following results:
 - a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve the indicated fire-resistance ratings.
 - b. To assure adherence to substrates through proper application, apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - c. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

B. Identification

1. Identify through penetration fire stop systems with pressure-sensitive, self-adhesive, pre-printed vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each fire stop system installation where labels will be visible to anyone seeking to remove penetrating items or fire stop systems. Warning label shall read:
2. "Warning — Through Penetration Fire Stop System — Do Not Disturb. Notify Building Management of Any Damage"
3. Date of installation

C. Cleaning and Protection

1. Clean off excess fill materials adjacent to openings as work progresses. Use only cleaning materials that are approved by the fire stop manufacturers and use only cleaning materials that do not damage materials in which openings occur.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

2. Provide final protection and maintain conditions during and after installation that ensure fire stop systems are without damage or deterioration at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out, remove damaged or deteriorated fire stop immediately, and install new materials to produce systems complying with specified requirements.
- D. Delivery, Storage, and Handling
 1. Deliver fire stop system products to the project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying:
- E. Product and Manufacturer
 1. Date of manufacturer
 2. Lot number
 3. Shelf life, if applicable
 4. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- F. Project Conditions
 1. Environmental Limitations
 - a. Do not install fire stop systems when ambient or substrate temperatures are beyond the limits permitted by the system manufacturers, or when substrates are wet due to rain, frost, condensation, or other causes.
- G. Ventilation
 1. Ventilate per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
- H. Fire Stopping Products and Accessories
 1. Provide fire stop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through penetration fire stop systems, under conditions of service and application, as demonstrated by the system manufacturer based on testing and field experience.
- I. Accessories
 1. Provide all components that are needed to install fill materials. Use only components specified by the fire stop system manufacturer and approved by the qualified testing and inspecting agency for the systems indicated. Accessories include, but are not limited to, the following items:
- J. Permanent forming/damming/backing materials, including the following:
 1. Slag-rock/wool-fiber insulation
 2. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state
 3. Fire-rated form board
 4. Temporary forming materials

PATHWAYS FOR COMMUNICATIONS SYSTEMS

5. Substrate primers
6. Collars
7. Steel sleeves

K. Mixing

1. For those products requiring mixing before application, comply with the fire stop system manufacturer's written instructions for accurate combination of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for the application indicated.

L. Implementation

1. Examination
2. Examine substrates and conditions with installer present to check for: compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

M. Surface Cleaning

1. Clean out openings immediately before installing through penetration fire stop systems. Comply with written recommendations of the fire stop system manufacturer and the following requirements:
2. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of the fire stop system.
3. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with the fire stop systems. Remove loose particles remaining from cleaning operation.
4. Remove laitance and form-release agents from concrete.

N. Priming

1. Prime substrates where recommended (in writing) by the system manufacturer. Use that manufacturer's recommended products and methods. Confine primers to the areas of bond. Do not allow spillage and migration onto exposed surfaces.

O. Installation

1. Install through penetration fire stop systems in a manner that complies with the manufacturer's written installation instructions and published drawings for products and applications indicated.
2. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of fire stop systems.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

3. Install fill materials for fire stop systems using proven techniques to produce the following results:
4. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve the indicated fire-resistance ratings.
5. To assure adherence to substrates through proper application, apply materials so they contact and adhere to substrates formed by openings and penetrating items.
6. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

P. Identification

1. Identify through penetration fire stop systems with pressure-sensitive, self-adhesive, pre-printed vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each fire stop system installation where labels will be visible to anyone seeking to remove penetrating items or fire stop systems. Warning label shall read:
2. "Warning — Through Penetration Fire Stop System — Do Not Disturb. Notify Building Management of Any Damage"
3. Date of installation

Q. Cleaning and Protection

1. Clean off excess fill materials adjacent to openings as work progresses. Use only cleaning materials that are approved by the fire stop manufacturers and use only cleaning materials that do not damage materials in which openings occur.
2. Provide final protection and maintain conditions during and after installation that ensure fire stop systems are without damage or deterioration at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out, remove damaged or deteriorated fire stop immediately, and install new materials to produce systems complying with specified requirements.

- R. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.4 FIRE-RATED PATHWAY INSTALLATION

- A. Install in locations where indicated on the Contract Drawings, arranged singly or in gangs at the height specified.
- B. Install the devices in strict accordance with the approved shop drawings and the equipment manufacturer's recommendations.
- C. Apply the factory supplied gasketing material prior to the installation of the wall plates.
- D. Secure wall plates to devices per the equipment manufacturer's recommendations.

PATHWAYS FOR COMMUNICATIONS SYSTEMS

3.5 OUTSIDE PLANT

- A. In addition to reference standards, conform with the following:
1. Distances between OSP underground pull points shall not exceed 500 ft.
 2. Underground duct shall be installed a minimum of 24 in. below grade.
 3. All underground conduit bends shall have a minimum radius of 10-times the conduit diameter.
 4. All 90° bends shall be encased in concrete.
 5. No more than two 90° bends, and a total of 180°, shall exist between pull points.
 6. Install conduit and duct with minimum slope of 4 in. per 100 ft. (0.33%). Slope conduit and duct toward maintenance vaults and away from building entrances.
 7. All underground conduits shall be sealed (duct plugs in empty conduits) to control water flow.
 8. For empty 4 in. conduits use Tyco/Jackmoon part number 40D402U
 9. For empty 2 in. conduits use Tyco/Jackmoon part number 20D236U
 10. All underground PVC conduit shall transition to rigid galvanized metallic conduit for above ground routing.
 11. Install fittings to accommodate expansion and deflection.
 12. Terminate conduit and duct at maintenance vault entries using end bell.
 13. Stagger conduit and duct joints vertically in concrete encasement 6 in. minimum.
 14. Use suitable separators and chairs installed not greater than 4 ft. on centers.
 15. Secure separators and chairs to trench bottom prior to concrete pour.
 16. Band conduits and ducts together before backfilling or placing concrete.
 17. Securely anchor conduit and duct to prevent movement during concrete placement.
 18. Underground conduit shall terminate on end walls of maintenance vaults only (no side wall use is allowed).
 19. Provide cable racking equipment in all maintenance vaults.
 20. All underground conduit utility separation distances shall comply with IEEE C2 (National Electrical Safety Code).
 21. All separation distances and clearances for overhead lines shall comply with IEEE C2 (National Electrical Safety Code).
 22. Install drains in maintenance vaults and connect to 4 in. pipe terminating in 1/3 cu. yd. crushed gravel bed
 23. Each underground conduit shall have a minimum 3/8 in. polypropylene pull rope installed.
 24. A mule tape with footage markers shall be installed in a minimum of one conduit per duct back section.
 25. Swab (clean) and proof (certify) prior to sealing.
 26. Reconditioning of Surfaces
 27. Provide reconditioning of surfaces to return site to original condition.
 28. Penetrations

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

29. Caulk and seal cable access penetrations in walls, ceilings and other parts of the building.
30. Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings.

3.6 ADJUSTING AND CLEANING

- A. Clean up spills of liquid components.
- B. Neatly cut and trim materials as required.
- C. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

END OF SECTION

IDENTIFICATION FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions, and requirements of other divisions apply to the work of this section.
- B. In the event of any conflicting requirements, the most stringent requirement will apply.

1.2 SUMMARY

- A. This Section includes requirements for communications infrastructure system:
 - 1. Testing
 - 2. Identification and Administration.

1.3 RELATED SECTIONS

- A. Communications Systems (27 00 00)

1.4 SUBMITTALS

- A. Provide submittal information for the following submittal sections as described below:
- B. Other information:
 - 1. Testing (see "Part 2 – Products: testing" herein):
 - 2. Provide a list of proposed test equipment for use in verifying the installation of the communications cabling system.
- C. Provide for each testing device:
 - 1. Manufacturer and product number.
 - 2. Manufacturer documentation showing date and outcome of last re-calibration. Testing device shall have been re-calibrated within the manufacturer's recommended recalibration period.
 - 3. Manufacturer documentation showing software revision. Software revision shall be most current revision available for the device and shall be based upon the most current TIA/EIA testing guidelines.
 - 4. Patch cords and other specialized components.
 - 5. Provide proposed test result forms.
 - 6. Provide the calculated optical fiber cable loss budget for each optical fiber cable in the system (see "Part 3 – Execution: Testing" herein).
- D. Identification and administration (see "part 2 – materials: identification and administration" herein):

IDENTIFICATION FOR COMMUNICATION SYSTEMS

1. Provide a list of proposed hand-carried or computer software based identification/label makers, and a list of proposed materials for identifiers/labels.
2. Provide actual samples of labels to be created for each system component to be labeled.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. The following products shall be used for labeling:

1. Computer Label Software - Easy-mark labeling software for PC, supplied on USB flash drive for preprinting communications labels on laser/inkjet printer. Part/Model No. Panduit PROG-EM2GO
2. Horizontal Cable - 2" x 1.5" Self-Laminating Laser Labels, 1000 per pack. Part/Model No. Panduit LJSL7-Y3-1
3. Category Cable & Patch Cords - Turn-Tell labels for Category 5e/6A cable and patch cords. Labels rotate and slide along cables after Installation for visibility from any angle and allow repositioning on the wire/cable to align legends for improved aesthetics. Eliminate the need to disconnect wire or replace label in the event of re-termination. Part/Model No. Panduit R100X150X1J
4. Fiber Patch Cords - White cable identification sleeve for 3mm duplex fiber cable, 1-inch-long, 100 per pack, use with labels: S100X225YAJ (Laser/Inkjet); R100X225X1J/S100X225VAC (LS8E Hand-held printer), S100X225VATY or S200X225VATY (Thermal Transfer Printer). Part/Model No. Panduit NWSLC-7Y
5. Patch Panel Labels - Patch panel labels for use with Easy-Mark software and laser/ink jet printer. Part/Model No. Panduit C261X035Y1J
6. Faceplate Labels - Single Gang, Faceplate labels for single gang stainless or sloped plastic-use with Easy-Mark software and laser/Ink jet printer. Part/Model No. Panduit C195X040Y1J
7. Faceplate Labels - Double Gang, Faceplate labels for double gang stainless - use with Ease-Mark software and laser/ink jet printer. Part/Model No. Panduit C288X040Y1J
8. Fiber Cable Labels - Cable label for indoor/outdoor tight-buffered armored fiber optic cable. For use with Easy-Mark software and ink jet printer. Part/Model No. Panduit S100X650YAJ
9. Busbar Labels - 1" high, white, vinyl tape labels for labeling grounding busbars, racks, cabinets, and pathways. For use with laser/inkjet printer. Part/Model No. Panduit C200X100FJJ
10. Modular Faceplate Label - Modular faceplate patch panel labels - use with PanTher handheld labeler. Part/Model No. Panduit C261X035Y1C
11. Faceplate Label Cassette - Single gang, faceplate labels for single gang stainless - use with PanTher handheld labeler. Part/Model No. Panduit C195X040Y1C
12. Faceplate Label Cassette - Double gang, faceplate labels for double gang stainless - use with PanTher handheld tester. Part/Model No. Panduit C288X040Y1C

IDENTIFICATION FOR COMMUNICATION SYSTEMS

13. Fiber Cable Label Cassette - Cable label for indoor/outdoor right-buffered armored fiber optic cable - use with PanTher LS8E handheld labeler. Part/Model No. Panduit S100X650VAC
14. Fiber Patch Cord Sleeve Label - Label for labeling fiber jumpers - use with PanTher LS8E handheld labeler. Part/Model No. Panduit S100X160VAC
15. Fiber Patch Cord Sleeve - Turn-Tell sleeve for fiber jumpers, use label above.
16. Busbar Label Cassette - 1" high, continuous black on white, vinyl tape labels for labeling racks, cabinets, and pathways - use with PanTher LS8E handheld labeler. Part/Model No. Panduit T100X000VPC-BK
17. Hand Held Labeler - Panduit PanTher hand-held label printing system kit. USE FOR LABELS THAT MUST BE PRINTED ON THE JOB SITE. Part/Model No. Panduit LS8EQ-KIT-ACS
18. Cable Label Cassette - Fast loading P11Labelcassette includes both label material and ribbon to make changing labels easy. Part/Model No. Panduit R100X150V1C
19. Coordinate with Owner if any additional equipment or cabling requires labeling. Provide labels for all equipment indicated by the Owner.

PART 3 - EXECUTION

3.1 TESTING

1. Testing of the systems shall be in accordance with the manufacturer's recommendations and with the Governing Requirements.
 - a. Test reports shall be complete and in accordance with the appropriate Governing Requirements.
 - b. Where testing discloses deficiencies in the work, the Contractor shall rework, repair, or replace equipment and systems found deficient. The Contractor shall continue remedial measures and retesting until satisfactory results are obtained. Remedial measures and retesting shall be at no additional cost to the Owner.
 - c. Testing of product or equipment prior to installation shall include performance testing to establish the applicability of equipment for its intended purpose. The Contractor shall:
 - d. Establish the required test procedures from required Governing Requirements and manufacturer's recommendations.
 - e. Provide necessary test equipment, power, and consumables to perform the test.
 - f. Notify the Engineer of test schedule(s) at least one week in advance.
 - g. Provide test result documentation to the Engineer.
 - h. Final testing and start-up of product, equipment, and systems shall include establishing proper capacity, operation, maintenance, and compliance with Governing Requirements. The Contractor shall:
 - 1) Provide the services of manufacturer's representatives for systems to be tested and started up.
 - 2) Perform commissioning test on all low voltage systems to ensure compatibility of Integrated Systems.

SECTION 27 05 53

IDENTIFICATION FOR COMMUNICATION SYSTEMS

- 3) Establish the required test procedures from required Governing Requirements and manufacturer's recommendations.
- 4) Provide necessary test equipment, power, and consumables to perform the test.
- 5) Notify the Engineer of test schedule(s) at least one week in advance.
- 6) Perform tests and start-up functions.
- 7) Provide documentation of test results and fully operational systems to the Engineer.
- 8) Test records shall be provided on a form approved by the Engineer.

END OF SECTION

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide labor, materials, and equipment for the complete installation of work called for in the Contract Documents.
2. Minimum requirements for equipment and cable installations in telecommunications equipment room (TEC), Telecommunications Distribution Room (TDR's) and entrance facilities.

1.2 SUBMITTALS

A. Provide product data for the following:

- ###### B. Manufacturer's data/cut sheets, product drawing/specifications and installation instructions for all products (submit with bid).

1.3 QUALITY ASSURANCE

- ###### A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the owner or owner representative.

- ###### B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated or a substitution is requested, equipment shall be equivalent in every way to that of the equipment specified. All substitutions are subject to the control and approval of the owner or the owner representative.

- ###### C. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

- ###### D. Material and work specified herein shall comply with the applicable requirements of:

1. ANSI/TIA-568-C Generic Telecommunications Cabling for Customer Premises
2. ANSI/TIA-569-C Telecommunications Pathways and Spaces
3. ANSI/TIA- 606-B Administration Standard for Telecommunications Infrastructure
4. ANSI/TIA-607-C Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
5. NFPA 70 – National Electric Code, current edition
6. BICSI – Telecommunications Distribution Methods Manual, current edition

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

7. NEMA – VE-1 – Metal Cable Tray Systems, 2002
8. NEMA – VE-2 – Metal Cable Tray Installation Guidelines, 2001

PART 2 - PRODUCTS

2.1 EQUIPMENT RACKS

- A. Floor Mounted Cabinet
 1. Manufacturer: Chatsworth
 2. Parts:
 - a. Z4-11U-113C-C12
 - b. 14480-C00
 - c. Provide all other accessories required for complete installation.
- B. Wall Mounted Cabinet
 1. Manufacturer: Chatsworth
 2. Parts:
 - a. 11996-736
 - b. 40972-001 (2 per cabinet)
 - c. Provide all other accessories required for complete installation.

2.2 CABLE MANAGEMENT

- A. Horizontal Wire Manager – 2U - Front Only
 1. Horizontal cable manager 1 RU, front/rear.
 2. The horizontal wire manager dimensions shall be 1.7"H x 19.0"W x 8.9"D.
 3. Manufacturer: Panduit, Part/Model No. WMPHF2E
- B. Horizontal Wire Manager – 2U - Front/Rear
 1. The horizontal cable manager shall be dual-sided.
 2. The horizontal cable manager dimensions shall be front/rear 3.5" high x 20.2" wide x 8.9" deep (89mm x 513mm x 226mm).
 3. The horizontal cable manager shall include extended front covers and two bend radius clips.
 4. The horizontal cable manager shall have ABS material and color black.
 5. Manufacturer: Panduit, Part/Model No. WMPH2E

2.3 RACEWAY

- A. Metal Cable Runway (Ladder Rack)
 1. Provide metal cable runway to affix tops of racks to walls, to route cable from walls to racks within the TEC/TDRs, and in locations shown on the Drawings. Cable

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

runway shall be sized and installed as shown on the Drawings. Cable runway shall be complete with all fittings including but not limited to splice kits, cable radius drop-outs, radius bends, protective end caps, support brackets, foot kits, vertical wall brackets, wall angles, grounding hardware and other incidental and miscellaneous hardware required for a complete cable runway system.

2. Cable Runway – 12" W
 - a. The cable runway shall be 12" wide, "Universal".
 - b. The cable runway dimensions are 3/8" (9.5mm) x 1-1/2" (38.1mm) steel tube welded rungs spaced 12" (305mm) on center.
 - c. The cable runway shall be UL classified.
 - d. The cable runway shall be flat black powder coat.
 - e. Manufacturer: Cooper B-Line, Model/Part No. SB17U12BFB
3. Cable Runway – Hold-Down Clamp Kit
 - a. The vertical cable runway bracket kit shall include two (2) wall clamps.
 - b. The clamp kit material shall be 11 Ga. (3.0mm) ASTM A570 structural steel.
 - c. The clamp kit finish shall be Flat Black Powder Coat (FB).
 - d. Manufacturer: Cooper B-Line, Model/Part No. SB2114AFB
4. Cable Runway – End Cap
 - a. The end caps are used for protective covering for stringer ends of cable runway.
 - b. The end caps shall meet UL 94 Flame Resistance requirement.
 - c. The end cap material shall be Black PVC Plastic.
 - d. Manufacturer: Cooper B-Line, Model/Part No. Cooper B-Line, SB110A1B
5. Cable Runway - 90° Junction-Splice Clamp and Kit
 - a. The cable runway kit shall be UL classified file number E60548.
 - b. The cable runway kit material shall be ASTM A570 structural steel with Black Zinc (BZ) finish.
 - c. The cable runway kit shall include two (2) clamps and hardware.
 - d. Manufacturer: Cooper B-Line, Model/Part No. SB2101ABZ.
6. Cable Runway – Butt-Splice Clamp and Kit
 - a. Cable Runway kit shall be UL classified file number E60548.
 - b. The cable runway kit includes two (2) clamps and hardware.
 - c. The cable runway shall material shall be ASTM A570 structural steel with Black Zinc (BZ) finish.
 - d. Manufacturer: Cooper B-Line, Model/Part No. SB2107BZ
7. Cable Runway - Butt-Swivel Splice Kit,
 - a. UL classified.
 - b. Black.
 - c. Cooper B-Line, SB21110ABZ
8. Cable Runway - Threaded Rod Cover
 - a. The threaded rod cover shall be used to protect cabling from the all threaded rod.
 - b. The threaded rod cover shall be UL-94 VO material for flame resistance.
 - c. The threaded rod cover material shall be PVC and gray color finish.

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- d. Manufacturer: Cooper B-Line, SB3015/ 8X72PVC
- 9. Cable Runway - Radius Drop-Out
 - a. The radius drop-out shall be used for cable to exit from side of cable runway stringer.
 - b. The radius drop-out will fit either 3/8" (9mm) x 1 1/2" (38mm) or 2" (51mm) stringers.
 - c. The radius drop-out material shall be 14 ga. (1.9mm) ASTM A36 steel and finish shall be Flat Black Powder Coat (FB)
 - d. Manufacturer: Cooper B-Line, SB2129SD12FB
- 10. Cable Runway - Channel Rack-to-Runway Attachment Kit
 - a. The kit shall be 3" upright network equipment rack top plate runway support kit for use to secure 15" to 18" wide runway cable runway (in parallel or perpendicular arrangement) to top angles of network equipment rack.
 - b. The kit shall include (1) mounting plate and (4) "J" bolts with 5/16"-18 hardware.
 - c. The channel material shall be ASTM A36 structural steel and finished Flat Black Powder Coat (FB).
 - d. Manufacturer: Cooper B-Line, SB213318FB
- 11. Runway Drop-Out - Radius
 - a. The steel runway drop-out shall be used to provide a smooth radius for cable exit.
 - b. The drop-out shall be 4" (102mm) cable bend radius.
 - c. The drop out material shall be 18 Gauge (1.2mm) ASTM A569 steel and finish Flat Black Powder Coat (FB).
 - d. The drop out includes cable tie down holes and self-drilling screws.
 - e. Manufacturer: Cooper B-Line, SB2129U12FB and SB2129U18FB. SB2129 Series fits channel or tube rungs 1/2" (13mm) x 1" (25mm); SB2129U Series fits rungs 3/8" (9mm) x 1 1/2" (38mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and tighten high strength bolts to the snug tight condition, in conformance with AISC Specification for Structural Joints using ASTM A325 or A490 Bolts. If Tension Control Bolts or Load Indicator Bolts are used, bolts shall be installed following recommendations of manufacturer. Hardened steel, round, flat washer shall be used under each nut and bolts shall be tightened until wrench twists of spliced ends.

END OF SECTION

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for the installation of a TIA/EIA standard inside (ISP) and outside (OSP) communications cabling systems.
2. Reference the Construction Drawings for further requirements. In the event of any conflicting requirements, the most stringent requirement will apply.

1.2 RELATED SECTIONS

- A. Communications Systems (27 00 00)
- B. Communications Horizontal Cabling (27 15 00)

1.3 SUBMITTALS

- A. Provide submittal information for the following submittal sections as described below:
 1. Product Data
 - a. Shop Drawings
 - b. Cable and conduit routing and Grouping Plan

PART 2 - PRODUCTS

2.1 SUMMARY

- A. Communication cabling system components shall be sourced (manufactured) by formally partnered Manufacturers (collectively referred to as the "Manufacturer"). Products shall not be intermixed between different manufacturers unless the Manufacturer of the chosen communications cabling system has listed (in writing) another manufacturer's component as an "Approved Alternative Product" and will warrant the "Approved Alternative Product" as part of the Manufacturer's extended Warranty.
- B. All cabling products shall be engineered "end-to-end" (i.e. the system and all of its components shall be engineered to function together as a single, continuous transmission path).
- C. The Contractor shall coordinate with ISD IT to receive a LAN diagram prior to installation of the backbone cabling.

COMMUNICATIONS BACKBONE CABLING

- D. The Contractor shall physically verify the following materials on site, prior to purchase and delivery of the materials:
1. Lengths of conduit and/or pathway are to be used for routing backbone cabling. Precut materials of insufficient length are the sole responsibility of the Contractor.
 2. Fill ratio and overall suitability of raceway for installation of inside plant cabling: The Contractor shall promptly notify the Engineer of potential overfill, potential for installation problems due to overfill, or raceway which may be otherwise deemed by the contractor unsuitable for use, and shall await the Engineer's direction prior to purchase and delivery of the materials.

2.2 OUTSIDE PLANT BACKBONE CABLING

- A. General: Cable installed home-run from IDF to MDF as shown on the Drawings, shall be Plenum (CMP, OFCP) rated unless installed in conduit from termination point to termination point. Cables shall be manufactured by the selected communications cabling Manufacturer. Provide cable in types, sizes, and quantities as shown on the Drawings. All cables of the same type (Cat 5e, Cat 6A UTP, 50µm MM, 9µm SM etc.) shall be of the same color – multiple colors of the same cable type are not acceptable.
- B. Single-mode OS2 Fiber Optic Cable
1. The fiber cable shall be a 9/125µm (OS2) single-mode indoor/outdoor loose-tube interlocking armored cable.
 2. The fiber cable shall be twelve (12) strand.
 3. The fiber cable shall be suitable for indoor/outdoor environments.
 4. The fiber cable shall be Plenum (OFCP)
 5. The fiber cable material shall be PVC.
 6. Acceptable Manufacturers: Panduit, Corning, Commscope
- C. FIBER OPTIC PANELS
1. 4U Rack-Mount Enclosure
 - a. 4-Rack Units
 - b. The fiber optic housing shall be 4-rack (4U) units that holds up to 12 adapter panels.
 - c. The patch panel dimensions shall be 6.98" H x 17.60" W x 16.30" D.
 - d. Manufacturer: Panduit, Part/Model No. FCE4U
 2. 4U Rack-Mount Enclosure
 - a. 4-Rack Units
 - b. The fiber optic housing shall be 4-rack (4U) units that holds up to 12 adapter panels or splice cassettes.
 - c. The patch panel dimensions shall be 6.94" H x 18.84" W x 16.77" D.
 - d. Manufacturer: Corning, Part/Model No. CCH-04U
 3. 1U Rack-Mount Enclosure
 - a. 1-Rack Units

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

- b. The fiber optic housing shall be 1-rack (1U) units that holds up to 3 adapter panels.
 - c. The patch panel dimensions shall be 1.74" H x 17.00" W x 14.20" D.
 - d. Manufacturer: Panduit, Part/Model No. FRME1U
- 4. 1U Rack-Mount Enclosure
 - a. 1-Rack Units
 - b. The fiber optic housing shall be 1-rack (1U) units that holds up to 2 adapter panels or splice cassettes.
 - c. The patch panel dimensions shall be 1.7" H x 18.84" W x 16.77" D.
 - d. Manufacturer: Corning, Part/Model No. CCH-01U
- 5. Wall Mount Housing
 - a. The fiber optic wall mount housing that holds up to 2 adapter panels.
 - b. The panel dimensions shall be 7.4" H x 16.1" W x 4.2" D.
 - c. Manufacturer: Corning, Part/Model No. WCH-02P
- 6. Fiber Storage Reel: 24"
 - a. The fiber storage reel shall be a 24-inch fiber optic reel.
 - b. The fiber storage reel shall have the capacity to hold up to 50 feet of 2-fiber 50/125 mm optical fiber cable or 50 feet of Cat 6A cable.
 - c. The storage ring materials shall be 16-gauge sheet metal.
 - d. The storage ring dimensions are: 24" diameter, 3.5" wide.
 - e. Mounting: Surface mounts to wall (#8x3/4" wood screws included).
 - f. Standards: ANSI/TIA-568-C
 - g. Manufacturer: Leviton, Part/Model No. 48900-OFR

2.3 SPLICE CASSETTES FOR SINGLEMODE (OS2) FIBER CABLE

- A. All SM fiber optic cable shall be terminated via fusion splices to a SM OS2 splice cassette.
 - 1. CCH Pigtailed Splice Cassette, 12-F, loaded with LC APC duplex, Single-mode (OS2), single-fiber (250 μ m) fiber optic adapters, color Green.
 - 2. Manufacturer: Corning, Part/Model No CCH-CP12-B3-P00RE

2.4 FIBER OPTIC PANELS

- A. Fiber Optics Adapter Plates
 - 1. 12-F OM4 LC fiber optic adapter panel, filled with six LC duplex multimode fiber optic adapters, color Aqua.
 - 2. Manufacturer: Panduit, Part/Model No. FAP6WAQDLCZ
- B. Fiber Optics Adapter Plates
 - 1. 12-F SM LC fiber adapter panel, OS1/OS2, filled with six LC duplex singlemode fiber optic adapters, color Blue.
 - 2. Manufacturer: Panduit, Part/Model No. FAP6WBUDLCZ

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

C. Fiber Optics Adapter Plates

1. 12-F OM4 LC fiber adapter panel, filled with six LC duplex singlemode fiber optic adapters, color Aqua.
2. Manufacturer: Corning, Part/Model No. CCH-CP12-E4

D. Fiber Optics Adapter Plates

1. 12-F OS2 LC fiber adapter panel, filled with six LC duplex singlemode fiber optic adapters, color Blue.
2. Manufacturer: Corning, Part/Model No. CCH-CP12-A9

E. Fiber Optics Adapter Plates

1. 24-F OM4 LC fiber adapter panel, filled with twelve LC duplex singlemode fiber optic adapters, color Green.
2. Manufacturer: Corning, Part/Model No. CCH-CP24-E4

F. Fiber Optics Adapter Plates

1. 24-F OS2 LC fiber adapter panel, filled with twelve LC duplex singlemode fiber optic adapters, color Blue.
2. Manufacturer: Corning, Part/Model No. CCH-CP24-A9

G. Fiber Storage Reel: 24"

1. The fiber storage reel shall be a 24-inch fiber optic reel.
2. The fiber storage reel shall have the capacity to hold up to 50 feet of 2-fiber 50/125 mm optical fiber cable or 50 feet of Cat 6A cable.
3. The storage ring materials shall be 16-gauge sheet metal.
4. The storage ring dimensions are: 24" diameter, 3.5" wide.
5. Mounting: Surface mounts to wall (#8x3/4" wood screws included).
6. Standards: ANSI/TIA-568-C
7. Manufacturer: Leviton, Part/Model No. 48900-OFR.

2.5 PERFORMANCE

- A. At a minimum, the communications cabling system shall support data network protocols/services at rates up to 10 Gbps. Fiber to 10Gbps. It shall support 10 Mb, 100 Mb, 1 Gb, and 10 Gb Ethernet, ATM (at OC-3 and OC-12) and other network protocols.

2.6 PATCH PANELS

- A. Fiber Patch Panels: Patch panels shall be used to terminate the fiber backbone cables and shall be sized (port/fiber count and rack units) as shown on the Drawings. Fiber patch panels shall consist of enclosures pre-assembled with connector panels, blank connector panels (for unused connector slots), strain relief, rack or wall mountable as shown on the Drawings. Enclosures/housings shall be sized to accommodate 100% of fiber strands

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

installed. Fiber patch panels shall be complete with fiber optic receptacle adapters and with all incidental materials necessary for mounting.

- B. Cable Support Bar/Strain Relief: Provide per manufacturer recommendations.

2.7 CONNECTORS

- A. Fiber Connectors: Fiber connectors shall be LC connectors. Fiber connectors shall meet or exceed the transmission requirements for connecting hardware as specified in the ANSI/TIA 568-C standards.

2.8 BACKBONE CABLE

- A. General: Cable installed home-run from IDF to MDF as shown on the Drawings, shall be Plenum (CMP) rated unless installed in conduit from termination point to termination point. Cables shall be manufactured by the selected communications cabling Manufacturer. Provide cable in types, sizes, and quantities as shown on the Drawings. All cables of the same type (Cat 5e, Cat 6A UTP, 50µm MM, 9µm SM etc.) shall be of the same color – multiple colors of the same cable type are not acceptable.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall pay particular attention to and comply with the applicable portions of the following:
 - 1. TIA/EIA-568-C: Commercial Building Telecommunications Cabling Standard
 - 2. TIA/EIA-606-A: Administration Standard for Commercial Telecommunications Infrastructure
 - 3. J-STD-607-B: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 - 4. TIA/EIA-455: Fiber Optic Test Standards
 - 5. TIA/EIA-526: Optical Fiber Systems Test Procedures
 - 6. IEEE 802.3 (series): Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit and 802.3ae 10 Gigabit Ethernet Standard
 - 7. BICSI: BICSI Telecommunications Cabling Installation Manual
 - 8. Manufacturer Recommendations and Installation Guidelines
- B. Connectors:
 - 1. The Contractor shall visually check fiber connectors and/or splices after connectorization and/or splicing with a minimum 200x magnification microscope to ensure that no physical damage has occurred during the installation process.
 - 2. Fiber splices shall be fusion spliced and shall be required for all single mode fiber strands. Mechanical splices are not acceptable. Each fusion splice shall be protected

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

in a splice tray or similar protective device that is designed to mount within the enclosure. Bare/stripped optical fiber strands shall be protected with a heat shrink or silicon adhesive to prevent exposure to moisture.

C. Cable:

1. General (applicable to all cable types):
 - a. Cable shall be installed in strict compliance with the manufacturer's recommendations.
 - b. Maintain separation from other conductors (power, fire alarm, etc.) per NEC requirements and TIA/EIA standards.
 - c. The bending radius and pull strength requirements of all cable as detailed in the TIA/EIA standards and the manufacturer's installation recommendations shall be strictly observed during handling and installation.
 - d. Pull cables simultaneously where more than one cable is being installed in the same raceway.
 - e. Use pulling compound or lubricant where necessary. Use compounds that will not damage conductor or insulation (Polywater, or approved equal).
 - f. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cable or raceway.
 - g. Cable jackets shall not be twisted during installation. Cables showing evidence of twisting shall be replaced at no additional cost to the Owner, regardless of the outcome of cable testing.
 - h. Cable shall be installed in a continuous (non-spliced) manner unless otherwise indicated.
 - i. Cable installed in conduit, basket tray and/or ducts:
 - 1) Fill ratios shall not exceed NEC requirements.
 - 2) Cable shall not be pulled into conduit/ducts until the conduit/duct ends have been prepared for cable installation (i.e. reamed to eliminate sharp edges and insulated throat bushings installed). Cables pulled into conduit/ducts prior to conduit/duct end preparation shall be replaced at no additional cost to the Owner.
 - 3) Reinstall pull-wires in conduits and ducts after use to facilitate future addition of cables.
 - j. Cable installed in cable tray/ladder rack:
 - 1) Cable shall not be attached to the cable tray (i.e. cable shall be left "loose") with the exception of cable installed in cable tray (cable runway) within telecommunications rooms (see "Cable in telecommunications rooms" below).
 - 2) Cable shall be laid in tray in such a way as to present a neat and professional appearance.
 - 3) For cable tray serving both backbone (riser) and horizontal cabling, install cable in cable tray in such a manner that backbone cabling does not overlap with horizontal cabling – reserve approximately one-fourth of the space in the tray for backbone cabling and the remaining three-fourths for horizontal cabling.

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

- 4) Where cables in cable trays are required to maintain specific distances between each other, they shall be firmly secured to maintain this distance at fire rated penetrations.
- k. Cable not installed in conduits/ducts or cable tray:
 - 1) Cables shall be strapped, fastened for support. Staples and/or tie wraps are not acceptable:
 - a) Straps, fasteners shall not be over-tightened. Cables showing evidence of over-tightening shall be replaced at no additional cost to the Owner, regardless of the outcome of cable testing.
 - b) Straps, fasteners installed in plenum spaces shall be plenum rated.
 - c) Reusable Velcro hook and loop style cable straps/fasteners shall be used within telecommunications rooms. The use of plastic tie wraps is not acceptable on any portion of the installation (see "Cable in telecommunications rooms" below).
 - d) Cables shall be bundled by application (horizontal or backbone) and by cable type (Cat 5e, Cat 6A UTP, MM, SM Fiber, etc.). Cable applications and types shall not be intermixed within a bundle.
 - l. Cables in suspended cable runs shall be supported at varying intervals. Cable spans shall be limited to 5 feet or less, and the length of spans shall vary along the cable path (i.e. a given span should not be exactly the same length as the span preceding or following it – "exact" spans can degrade cable performance).
 - m. Cable installed on exposed surfaces or structural members shall be installed parallel and perpendicular to the surfaces. Surface contours shall be followed wherever possible. Cables shall be attached to surfaces at intervals not to exceed 3 feet.
 - n. Attaching cables to pipes, electrical conduit, mechanical items, existing cables, or the ceiling support system (grids, hanger wires, etc. – with the exception of ceiling support anchors) is not acceptable.
- D. CABLE IN TELECOMMUNICATIONS EQUIPMENT/DATA ROOMS:
 - 1. Cable straps: Install per Section 27 11 00 – Communications Equipment Room Fittings.
 - 2. Cable on backboards:
 - a. Lay and dress all cables to allow other cables to enter raceway (conduit or otherwise) without difficulty at a later time by maintaining a working distance from these openings.
 - b. Cable shall be routed as close as possible to the ceiling, floor, sides, or corners to insure that adequate wall or backboard space is available for current and future equipment and for cable terminations.
 - c. Lay cables via the shortest route directly to the nearest edge of the backboard from mounted equipment or blocks. Secure all similarly routed and similar cables together and attach to D-rings vertically and/or horizontally, then route over a path that will offer minimum obstruction to future installations of equipment, backboards or other cables.
- E. Cable Slack

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

1. Provide cable slack (service loops) at cable ends (both ends) to accommodate future cabling system changes.
 2. Provide slack length as follows:
 - a. For fiber: Provide a minimum of 25 feet.
 - b. For copper and coaxial: Provide a minimum of 25 feet.
- F. Fiber Cable:
1. Half the quantity of installed singlemode fiber optic strands shall be connectorized. The unterminated fiber strands shall be labeled, coiled, and protected in place for future use.
- G. Cable assemblies (patch cords) and cross-connects:
1. Provide 100% cable assemblies required for a complete system.
- H. Warranty
1. Contractor shall provide a minimum of 25-year warranty for each backbone system installed.
 2. Contractor must be adequately trained by system manufacturer.
 3. Contractor must have at least 5 year's installation experience in such manufacturer system being installed.

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The requirements of the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, AND DIVISION 01 of the Specifications apply to the Work of this Section.
2. Provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.

1.2 RELATED SECTIONS

- ###### A. Communications Systems (27 00 00)

1.3 SYSTEM DESCRIPTION

A. Structured Cabling

1. Furnish and install complete permanent link Structured Cabling System (SCS). The SCS shall serve as a vehicle for transport of data, video, and voice telephony signals throughout the network from designated demarcation points to outlets located at various workstations and other locations as indicated on the contract drawings and described herein.
2. Wiring utilized for data and voice communications shall originate at Owner provided networking equipment either in vertical equipment racks located at the Telecommunications Equipment/Data (TEC/TDR) Rooms. Telecommunications Service Outlets (TSO) shall be furnished, wired and installed by the SCS system contractor. All cables and terminations shall be identified at all locations.
3. All cables shall terminate in an alphanumeric sequence at all termination locations.
4. All balanced twisted pair cable terminations shall comply with, and be tested to TIA/EIA568-B standards for Category 6A requirements in ANSI/TIA-568-C.2, CENELEC EN-50173 series, and ISO 11801:2002 including amendments 1 and 2 installations

1.4 SUBMITTALS

A. Provide product data for the following:

1. Manufacturer's data/cut sheets, product drawing/specifications and installation instructions for all products (submit with bid).

COMMUNICATIONS HORIZONTAL CABLING

1.5 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the owner or owner representative.
- B. Equipment and materials shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated or a substitution is requested, equipment shall be equivalent in every way to that of the equipment specified. All substitutions are subject to the control and approval of the owner or the owner representative.
- C. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
- D. Material and work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA/EIA – 568-B Commercial Building Telecommunications Cabling Standard, 2015
 - 2. TIA – 569-B Commercial Building Standard for Telecommunications Pathways and Spaces, 2015
 - 3. ANSI/TIA/EIA – 606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, 2012
 - 4. ANSI-J-STD – 607-B Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2015
 - 5. NFPA 70 – National Electric Code, latest edition
 - 6. BICSI – Telecommunications Distribution Methods Manual, latest edition
 - 7. NEMA – VE-1 – Metal Cable Tray Systems, 2002
 - 8. NEMA – VE-2 – Metal Cable Tray Installation Guidelines, 2001

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING AND COMPONENTS

- A. All voice and data communication cabling shall be a CAT6 solution and shall meet or exceed Category 6 / Class E requirements in ANSI/TIA-568-C.2.

2.2 CABLE AND CONNECTIVITY

- A. Category 6 Cabling
 - 1. Category 6/Class E cable with FEP Plenum (CMP) insulation.
 - 2. Bare copper wire insulated with FEP. Two primaries twisted together to form a pair with four pairs cabled together with a central filler.

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

3. All four pairs shall be surrounded an aluminum/polyester tape and jacketed with flame-retardant polymer alloy.
 4. Manufacturer: Panduit, no approved equal.
 5. All copper cabling shall be shall be plenum (CMP) rated. All cabling shall bear plenum markings.
 6. Color for voice/data, Blue
 7. Utilize OSP certified cabling where required.
 8. Data cables to be terminated on ports 1 and 2 of the faceplate
 9. Workstation outlets shall be CAT6 Information Outlets with compatible faceplates, surface-mount boxes, and/or modular panels.
 10. Copper patch panels shall be CAT6 Panels.
 11. Contractor shall provide all cable assemblies (patch cords) and cross-connects as required for a complete system.
- B. Modular Patch Panel
1. Mini-Com 48 port 2U, High Density. Populate with Category 6 jacks below
 2. Manufacturer: Panduit, Part/Model No. CPPL48WBLY
- C. Patch Panel Strain Relief Bar
1. Strain relief bar (SRB) are used to support and manage cables in TEC/TDR rooms.
 2. Manufacturer: Panduit, Part/Model No. SRBM19BLY
- D. CAT6 Modular Connector
1. Category 6, RJ45, 10 Gb/s, 8-position, 8-wire universal module.
 2. Mini-Com Punchdown Module (BLUE).
 3. Manufacturer: Panduit, Part/Model No. CJ688TGBL
- E. CAT6 Patch Cords
1. Patch Cords shall be Category 6/Class E, UTP constructed of 28 AWG stranded copper cable with an enhanced performance modular plug on each end.
 2. Copper conductors in patch cable shall be twisted in pairs and separated by a quadrant separator.
 3. Manufacturer: Panduit, Part/Model No. Panduit UTP28P^** (^ = length, ** = color)
- F. Faceplates
1. Mini-Com FlushMount Faceplate
 - a. Flush mount faceplate single gang white
 - b. Manufacturer: Panduit, Part/Model No. CFPL2WHY (2 Port)
 2. Surface Mount Box
 - a. Surface Mount Box shall be two port white
 - b. Manufacturer: Panduit CBX2WH-AY
- G. Hook and Loop Cable Ties

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

1. Tak-Tape
 - a. The hook and loop cable tie shall be .75" wide with 35 ft. continuous roll.
 - b. The hook and loop cable tie shall be color black.
 - c. Manufacturer: Panduit, Part/Model No. TTS-35RX0
2. Plenum rated hook and loop cable ties for air return spaces – 6"
 - a. The hook and loop cable tie shall be perforated at 6" length.
 - b. The hook and loop cable tie shall be Maroon color.
 - c. Manufacturer: Panduit, Part/Model No. HLSP1.5S-X12
3. Plenum rated hook and loop cable ties for air return spaces – 12"
 - a. The hook and loop cable tie shall be perforated 12" length.
 - b. The hook and loop cable tie shall be Maroon color.
 - c. Manufacturer: Panduit, Part/Model No. HLSP3S-X12
4. Cable Ties for Plenum
 - a. The cable ties shall be Pan-Ty ®, standard cross section.
 - b. 12" long (295cm) length
 - c. The cable tie shall be distinctive Maroon color.
 - d. UL Listed for use in plenum or air handling spaces per NEC.
 - e. Manufacturer: Panduit, Part/Model No. PLT3S-C702Y

H. Horizontal Cable Labels

1. The cable labels shall be self-laminating with 2" x 0.5" printable area.
2. The cable labels shall be compatible with 0.16-0.32" O.D. cables.
3. The cable labels shall be white color.
4. Manufacturer: Panduit, Part/Model No. PLL-40-Y3-1
5. See section 27 05 53 for further labeling requirements.

PART 3 - EXECUTION

3.1 CONTRACTOR

- A. The contractor selected to provide the installation of this system shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein.
- B. The contractor shall utilize the authorized manufacturer components and distribution channels in provisioning this Project.
- C. Contractor shall have a minimum of five (5) years of recent experience on structured cabling systems of similar type and size.
- D. Contractor and design firm shall be in compliance with all federal, state and local statutes regarding qualifications of firms.

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

- E. The contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.
- F. The contractor shall own and maintain the tools and equipment approved by the cabling system manufacturer for successful installation and testing of Category 6A balanced twisted pair distribution systems.
- G. The contractor shall have personnel who are adequately trained in the usage of such tools and equipment.
- H. Contractor shall submit a resume of qualification with the Contractor's proposal indicating the following:
 - 1. A list of recently completed projects of similar type and size with contact names and telephone numbers for each
 - 2. A list of test equipment proposed for use in verifying the installed integrity of metallic and fiber optic cable systems on this project.

3.2 CABLE

- A. General (applicable to all cable types) cable shall be installed in strict compliance with the manufacturer's recommendations.
- B. Maintain separation from other conductors (power, fire alarm, etc.) per NEC requirements and TIA/EIA standards.
- C. The bending radius and pull strength requirements of all cable as detailed in the TIA/EIA standards and the manufacturer's installation recommendations shall be strictly observed during handling and installation.
 - 1. Pull cables simultaneously where more than one cable is being installed in the same raceway.
 - 2. Use pulling compound or lubricant where necessary. Use compounds that will not damage conductor or insulation (Polywater, or approved equal).
 - 3. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cable or raceway.
- D. Cable jackets shall not be twisted during installation. Cables showing evidence of twisting shall be replaced at no additional cost to the Owner, regardless of the outcome of cable testing.
- E. Cable Testing
 - 1. All category and fiber optic cabling shall be tested with a Fluke level 3 or better testing device.
 - 2. All cable test results must pass the certification testing.
 - 3. All cable test results shall be provided to the Low Voltage Designer for review and approval prior the site commissioning visit and inspection.

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

4. All cable test results shall be accurately labeled with the cable ID's indicated on the labeling in the field.
- F. Cable shall be installed in a continuous (non-spliced) manner unless otherwise indicated.
- G. Cable installed in conduit, basket tray, and/or ducts:
 1. Fill ratios shall not exceed NEC requirements.
 2. Cable shall not be pulled into conduit/ducts until the conduit/duct ends have been prepared for cable installation (i.e. reamed to eliminate sharp edges and insulated throat bushings installed). Cables pulled into conduit/ducts prior to conduit/duct end preparation shall be replaced at no additional cost to the Owner.
 3. Reinstate pull-wires in conduits and ducts after use to facilitate future addition of cables.
 4. Standard in-wall communication outlets (TSO) shall be installed in a 5"W x 5"L x 2-7/8" deep double-gang backbox with single gang ring with 1-1/4" conduit stubbed to accessible ceiling.
- H. Cable installed in cable tray:
 1. Cable shall not be attached to the cable tray (i.e. cable shall be left "loose") with the exception of cable installed in cable tray (cable runway) within TEC/TDR Rooms (see "Cable installed in Telecommunications Rooms" below).
 2. For performance reasons, station cable in tray shall not be combed.
 3. Cable shall be laid in tray in such a way as to present a neat and professional appearance
- I. Cable NOT installed in conduit/ducts or cable tray:
 1. Cables shall be strapped or fastened for support. Staples and plastic cable ties are not acceptable.
 - a. Straps and fasteners shall not be over-tightened. Cables showing evidence of over-tightening shall be replaced at no additional cost to the Owner, regardless of the outcome of cable testing.
 - b. Straps, fasteners, and tie-wraps installed in plenum spaces shall be plenum rated.
 - c. Reusable Velcro hook and loop style cable straps/fasteners shall be used within Telecom Rooms. The use of plastic tie wraps is not acceptable within Telecom Rooms (see "Cable in Telecom Rooms" below).
 - d. Cables shall be bundled by application (horizontal or backbone) and by cable type (Cat 3, Cat 6 UTP, MM Fiber, SM Fiber, etc.). Cable applications and types shall not be intermixed within a bundle.
 2. Cables in suspended cable runs shall be supported at varying intervals. Cable spans shall be limited to 5 feet or less, and the length of spans shall vary along the cable path (i.e. a given span should not be exactly the same length as the span preceding or following it – "exact" spans can degrade cable performance).
 3. Cable installed on exposed surfaces or structural members shall be installed parallel and perpendicular to the surfaces. Surface contours shall be followed wherever possible. Cables shall be attached to surfaces at intervals not to exceed 3 feet.

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

4. Attaching cables to pipes, electrical conduit, mechanical items, existing cables, or the ceiling support system (grids, hanger wires, etc. – with the exception of ceiling support anchors) is not acceptable.
- J. Cable installed in Telecommunications (TEC/TDR) Rooms
 1. Cable on backboards:
 - a. Lay and dress all cables to allow other cables to enter raceway (conduit or otherwise) without difficulty at a later time by maintaining a working distance from these openings.
 - b. Cable shall be routed as close as possible to the ceiling, floor, sides, or corners to insure that adequate wall or backboard space is available for current and future equipment and for cable terminations.
 - c. Lay cables via the shortest route directly to the nearest edge of the backboard from mounted equipment or blocks. Secure all similarly routed and similar cables together and attach to D-rings vertically and/or horizontally, then route over a path that will offer minimum obstruction to future installations of equipment, backboards, or other cables.
- K. Cable terminating on patch panels located on racks.
 1. Route cables in Telecom Rooms to patch panels on racks by routing across cable runway to top of rack and then down vertical cable management sections to patch panel.
- L. Cable Slack:
 1. Provide cable slack (service loops) at cable ends (both ends) to accommodate future cabling system changes.
 2. Provide slack length as follows:
 - a. Provide 10 feet slack loop at the work space end of the cable route. Place slack within accessible space above the ceiling and within 18 inches of the transition into the outlet pathway conduit.
 - b. In the Telecom Room: Route cable around ladder rack to provide a 10' slack loop.

3.3 WARRANTY

- A. Contractor shall certify and provide a system that offers a Manufacturer's Warranty no less than 25 years and Applications Assurance as a registered channel solution.
- B. To offer the manufacturer warranty, the installing contractor must be certified and trained by the manufacture's system for not less than 5 years
- C. Current manufacturer certification shall be valid at the time of installation.

END OF SECTION

SECTION 27 20 00

DATA COMMUNICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General Description: This specification section covers the installation and configuration of network equipment as specified herein.

1.2 QUALIFICATIONS

- A. General
 - 1. The approved Contractor shall be responsible for satisfactory operation of the system and its certification.
 - 2. Approval of the Owner is required of products or services of the proposed manufacturer, suppliers and installers and will be based upon conformance to the specifications.
- B. Contractor Qualifications
 - 1. Hold current legally required California State Contractor's licenses necessary to accomplish the installation and activation of the described system at the facilities indicated.
 - 2. Must provide letter documenting current status as Cisco certified dealer and installer. Project submittals must include copies of Cisco technician certificates for all individuals that are working on Owner systems.
 - 3. Technicians shall, at minimum, hold a Cisco Certified Network Associate (CCNA) certification.
 - 4. Indicate complete and total compliance with the provisions of these Specifications by letter or by submittal of the bid response forms, signed by an officer of the corporation, or a principal if other ownership exists. In addition, the letter or forms shall include a complete listing of exceptions, if any.

1.3 GENERAL CONDITIONS

- A. Contract Compliance: Provide the Systems and Services in accordance with the conditions and system descriptions as described in Part 1 of each specification section. Provide specified products as described in Part 2 of each specification section. Utilize specified procedures and practices as described in Part 3 of each specification section.
- B. Codes: Furnish material and workmanship for this work in conformance with applicable legal and code requirements.

1.4 RELATED WORK

- A. In accordance with Section 28 23 00, Video Surveillance System

SECTION 27 20 00

DATA COMMUNICATIONS

1.5 PRECEDENCE

- A. Obtain, read and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

1.6 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

- A. General: Bid documents and specifications are considered conceptual in nature and provide direction on products and project requirements. Contractor is given a choice of methods that may be incorporated into the system. These choices may affect the overall design, configuration, and installation of the proposed system.
- B. Contractor Responsibility: Prepare and submit shop drawings, which show details of all work to ensure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal package shall consist of Drawings, Equipment Data Sheet Submittals, and an Acceptance Testing Plan.
- C. Completeness: The Equipment Submittals, Acceptance Testing Plan and the Shop Drawings should be submitted as a complete and contiguous package. Partial or unmarked submittals will not be accepted for review.
- D. Scheduling: A schedule of shop drawing submissions shall be submitted for the Owner's review on a form acceptable to the Owner within ten (10) days after award of the Contract. The schedule of shop drawing submissions shall include as a minimum, but not limited to the requirements stated herein.
- E. Requirements: Provide the following information complete, and in the manner described herein:
 - 1. Hardware, Application Software, and Network Requirements: A system description that shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:
 - a. Server(s) processor(s), disk space and memory size and/or expansion of existing
 - b. Operating System(s) Software, where software is provided or upgraded
 - c. Application Software
 - d. Network bandwidth and reliability requirements
 - e. Number and locations of equipment
 - f. Other specific network requirements, preferences, and constraints
 - g. Backup/archive system size and configuration
 - h. Start-up operations
 - i. System power requirements
 - j. Device/component environmental requirements (cooling and or heating parameters)

SECTION 27 20 00

DATA COMMUNICATIONS

2. Shop Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
 - a. Title Sheet:
 - b. Single-Line/Block Diagrams: Show signal relationships of equipment and devices within the system.
 - c. Component Connection Diagrams:
 - 1) For each equipment component show the rear elevation of the device and all connectors/terminations as a pictorial.
 - 2) Show the wire designations on connectors. Typical wiring detail where multiple of same device is provided.
 - d. Equipment Wiring Diagrams:
 - 1) Show a pictorial illustration of each piece of equipment.
 - 2) Show the device nomenclature exactly as shown on the single line diagrams.
 - 3) Connections
 - a) Every connection in the system must be documented.
 - b) Connection information may be rendered as a list(s), if properly coordinated with, and referenced to, typical component and single-line diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its connections.
 - e. Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.
 - f. Each Drawing or page shall include:
 - 1) Project name, Project Number, and descriptions.
 - 2) Submittal date and space for revision dates.
 - 3) Identification of equipment, product, or material.
 - 4) Name of Contractor and Subcontractor.
 - 5) Name of Supplier and Manufacturer.
 - 6) Physical dimensions clearly identified.
 - 7) ASTM and Specifications references.
 - 8) Identification of deviations from the Contract Documents.
 - 9) Contractor's stamp, initialed or signed, dated and certifying to review of submittal, and compliance with Contract.
 - 10) Location at which the equipment or materials are to be installed.
3. Equipment Submittals
 - a. Provide a Title Page, with project name, Contractor's name and address, contact information, date of submission, and submission revision number.
 - b. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
 - 1) Model number
 - 2) Specification sheet page reference

SECTION 27 20 00

DATA COMMUNICATIONS

- c. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components, and devices. Number each page, to correspond with the Parts List.
 - d. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
 - e. Indicate kinds of materials and finishes for equipment where more than one option is presented.
- 4. Acceptance Testing Plan
 - a. Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
 - b. Provide a sample of the test forms to be used for each system and for each component of each system.
 - c. Include all tests required by the equipment manufacturer and by this Specification.
- F. The Owner will return unchecked any submittal which does not contain complete data on the work and full information on related matters.
- G. Verification: The contractor shall check and acknowledge all shop drawings and shall place his signature on all shop drawings submitted to the Owner. Contractor's signature shall constitute a representation that all quantities, dimensions, field construction criteria, materials, catalog numbers, performance criteria and similar data have been verified and that, in his opinion, the submittal fully meets the requirements of the Contract Documents.
- H. Timeliness: The Contractor shall schedule, prepare, and submit a complete shop drawing assembly in accordance with a timetable that will allow his suppliers and manufacturers sufficient time to fabricate, manufacture, inspect test and deliver their respective products to the project site in a timely manner so as to not delay the complete performance of the work.
- I. Departure from Contract Requirements: If shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of transmittal, otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.
- J. Contractor Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract. No construction called for by shop drawings shall be initiated until such drawings have been reviewed and approved.
- K. Shop Drawing Submittal Review: The procedure in seeking review of the shop drawings shall be as follows:

DATA COMMUNICATIONS

1. The Contractor shall submit one (1) complete electronic set of shop drawings with equipment submittals and other descriptive data with one copy of a letter of transmittal to the Owner for review thirty (30) working days after award of the contract. The letter of transmittal shall contain the project name, the Owner's Project Number, the name of the Contractor, the list of drawings submitted including numbers and titles, requests for any review of departures from the contract requirements and any other pertinent information. Drawings submitted for review shall be PDF format drawings and included with the equipment submittals.
2. Drawings or descriptive data will be stamped "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected" or 'Submit Specific Item' and one copy with a Letter of Transmittal will be transmitted to the Contractor with the return of submitted documents.
3. If a shop drawing or data is stamped "Reviewed" or "Furnish as Corrected", no additional submittal is required for that shop drawing.
4. If a shop drawing or data is stamped "Revise and Resubmit" or "Rejected", the Contractor shall make the necessary corrections and resubmit the documents as required above. The letter transmitting corrected documents shall indicate that the documents are re- submittals.
5. If any corrections, other than those noted by the Owner, are made on a shop drawing prior to resubmittal, such changes should be pointed out by the Contractor upon resubmittal.
6. The Contractor shall revise and resubmit the shop drawing as required, until they are stamped either "Reviewed" or "Furnish as Corrected."
7. After the Contractor's submittal or resubmittal of shop drawings, the Owner shall be provided with fifteen (15) working days for review. Should the Owner require additional review time above and beyond the stated fifteen (15) working days, the Contractor may ask for a time extension and/or monetary compensation, if they can present valid, factual evidence that actual damages were incurred by the Contractor. The Owner shall determine the amount of the time extension and/or the monetary compensation to be awarded the Contractor.
8. The Owner will not issue a "Notice to Proceed" until shop drawings are reviewed, unless otherwise approved by the Owner.
9. The Contractor shall be responsible for extra costs incurred by the Owner caused by the Contractor's failure to comply with the procedure outline above.

1.7 OPERATING AND MAINTENANCE MANUALS

- A. Phase One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:
 1. Record Drawings: Submit one (1) copy of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, connections and relationships as they were installed. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable format, on USB drive.

DATA COMMUNICATIONS

2. Manuals: Submit one (1) copy of each of the following materials in bound manuals, or electronic PDF copies on USB Drive:
 - a. A final Bill of Material.
 - b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
 - c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals, and service sheets published by the manufacturers of the components, devices and equipment provided.
 - d. Include information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.
 - e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
 - f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
 - g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.
- B. Phase Two: Within fourteen (14) days of receipt of engineer reviewed Operating and Maintenance Manual (Phase One), submit one (1) electronic copy in editable format of the reviewed Record Drawings and one (1) copies of the reviewed Operating and Maintenance Manuals to the Owner, on USB Drive.
 1. The contractor shall provide to the Owner one (1) copy of new executive and user software, including required graphical maps, on USB Drive.
 2. Sufficient information, (detailed schematics of subsystems, assemblies, and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

1.8 WARRANTY

- A. Furnish and guarantee maintenance, repair and inspection service for the system using factory trained authorized representatives of the manufacturer of the equipment for a period of one year after final acceptance of the installation.
- B. Third Party Device warranties are transferred from the manufacturer to the contractor, which may then transfer third party warranties to the Owner. Specific third-party warranty details, terms and conditions, remedies, and procedures, are either expressly stated on, or packaged with, or accompany such products. The warranty period may vary from product to product. These products include but are not limited to devices that are directly interconnected to the field hardware or computers and are purchased directly from the manufacturer.
- C. Purpose
 1. The Contractor shall repair any system malfunction or installation deficiency discovered by the Owner during the burn in and warranty period.

SECTION 27 20 00

DATA COMMUNICATIONS

2. The Contractor shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Owner during the warranty period.
- D. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:
 1. Service Contract shall cover a 1-year agreement within the base scope.
- E. Response Time: Response time for service calls.
 1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 8 hours to the project site.
 2. Emergency service calls where controllers are not reporting shall be within 4 hours to the project site.
 3. Normal service calls for device malfunctions shall be within 48 hours during normal working hours to the site.
- F. Repair Time: Contractor shall stock parts in sufficient quantities such that repair, or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 48 hours. Contractor may contact Owner for use of Owner supplied spare parts where delay of system repair will have negative impact on system performance.
- G. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.
- H. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.
- I. Transmittal: A copy of this Warranty shall be delivered to and signed for by the Owner. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.
- J. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.
- K. Sub-Contracting: Warranty service work may not be sub-contracted except with specific permission and approval by the Owner.
- L. Resolution of Conflicts
 1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.
 2. If the Contractor or his approved subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of

SECTION 27 20 00

DATA COMMUNICATIONS

a malfunction shall be considered adequate when the device, equipment, system, or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

1.9 OWNER'S RIGHT TO USE EQUIPMENT

- A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

1.10 EXISTING SYSTEMS

- A. Network Communications Equipment - Local Area Network (LAN)
 - 1. Modifications to the Existing System
 - a. The addition or replacement of existing equipment with new shall provide services and functions identical to the existing system in addition to any new functions and services specified herein.
 - b. The Contractor shall use and expand, as necessary, the existing system as part of this work, including but not limited to servers, software, and software licensing.
 - c. Contractor shall coordinate with the Owner to ensure new and modified systems are fully and seamlessly integrated into the existing system.
- B. Refer to 28 05 00, Security System General Requirements for related work.

1.11 TECHNICAL REQUIREMENTS & SCOPE OF WORK

- A. Network Equipment
 - 1. The Owner maintains and operates an existing Cisco network. The Contractor shall furnish, install, and program new equipment as specified.
 - 2. Coordinate exact programming requirements with Owner's IT department prior to programming any equipment. Ensure all functional requirements from the Owner are met. It is the Contractor's responsibility to fully program the network equipment.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Product Acceptability: The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Owner shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.

SECTION 27 20 00

DATA COMMUNICATIONS

2.2 NETWORK EQUIPMENT

A. General

1. Refer to Enclosure B for final parts list.

B. Equipment

Part	Manufacturer	Model
Catalyst 9300 48-port Universal Power Over Ethernet (UPOE), Network Advantage	Cisco	C9300-48U-A
SOLN SUPP 8X5XNBD Catalyst 9300 48-port Universal Power Over Ethernet (UPOE), Network Advantage	Cisco	CON-SSSNT-C93004UA
1100W Alternating Current (AC) 80+ platinum Config 1 Power Supply	Cisco	PWR-C1-1100WAC-P
1100W Alternating Current (AC) 80+ platinum Config 1 Secondary Power Supply	Cisco	PWR-C1-1100WAC-P/2
North America Alternating Current (AC) Type A Power Cable	Cisco	CAB-TA-NA
C9300 DNA Advantage , 48-Port, 5 Year Term License	Cisco	C9300-DNA-A-48-5Y
Cisco ONE Add-On Session Opt Out (No Fulfillment)	Cisco	C1-ADD-OPTOUT
Catalyst 9300 2 x 25GE Network Module	Cisco	C9300-NM-2Y
10/25GBASE-LR SFP28 Module	Cisco	SFP-10/25G-LR-S
10GBASE-CU Small Form-factor Pluggable Transceiver Plus (SFP+) Cable 5 Meter	Cisco	SFP-H10GB-CU5M
Catalyst 9500 48-port x 1/10/25G + 4-port 40/100G, Advantage	Cisco	C9500-48Y4C-A
SOLN SUPP 8X5XNBD Catalyst 9500 48-port 25/100G only, Advantage	Cisco	CON-SSSNT-C9504YA4
650W Alternating Current (AC) Config 4 Power Supply front to back cooling	Cisco	C9K-PWR-650WAC-R
650W Alternating Current (AC) Config 4 Power Supply front to back cooling	Cisco	C9K-PWR-650WAC-R/2
Power Cord, 125V Alternating Current (AC) 13 Amp (A) National Electrical Manufacturers Association (NEMA) 5-15 Plug, North America	Cisco	CAB-9K12A-NA
C9500 DNA Advantage , Term License	Cisco	C9500-DNA-48Y4C-A
Catalyst 9500 NW and Cisco DNA Advantage license (5Y)	Cisco	C9500-DNA-A-5Y
10/25GBASE-LR Small Form-factor Pluggable Transceiver (SFP) SFP28 Module	Cisco	SFP-10/25G-LR-S
10GBASE-CU Small Form-factor Pluggable Transceiver Plus (SFP+) Cable 5 Meter	Cisco	SFP-H10GB-CU5M

SECTION 27 20 00

DATA COMMUNICATIONS

PART 3 - EXECUTION

3.1 GENERAL

- A. Perform this work in accordance with acknowledged industry and professional standards and practices, and the procedures specified herein.
- B. The Contractor shall ensure that installation personnel understand the requirements of this Specification.

3.2 COORDINATION

- A. General
 - 1. This Contract involves functioning systems. Coordination with the Owner is critical. Do not interrupt any functioning system without coordinating with the client.
 - 2. Coordinate the work with the Owner and all trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.
 - 3. Meet with the Owner and each trade. Identify devices needed to complete functional operation of this work which are being provided by Owner, General Contractor or another trade, and assure that the work being provided by others will be acceptable.
 - 4. Make sure work by others is scheduled in order that this work can be installed in a timely fashion.
 - 5. Verify work by others which may be necessary to facilitate the work and coordinate with other trades. Assure that related work by others is coordinated with this work.
- B. Required Resources: Become familiar with the available access and space for equipment and any potential interference requiring coordination. Coordinate with the Owner to assure that adequate electrical and HVAC, services are available. Provide the physical space for equipment, and ample access room for installation and maintenance of equipment.
- C. Interface Devices: Provide items necessary to complete this work in conformance with the Contract Documents or the satisfaction of the Owner without any additional expense.
- D. Equipment shall be mounted with sufficient clearance to meet applicable codes and facilitate observation and testing. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system. Units shall be installed parallel and square to building lines.
- E. Where new equipment is replacing old equipment, Contractor is responsible for removing the old equipment.
- F. Project Documentation: Review project documentation. If the Contractor perceives conflict or ambiguity in the contract documents, he shall seek interpretation from the Owner. Failure to do so may result in remedial work.

SECTION 27 20 00

DATA COMMUNICATIONS

- G. Project Schedule: Immediately obtain and follow the project schedule established by the Owner. Failure to maintain the schedule may result in a requirement by the Owner to expend extra effort until the project schedule has been achieved.
- H. Schedule Changes: Time is of the essence of this agreement. In the event that it becomes necessary for the Contractor to expend "extra effort" to complete the work according to schedule changes not covered above, the Contractor agrees to cooperate with the Owner in good faith to complete the work according to schedule requirements.
- I. Supervision: Maintain a competent supervisor and supporting technical personnel acceptable to the Owner during the entire installation. A change of supervisor during the project shall not be acceptable without prior written approval from the Owner.
- J. Work and Manpower Rules: Comply with applicable jobsite work and manpower regulations.
- K. Found Conflicts: Continuously make known to the Owner, conflicts discovered which may affect the orderly completion or the specified performance of this work. Cooperate with the Owner and other trades to accommodate such changes as may be necessary to resolve found conflicts.
- L. Coordination Difficulties: Promptly notify the Owner in writing of any difficulties which may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable, to receive this work, except for defects that may develop in the work of others after its execution.
- M. Environmental: Verify the intended location(s) for equipment is suitable for the equipment. If conditions such as temperature, humidity, dust level or the like require modification, make it known to the Owner immediately upon award of the contract. If equipment requires strict environmental conditions (dust limitations, etc.), notify the Owner immediately upon award of the Contract. Failure to notify the Owner of such conditions shall constitute acceptance of the conditions and any later required modifications to the equipment or the environment shall be at the sole cost of the Contractor.
- N. Extra Effort: The Owner retains the right to require the Contractor to expend whatever extra effort as may be required, in event the Contractor fails to perform satisfactorily at any milestone date, unless such delay is approved in writing by the Owner, or it can be proved by the Contractor that such delay was caused by other contractors, or Owner's intransigence relating to Owner requested changes in the scope of work. Any costs pursuant to such extra effort will be borne solely by the Contractor. If Project Schedule delays are approved, provide the Owner with monthly revisions of the Project Schedule reflecting actual performance vs. the schedule.

3.3 WORKMANSHIP

- A. The installation shall be performed in a professional and workmanlike manner.

DATA COMMUNICATIONS

- B. On a daily basis, clean up and deposit in appropriate containers debris from work performed under the appropriate Specification sections. Owner and organize parts, tools and equipment when not being used.
- C. Preparation, handling, and installation shall be in accordance with the Manufacturer's written instructions and technical data appropriate to the product specified.
- D. Work shall conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.
- E. At the conclusion of the installation, work areas, including panel boxes, shall be vacuumed and cleaned to remove debris and grease.

3.4 SOFTWARE CONFIGURATION

- A. Contractor shall coordinate with the Owner to determine the required configuration requirements for network equipment.

3.5 START-UP RESPONSIBILITY

- A. Contractor shall initiate System Operation. Competent start-up personnel shall be provided by Contractor on each consecutive working day until the System is functional and ready to start the acceptance test phase. If in Owner's judgment Contractor is not demonstrating progress in solving any technical problems, Contractor shall supply Manufacturer's factory technical representation and diagnostic equipment at no cost to Owner, until resolution of those defined problems. Where appropriate, Contractor will bring the System on-line in its basic state (i.e., alarm reporting, facility code access control, etc.).
- B. Properly ground each piece of electronic equipment prior to applying power.
- C. Properly ground all shielded wire shields to the appropriate earth ground at the hub end only, not at the remote or device end.
- D. Use a start-up sequence that incrementally brings each portion of the system on-line in a logical order that incorporates checking individual elements before proceeding to subsequent elements until the entire system is operational.

3.6 ACCEPTANCE TESTING

- A. Contractor shall confirm in writing to the Owner and Design team, that the system has been tested and is fully functional prior to acceptance testing.
- B. During acceptance testing, the Contractor shall test all functionality of the system per the Owner's provided programming requirements in the presence of the Owner's IT department.

SECTION 27 20 00

DATA COMMUNICATIONS

- C. If issues are found during acceptance testing, the Contractor is responsible for correcting all issues and coordinating a new acceptance testing date to retest all system functions.

END OF SECTION 27 20 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Standard Guidelines referenced in Division 01 Summary Section, apply to this Section.

1.2 BASIC DEFINITIONS

- A. Los Angeles County (LAC) shall be hereinafter referred to in this document as Owner and the respondent shall be referred to as Contractor. The term Owner includes direct employees and other appointed Owner agents such as Architects or consultants. These agents may be requested by Owner to represent Owner in undertaking certain project tasks.
- B. "Days": As used in the specifications, the word "days" means calendar days including weekend days.
- C. "Provide": As used in the plans and specifications, the word "provide" means to furnish, install, connect, program, test, commission and warranty the subject material or services.
- D. Specified Items – Substitutions
 - 1. "No Acceptable Equal": The exact make and model number identified in this Specification shall be provided without exception. Where compatibility with existing systems is specified, and where a specific make or model number is not identified, the Contractor shall provide equipment which is compatible with, and equivalent to, existing equipment of the same description and type, and serving the same purpose.
 - 2. "Or Equal": An item may be substituted for the specified item provided that in every technical and aesthetic sense, the substituted item provides the same or better capability than the specified item, and is fully compatible with the new or existing systems specified. For expansion of existing systems, the item shall also be approved and fully supported by the existing system manufacturer. The Owner shall be the sole authority to determine the equality of substituted products with specified items.
 - 3. "Aesthetics", or "Aesthetic Considerations": If aesthetic considerations are involved in either the 'or equal' or 'approved equal' category, this shall be a consideration in approving or disapproving the proposed substitute. If the proposed substitute is aesthetically unacceptable to the Owner, then the specified, or another technically equal item, shall be provided.
- E. "Beneficial Use": Each component of a system is not considered available for beneficial use until and unless all components and conditions have been fulfilled to make the system fully operational.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

1.3 SITE ACCESS CONTROL

- A. The Contractor shall obtain rules and regulations from the Owner's Project Manager and shall train construction and delivery personnel on their requirements. Contractor shall consistently remain in contact with the Owner for revisions to project policy, and shall be held fully responsible for monitoring and ensuring Contractor and Subcontractor compliance to Owner Access Control rules and regulations as directed by the Owner.
- B. Contractor's personnel, operating forces, and delivery personnel shall strictly follow all rules and regulations concerning Access Control at the site, including but not limited to those relating to credentialing, background checks, and access to restricted and secure areas, parking, the handling of Access Control information, and the use of the facility.

1.4 DESCRIPTION

- A. General Description: This specification section covers general requirements for the furnishing, installation and testing of a complete expansion to the Owner' video surveillance system.
- B. Furnish and install Video Surveillance System (VSS) software programming, hardware devices, mounting brackets, power supplies, video servers, Network Video Recorders (NVR), and equipment enclosures, as shown and specified.
- C. Furnish and install outlets, junction boxes, pull boxes, conduit, backboxes, special/custom backboxes, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26, Electrical Work.

1.5 SCOPE OF WORK

- A. Systems: Provide a Video Surveillance System (VSS) per the contract schedule, and with acceptable engineering and installation practices as described herein.
- B. Areas of work include, but are not limited to:
 - 1. Shop Engineering and Documentation
 - 2. Wiring and Installation Diagrams
 - 3. Submittals
 - 4. Coordination
 - 5. System Installation
 - 6. Training
 - 7. Start-up Testing
 - 8. Commissioning
 - 9. Close out & As-Build documentation
 - 10. Warranty

SECURITY SYSTEMS GENERAL REQUIREMENTS

1.6 BID RESPONSE

A. Bidders Responsibility

1. Contractor is responsible for verifying actual conditions by visiting the site, reviewing the Specifications and drawings, and to advise the Owner in writing of any conditions which may adversely affect the work. If any necessary exceptions are discovered, Contractor shall immediately notify the Owner for resolution prior to any change in the design or the scope, and any resultant claim for additional compensation.
2. The Bid Response must fulfill the intent of the Drawings and Specifications to the satisfaction of the Owner to qualify as an acceptable Bid Response.

B. Substitutions

1. Catalog and/or model numbers for Owner approved equipment and systems are included as a part of these specifications.
2. Any substitution proposed by Contractor for catalog numbers and brands or trade names noted or specified herein shall be solely at the Contractors risk. The Owner maintains sole authority to hold a review of substitutions, and sole authority to approve or disapprove of substitutions for any reason.
3. The Owner's acceptance of substitutions shall not relieve Contractor from complying with the requirements of the drawings and Specifications. Contractor shall be responsible, at Contractor's sole expense, for any changes resulting from Contractor's substitutions that affect other parts of Contractor's own work or the work of others.

C. Technical Bid Submission: At bid submission, submit one (1) copy of the following

1. An equipment list with names of Manufacturers of primary systems (VSS) including model numbers and technical information on equipment proposed.
2. A letter from the manufacturer(s) stating that the system Contractor is an authorized distributor or installer of the proposed primary systems (VSS).
3. Indicate complete and total compliance with the provisions of these Specifications by letter or by submittal of the bid response forms, signed by an officer of the corporation, or a principal if other ownership currently exists. If there are exceptions to the specifications, submit a statement listing every technical and operational parameter wherein the submitted equipment or system may vary from that which was originally specified. If the submitter fails to list a particular variance and his submittal is accepted, but is subsequently deemed to be unsatisfactory because of the unlisted variance, the submitter must replace or modify such equipment at once and without cost to the Owner.
4. Failure of Contractor to submit the above information shall be considered non-responsive to the bid requirements and sufficient cause for bid rejection.

D. Examination of Site and Verification of Existing Conditions

1. Contractor shall have visited the site and familiarized himself with existing conditions prior to submitting his bid and shall be prepared to carry out the work within the existing limitations. Failure or neglect to do so shall not relieve Contractor

SECURITY SYSTEMS GENERAL REQUIREMENTS

of his responsibilities nor entitle him to additional compensation for work overlooked and not included in his bid.

2. Existing structures and utilities shown on the contract drawings are obtained from project drawings and exploratory field examination. Contractor shall verify existing conditions and required dimensions, including those shown on the drawings, by measurement at the job site. Contractor shall notify the Owner of exceptions before proceeding with the work.
3. Contractor shall confirm the availability of the proper power source for each piece of specified equipment, through site visits and drawings as necessary. Where proper power does not exist, Contractor shall identify this situation to the Owner for guidance. Should the Owner direct Contractor to provide the necessary power, it shall be provided using equipment and methods authorized by the Owner.

- E. Data Accuracy: Absolute accuracy of information regarding existing conditions cannot be guaranteed. The Drawings and Specifications are for the assistance and guidance of Contractor and exact locations, distances, and elevations will be governed by actual field conditions. Where variations from the bid documents are required, such variations shall be approved by the Owner.

1.7 QUALIFICATIONS

A. General

1. The approved Contractor shall be responsible for satisfactory operation of the system and its certification.
2. Approval of the Owner is required of products or services of the proposed manufacturer, suppliers and installers and will be based upon conformance to the specifications.

B. Manufacturer Qualifications

1. System components shall be furnished by manufacturers of established reputation and experience who shall have produced similar equipment and who shall be able to refer to similar installations rendering satisfactory service.
2. The manufacturer's products shall have been in satisfactory operation on at least three similar installations for not less than three years. Contractor shall submit a list of similar installations.
3. Components including, but not limited to, cameras, computers, and power supplies shall have been tested and listed by Underwriters Laboratories, Inc., Factory Mutual Systems, or other approved independent testing laboratory.
4. Components installed within a common enclosure shall be approved by an agency recognized by the local city Department of Building and Safety as an assembly.

C. Contractor Qualifications

1. Hold current legally required California State Contractor's licenses necessary to accomplish the installation and activation of the described system at the facilities indicated. Contractor shall submit copies of licenses to Owner prior to the start of work.

SECURITY SYSTEMS GENERAL REQUIREMENTS

2. Hold current legally required state registrations required to meet local requirements for submittal drawings
3. Have manufacturers trained and certified engineering, field technicians and programming staff.
4. Indicate complete and total compliance with the provisions of these Specifications by letter or by submittal of the bid response forms, signed by an officer of the corporation, or a principal if other ownership exists. In addition, the letter or forms shall include a complete listing of exceptions, if any.

1.8 PHASING PLAN

- A. The work shall be performed in phases.
 1. Each phase of work shall include, but not be limited to the provision of applicable conduit, power, equipment, programming, and documentation to provide a complete, operational system, as described herein.
 2. Coordinate work phasing with the Owner
 3. Within 14 days after award of the project, submit a preliminary phasing plan to the Owner for review. The Shop Drawings shall reflect the process of the phasing plan.
- B. The Phasing Plan shall be designed to allow the continuation of Owner business and activities and to limit down- time of critical systems, during construction. Each system element shall be addressed individually. Phases and system elements may be combined, or rearranged, based upon planned work schedules and available labor to perform the work.
- C. Phasing Plan: The proposed phasing plan should address the upgrades with the following approach:
 1. Install or coordinate with the Owner on the installation of the required network connectivity.
 2. Install, power, and test the control equipment, including but not limited to video recorders, computer workstations, and application software. Where new equipment will replace existing equipment in the same location, provide temporary installation of the new equipment.
 3. Install conduit, cable, and new devices. Connect to controls, and test.
 4. Install conduit, cable, and devices which replace existing devices. Connect to controls, and test.
 5. Where new equipment replaces existing equipment in the same location, remove existing and install the new equipment. Reconnect pre-tested devices, and test again.
 6. Program, configure, test and commission the system as required by the Owner and these specifications.
- D. Modifications to the Phasing plan may be submitted by the Contractor, after the Shop Drawings and Equipment Submittals have been reviewed and accepted for installation. The Contractors' modified phasing plan shall be based upon Contractor's actual proposed equipment, project schedule and installation planning. The proposed phasing plan shall be designed to achieve the same goals as the phasing plan contained herein.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

The Contractors' plan must be accepted by the Owner prior to any demolition or installation of equipment and cable. The Owner reserves the right to modify the proposed plan, or any part thereof.

1.9 GENERAL CONDITIONS

- A. Contract Compliance: Provide the Systems and Services in accordance with the conditions and system descriptions as described in Part 1 of each specification section. Provide specified or Owner approved equivalent alternate products as described in Part 2 of each specification section. Utilize specified procedures and practices as described in Part 3 of each specification section.
- B. Codes: Furnish material and workmanship for this work in conformance with applicable legal and code requirements.
- C. Inclusive Work: Provide sufficient time, material, and manpower to verify, revise or refine the Bid Drawings as necessary to develop fully engineered Shop Drawings as required by the General Requirements, and in order for this work to realize complete, stable and safe operation.

1.10 RELATED WORK

- A. General
 - 1. Observe interface procedures to related work.
 - 2. Coordinate with the Owner on aspects of aesthetic interface.
 - 3. Coordination: Coordinate this work with related work by other contractors.
 - 4. Coordinate with existing construction, equipment, and field devices.
 - 5. Equipment provided under this project shall be installed in a manner consistent with architectural, operational, service and maintenance considerations.
 - 6. "Coordinate" related work not specifically mentioned below.
- B. Owner's General Provisions and Work Contract
- C. Division 01, General Requirements: Coordinate this work with applicable sections of the Owner's General Requirements and General Provisions.
- D. Finishes: Coordinate this work with applicable Owner requirements for Finishes, including but not limited to the following.
 - 1. Painting/Patching: Provide painting, patching and repair services to match existing conditions.
 - 2. Painting of walls shall be from corner of nearest wall across repair area to nearest wall on opposite side of repair area.
- E. Division 26, Electrical
 - 1. Coordinate this work with applicable sections of Division 26, Electrical, including but not limited to the following:

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- a. Electrical power distribution sources for existing buildings shall be by the Owner unless otherwise noted. Contractor shall coordinate with the Owner to identify and verify 120-volt power service requirements with the first shop drawing submittal.
 - b. Conduit, boxes, and rough-in material shall be provided and installed by the Contractor, unless otherwise noted.
 - c. Specialty boxes shall be provided by the Contractor and installed by the Contractor, unless otherwise noted.
- F. Division 27, Communications
- 1. General: Coordinate this work with applicable sections of Division 27, Communications, including but not limited to structured cabling, fiber optic cabling, telephone, and data communications requirements.
 - 2. Contractor shall coordinate with the Owner to identify and verify shared cable/pathway, LAN ports, and bandwidth requirements at the time of the first shop drawing submittal.
- G. Division 28, Electronic Safety and Security
- 1. Section 28 05 00 – Security System General Requirements
 - a. Provide equipment and services required by related Sections pursuant to the requirements of Section 28 05 00, Security System General Requirements.
 - 2. Section 28 05 53 – Identification for Electronic Safety and Security
 - a. Provide equipment and services required by related Sections pursuant to the requirements of Section 28 05 53, Identification for Electronic Safety, and Security.
 - 3. Section 28 08 00 – Testing and Commissioning
 - a. Provide equipment and services required by related Sections pursuant to the requirements of Section 28 08 00, Testing and Commissioning.
 - 4. Section 28 23 00 - Video Surveillance System
 - a. Provide equipment and services required by Section 28 23 00, Video Surveillance System, pursuant to the requirements of this section.

1.11 PRECEDENCE

- A. If any statement in this or any other security specification is in conflict with any provision of the General Terms and Conditions of the contract, the provision stated in the General Terms and Conditions shall take precedence. Any questions that result from such potential conflict, which require additional interpretation and guidance shall be immediately brought to the Owner's attention.
- B. Obtain, read and comply with Division 26, Electrical and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable Division 26 sub-sections and directions as contained herein, this section shall govern.
- C. Architectural drawings shall have precedence over other drawings in regard to dimensions and location.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

1.12 APPLICABLE PUBLICATIONS

- A. The edition of the appropriate code or standard at the time of permitting shall govern all applications.
- B. Standards: Perform the work in accordance with the following standards:
 - 1. UL Underwriters Laboratories, Inc., UL 294, UL 1076, ULC
 - 2. EIA Electrical Industries Association.
 - 3. NTSC National Television Standards Committee.
 - 4. NEMA National Electrical Manufacturers Association.
 - 5. NECA National Electrical Contractor's Association, Standards of Installation.
 - 6. NFPA National Fire Protection Association 101 Life Safety Code
 - 7. CCR Title 24 California Building Code
 - 8. CCR Title 24 California Electric Code
 - 9. ADA Americans With Disabilities Act
 - 10. FCC Part 15, Part 68
 - 11. IEEE RS 170 variable standard NTSC (color camera broadcast)
- C. Where more than one code or regulation is applicable, the more stringent shall apply.
- D. Cable installation, identification and termination shall be performed in accordance with manufacturer's installation manuals in addition to the above applicable codes.
- E. In the absence of manufacturer's recommendations on conductor applications, the Contractor shall ensure that the cable selected meets all technical requirements of the location of its installation, and of the equipment to be installed.

1.13 SHOP DRAWING & EQUIPMENT SUBMITTAL

- A. General: Bid documents, including drawings, details and specifications are considered conceptual in nature, and provide direction on products and project requirements. Contractor is given a choice of methods that may be incorporated into the system. These choices may affect the overall design, configuration, and installation of the proposed system.
- B. Contractor Responsibility: Prepare and submit shop drawings, rendered in the latest AutoCad format, which show details of all work to insure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal package shall consist of Drawings, Equipment Data Sheet Submittals, and an Acceptance Testing Plan.
- C. Completeness: The Equipment Submittals, Acceptance Testing Plan and the Shop Drawings should be submitted as a complete and contiguous package. Partial or unmarked submittals will not be accepted for review.

SECURITY SYSTEMS GENERAL REQUIREMENTS

- D. Scheduling: A schedule of shop drawing submissions shall be submitted for the Owner's review on a form acceptable to the Owner within ten (10) days after award of the Contract. The schedule of shop drawing submissions shall include as a minimum, but not limited to the requirements stated herein.
- E. Requirements: Provide the following information complete, and in the manner described herein:
1. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the security systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:
 - a. Server(s) processor(s), disk space and memory size and/or expansion of existing
 - b. Workstation(s) processor(s), disk space and memory size
 - c. Description of site (field) control equipment (Controllers/Field Panels, NVR's, Modules) and their configuration
 - d. Operating System(s) Software, where software is provided or upgraded
 - e. Application Software, with Optional and Custom Software Modules supplied in this project
 - f. Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.
 - g. Network bandwidth and reliability requirements
 - h. Number and location of LAN ports required
 - i. Other specific network requirements, preferences, and constraints
 - j. Backup/archive system size and configuration
 - k. Start-up operations
 - l. System power requirements and Uninterruptible Power Supply (UPS) sizing
 - m. Device/component environmental requirements (cooling and or heating parameters)
 2. Shop Drawings: Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following information:
 - a. Title Sheet:
 - b. Floor Plans: Showing devices, pull boxes, cabinets, conduits, and conductors in their proposed locations with device numbering scheme.
 - c. Riser Diagram: Showing all conduit relationships between devices shown on the Floor Plans. Show all power sources.
 - d. Single-Line/Block Diagrams: Show signal relationships of controls and devices within the system.
 - e. Custom Assembly Diagrams: For each custom assembly provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes (momentary or alternate action switch, lens color, panel finish)
 - f. Component Connection Diagrams:

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- 1) For each equipment component, such as a computer, video switcher, camera or video recorder, show the rear elevation of the device and all connectors/terminations as a pictorial.
 - 2) Show the wire designations on connectors. Typical wiring detail where multiple of same device is provided.
 - 3) Show a schedule of the wire colors connected to the pins on each device connector
- g. Equipment Wiring Diagrams:
- 1) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet, including terminals, components, and wiring devices.
 - 2) Show the device nomenclature exactly as shown on the single line diagrams.
 - 3) Terminations: Show every termination and terminating cable, with applicable cable and wire numbers matching the single line diagrams.
 - a) Every termination in the system must be documented.
 - b) Termination information may be rendered as a wiring list(s), if properly coordinated with, and referenced to, typical component and single-line diagrams. Otherwise, the Shop Drawings shall show a pictorial of every component in the system, with its terminations.
 - 4) Show wire colors for each terminal.
 - 5) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
- h. Provide working dimensions and erection dimensions.
- i. Arrangements and sectional views
- j. Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.
- k. Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
- l. Duplicate of design drawings may be used where each sheet is modified to reflect contractor coordination, specific requirements of the project and multidiscipline conditions.
- m. Each Drawing or page shall include:
- 1) Project name, Project Number, and descriptions.
 - 2) Submittal date and space for revision dates.
 - 3) Identification of equipment, product, or material.
 - 4) Name of Contractor and Subcontractor.
 - 5) Name of Supplier and Manufacturer.
 - 6) Relation to adjacent structure of material.
 - 7) Physical dimensions, clearly identified.
 - 8) ASTM and Specifications references.
 - 9) Identification of deviations from the Contract Documents.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- 10) Contractor's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
 - 11) Location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material.
3. Equipment Submittals
 - a. Provide a Title Page, with project name, Contractors name and address, contact information, date of submission, and submission revision number.
 - b. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:
 - 1) The system type
 - 2) Model number
 - 3) Specification sheet page reference
 - c. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components, and devices. Number each page, to correspond with the Parts List.
 - d. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.
 - e. Indicate kinds of materials and finishes for equipment where more than one option is presented.
 4. Acceptance Testing Plan
 - a. Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).
 - b. Provide a sample of the test forms to be used for each system and for each component of each system.
 - c. Include all tests required by the equipment manufacturer and by this Specification.
 5. Spare Parts List: Submit a list of recommended spare parts. Spare parts shall comprise a minimum of 5% or minimum of 2 each of field devices, device termination boards and a minimum of 1 system controller boards.
 6. Training Program
 - a. Submit a training program 10 working days prior to scheduled training to be followed in training key employees in the operation and maintenance of the installed system at the project site. The proposed training program shall be designed to provide a level of basic competence with the system for selected personnel. These selected personnel shall then be expected to train other personnel as required, utilizing the training that they have been given and the body of training documentation provided by Contractor. This plan shall comply with the requirements stated in the "Training" section, of these Specifications, all stated hours of which shall be considered to be classroom hours.
 - b. Submit a curriculum to account for, and relate, each subject to actual training time. All required hours shall be accounted for in this curriculum.
 - c. The training plan shall cover the overall system, each individual system, each subsystem, and each component. The plan shall also cover procedures for

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

database management, normal operations, and failure modes with response procedures for each failure. Each procedural item must be applied to each equipment level.

- F. The Owner will return unchecked any submittal which does not contain complete data on the work and full information on related matters.
- G. Verification: The contractor shall check and acknowledge all shop drawings, and shall place his signature on all shop drawings submitted to the Owner. Contractor's signature shall constitute a representation that all quantities, dimensions, field construction criteria, materials, catalog numbers, performance criteria and similar data have been verified and that, in his opinion, the submittal fully meets the requirements of the Contract Documents.
- H. Timeliness: The Contractor shall schedule, prepare, and submit a complete shop drawing assembly in accordance with a time-table that will allow his suppliers and manufacturers sufficient time to fabricate, manufacture, inspect test and deliver their respective products to the project site in a timely manner so as to not delay the complete performance of the work.
- I. Departure from Contract Requirements: If shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of transmittal, otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.
- J. Contractor Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract. No construction called for by shop drawings shall be initiated until such drawings have been reviewed and approved.
- K. Shop Drawing Submittal Review: The procedure in seeking review of the shop drawings shall be as follows:
 - 1. The Contractor shall submit four (4) complete sets of shop drawings with equipment submittals and other descriptive data with one copy of a letter of transmittal to the Owner for review thirty (30) working days after award of the contract. The letter of transmittal shall contain the project name, the Owner's Project Number, the name of the Contractor, the list of drawings submitted including numbers and titles, requests for any review of departures from the contract requirements and any other pertinent information. Drawings submitted for review shall be full-sized drawings, rolled and included with the equipment submittals.
 - 2. Drawings or descriptive data will be stamped "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected" or 'Submit Specific Item' and one copy with a Letter of Transmittal will be transmitted to the Contractor with the return of submitted documents.

SECURITY SYSTEMS GENERAL REQUIREMENTS

3. If a shop drawing or data is stamped "Reviewed" or "Furnish as Corrected", no additional submittal is required for that shop drawing.
 4. If a shop drawing or data is stamped "Revise and Resubmit" or "Rejected", the Contractor shall make the necessary corrections and resubmit the documents as required above. The letter transmitting corrected documents shall indicate that the documents are re- submittals.
 5. If any corrections, other than those noted by the Owner, are made on a shop drawing prior to resubmittal, such changes should be pointed out by the Contractor upon resubmittal.
 6. The Contractor shall revise and resubmit the shop drawing as required, until they are stamped either "Reviewed" or "Furnish as Corrected."
 7. After the Contractor's submittal or resubmittal of shop drawings, the Owner shall be provided with fifteen (15) working days for review. Should the Owner require additional review time above and beyond the stated fifteen (15) working days, the Contractor may ask for a time extension and/or monetary compensation, if they can present valid, factual evidence that actual damages were incurred by the Contractor. The Owner shall determine the amount of the time extension and/or the monetary compensation to be awarded the Contractor.
 8. The Owner will not issue a "Notice to Proceed" until shop drawings are reviewed, unless otherwise approved by the Owner.
- L. The Contractor shall be responsible for extra costs incurred by the Owner caused by the Contractor's failure to comply with the procedure outline above.

1.14 OPERATING AND MAINTENANCE MANUALS: RECORD DOCUMENTS

- A. Phase One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:
1. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCADfiles, in ".dwg" format, on CD or DVD disks.
 2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies on CD/DVD discs, with labeled dividers:
 - a. A final Bill of Material for each system.
 - b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.
 - c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals, and service sheets published by the manufacturers of the components, devices and equipment provided.

SECURITY SYSTEMS GENERAL REQUIREMENTS

- d. Include information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.
 - e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.
 - f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.
 - g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturers' Warranty Registration papers as described herein.
- B. Phase Two: Within fourteen (14) days of receipt of engineer reviewed Operating and Maintenance Manual (Phase One), submit three (3) electronic copies in AutoCAD editable dwg. format of the reviewed Record Drawings and three (3) copies of the reviewed Operating and Maintenance Manuals to the Owner, on CD or DVD disks.
- 1. The contractor shall provide to the Owner one (1) copy of new executive and user software, including required graphical maps, on CD-ROM disks.
 - 2. Sufficient information, (detailed schematics of subsystems, assemblies, and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

1.15 CHANGES

- A. Before proceeding with changes or claims for extras, Contractor shall provide written notice, secure prior written approval from the Owner, and substantiate actual cost of each change or claim.

1.16 NOTIFICATION

- A. Contractor shall not shut off any existing systems. Contractor shall give the Owner at least 14 calendar day notice of any requirement to shut off or interfere with existing alarm, access control, regulating, computer or other service systems. The Owner will arrange and execute any shutdown. Work such as splicing, where approved, and connections necessary to establish or re-establish any system shall be completed by Contractor in close coordination with the Owner.

1.17 INTERFERENCE WITH THE FACILITY

- A. Transportation and storage of materials at the facility, work involving the facility, and other matters affecting the habitual use by the Owner of its buildings, shall be conducted so as to cause the least possible interference's, and at times and in a manner acceptable to the Owner. Contractor shall make every effort to deliver equipment per the schedule required by the project.

SECURITY SYSTEMS GENERAL REQUIREMENTS

1.18 WARRANTY

- A. Furnish and guarantee maintenance, repair and inspection service for the system using factory trained authorized representatives of the manufacturer of the equipment for a period of one year after final acceptance of the installation.
- B. Third Party Device warranties are transferred from the manufacturer to the contractor, which may then transfer third party warranties to the Owner. Specific third party warranty details, terms and conditions, remedies, and procedures, are either expressly stated on, or packaged with, or accompany such products. The warranty period may vary from product to product. These products include but are not limited to devices that are directly interconnected to the field hardware or computers and are purchased directly from the manufacturer. Examples may include but not be limited to; servers, cameras, video recorders, card readers, and computers.
- C. Purpose
 - 1. The Contractor shall repair any system malfunction or installation deficiency discovered by the Owner during the burn in and warranty period.
 - 2. The Contractor shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Owner during the warranty period.
- D. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:
 - 1. Quarterly Inspection, Preventative Maintenance and Testing of equipment and components
 - 2. Regular Service, Emergency Service, and Call-Back Service
 - 3. Labor and Repairs
 - 4. Equipment and Materials
- E. Response Time: Response time for service calls.
 - 1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 2 hours to the project site.
 - 2. Emergency service calls where controllers are not reporting shall be within 2 hours to the project site.
 - 3. Normal service calls for device malfunctions shall be within 24 hours during normal working hours to the site.
- F. Repair Time: Contractor shall stock parts in sufficient quantities such that repair or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 72 hours. Contractor may contact owner for use of owner supplied spare parts where delay of system repair will have negative impact on system performance.
- G. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.

SECURITY SYSTEMS GENERAL REQUIREMENTS

- H. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.
- I. Transmittal: A copy of this Warranty shall be delivered to, and signed for by the Owner. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.
- J. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.
- K. Sub-Contracting: Warranty service work may not be sub-contracted except with specific permission and approval by the Owner.
- L. Resolution of Conflicts
 1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.
 2. If the Contractor or his approved subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system, or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

1.19 PERMITS AND INSPECTIONS

- A. Responsibility: Obtain permits and inspections required for the work. Permit and inspection costs will be borne by the Contractor.
- B. Performance: Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of any legal authority having jurisdiction.
- C. Review: Obtain approvals from authorities responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein and required by the appropriate jurisdiction. Make corrections, changes, or additions as required and deliver certificates of acceptance, operation, and/or compliance with the "Operating and Maintenance Manuals" as described herein.

1.20 TRAINING

- A. On-Site Training

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

1. General: Present, review and describe equipment and materials to the Owner and Owner's operating personnel and fully demonstrate the operation and maintenance of the systems, equipment and devices specified herein.
2. Training shall comprise two separate levels of training;
 - a. User Group upon substantial completion of the project
 - 1) User group training shall include a site/building walk through indicating locations of equipment and their usage
 - 2) User group training shall include the operation of workstation capability of system monitoring, command override and report generation.
 - b. Maintenance Group upon completion of the project prior to close out
 - 1) Maintenance group training shall include a site/building walk through indicating locations of equipment and their usage
 - 2) Review of as-build documentation at each controller location
 - 3) Trouble shooting techniques in hardware and software
3. The training shall cover the overall system, each individual system, each subsystem, and each component. The training shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item must be applied to each equipment level.
4. Duration: Provide at least 2 hours of on-site training on each system for each group of designated representatives of the Owner at a location convenient to the Owner.
5. On-site training shall commence as follows:
 - a. VSS: Just prior to completion of the first phase of work which establishes the new VSS control over video cameras.

1.21 SAFEGUARDS AND PROTECTION

- A. Barriers: Provide and maintain suitable barriers, guards, fences and signs where necessary to accommodate the safety of others relative to and/or for the protection of this work.
- B. Regulations: Comply with OSHA, Federal, State, and local regulations and standards pursuant to this work.
- C. Protection: Protect all materials and equipment to prevent the entry or adhesion of any and all foreign material. If necessary, cover equipment with temporary protective material suitable for this purpose.
- D. Finishing: Check, clean and remove defects, scratches, fingerprints, and smudges if necessary from all equipment and devices immediately prior to Acceptance of the Installation.
- E. Damage: Replace all damaged or defective material or work at no additional cost prior to Final Acceptance.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- F. Documentation: Provide written description of accidents by workers, students and staff of any incident occurring on the project. Report incident in writing to Owner immediately and to the Project Manager for follow up.

1.22 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Unless otherwise noted, pre-testing or configuration is required by the contractor, deliver materials to the job site in manufacturer's original unopened containers, clearly labeled with the manufacturer's name and equipment model identification number.
- B. Storage and Handling: Store and protect equipment in a manner which will preclude damage.

1.23 EQUIPMENT COMPATIBILITY REQUIREMENTS

- A. While individual items of equipment may meet the equipment specifications and in fact meet the system specifications, the total system shall be designed so that the combination of equipment actually employed does not produce any undesirable effects such as signal distortion, noise, transients, or crosstalk interference's when electrically associated with itself or other equipment.

1.24 OWNER'S RIGHT TO USE EQUIPMENT

- A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

PART 2 - PRODUCTS

2.1 GENERAL

- A. These general criteria shall apply to "Part 2-Products" of all Security specifications that are a part of this work.
- B. Product Acceptability: Products sections contain lists of Owner acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Owner shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.
- C. Manufacturers Specification Reference: Where a specific material, devices equipment or systems are specified directly, the current manufacturers' specification for the same becomes a part of these specifications, as if completely elaborated herein.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- D. Equipment shall be new and the current model of a standard product of a manufacturer of record. A manufacturer of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied.
- E. For each item of equipment offered, manufacturer shall maintain:
 - 1. A factory production line.
 - 2. A stock of replacement parts.
 - 3. Engineering drawings, specifications, operating manuals and maintenance manuals.
 - 4. Manufacturer shall have published and distributed descriptive literature and equipment specifications on each item of equipment offered.
- F. Complete System: Auxiliary and incidental equipment necessary for the complete operation and protection of the systems specified herein shall be furnished and installed as if specified in full.
- G. Similar Devices: Similar devices within a system shall be identical unless specific color variances are required by the Owner or Architect.
- H. Safety: Unless otherwise specified, equipment shall be UL rated individually and listed as an assembly. Electronic equipment shall be of the dead front type, having no exposed live electrical connections, terminals or exposures to hands-on operating surfaces or other exposed surfaces during any power-on condition. Every live electrical connection, terminal or exposure shall be covered with durable, removable insulating material.
- I. Rack Mounting: Rack-mounted electronic equipment shall be specifically designed or modified for standard 19-inch rack mounting unless otherwise noted.
- J. Keying: Key panels identically where provided for similar usage within a system. Coordinate lock types with Owner.
- K. Framing: Floor supported units shall be substantially framed and supported. All bolted connections shall be made with self-locking devices.
- L. Aesthetics: Coordinate console or control panels so that their general appearance is similar. Provide locking panel covers on recessed, semi-recessed and surface mounted control panels not located in equipment rooms. Control panels shall be contained within or mounted to formed and welded aluminum or steel back-boxes. Operating panels shall be recessed within the back-box to a depth sufficient to permit a locking hinge panel cover to close completely without affecting any device within the enclosure.
- M. No contractor proprietary equipment will be permitted without prior approval from the Owner.
- N. Operational Voltage: Devices connected to the fuse or breaker protected electrical system and all auxiliary equipment necessary for the operation of the equipment associated with systems specified herein shall be designed to operate from 105 to 130 volt, 60 Hertz, alternating current service, with stable performance, fully in accordance with these specifications, and shall have integral fuse or circuit breaker protection.

SECURITY SYSTEMS GENERAL REQUIREMENTS

- O. Contractor-fabricated items shall be provided with fuses that indicate when they are blown or defective.
- P. Protection devices shall be located to facilitate replacement, resetting or observation of status without demounting the associated unit and/or de-energizing adjacent equipment.
- Q. Manufacturer's Recommendations: Components and devices shall be operated in accordance with recommendations of the manufacturer and shall contain sufficient permanent identification to facilitate replacement.
- R. Testing Requirements:
 - 1. Equipment, devices, and assemblies shall meet the local city requirements for listing and labeling, which includes UL listing and labeling for manufactured equipment.
 - 2. UL Listing: For devices and assemblies with proper UL listing and labeling, stickers shall be accessible and visible to the Inspectors. Paperwork shall also be available during inspections and shall be provided to the Owner as part of the close out documentation
 - 3. Unlisted Devices and Assemblies: Devices and assemblies without prior listing from testing authorities accepted by the local city, shall be tested by an agency acceptable to the local city prior to inspection, to obtain a listing and label. Documentation on the testing and approval shall be provided to the Owner as part of the close out documentation.

2.2 MISCELLANEOUS PRODUCTS

- 1. Provide Tamperproof security fasteners for the installation of security equipment, cabinets, enclosures and pull boxes in accessible locations. Provide Bryce Fastener PentaPlus series, TP3 style by Tamperproof Screw Company, or equal by Hudson Fastener.
- 2. Provide six (6) compatible screw drivers and transfer to the Owner prior to final acceptance testing.

2.3 TEST EQUIPMENT

- A. The Contractor is responsible for providing test equipment required to test the system in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the system and retain ownership of the equipment. The Contractor shall furnish test equipment of an accuracy better than the parameters to be tested.
- B. The test equipment list shall be furnished as a part of the submittal.
- C. Readiness: Keep test equipment at hand and maintain in calibrated condition at the jobsite as required for routine and performance testing of this work.

SECURITY SYSTEMS GENERAL REQUIREMENTS

PART 3 - EXECUTION

3.1 GENERAL

- A. Perform this work in accordance with acknowledged industry and professional standards and practices, and the procedures specified herein.
- B. Aesthetics are an important consideration in this installation. Components shall be installed so as to have aesthetically pleasing results per Owner and Architect requirements. Actual locations of visible components shall be coordinated in advance with Owner and Architect.
- C. The Contractor shall insure that installation personnel understand the requirements of this Specification.

3.2 COORDINATION

- A. General
 - 1. This Contract involves functioning systems. Coordination with the Owner is critical. Do not interrupt any functioning system without complying with the requirements of "Notification" section of this specification.
 - 2. Coordinate the work with the Owner and all trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.
 - 3. Meet with the Owner and each trade. Identify devices needed to complete functional operation of this work which are being provided by Owner, General Contractor or another trade, and assure that the work being provided by others will be acceptable.
 - 4. Make sure work by others is scheduled in order that this work can be installed in a timely fashion.
 - 5. Verify dimensions, and work by others which may be necessary to facilitate the work and coordinate with other trades. Assure that related work by others is coordinated with this work.
 - 6. Verify field conditions. Regularly examine construction and the work of others which may affect the work to ensure proper conditions are provided for the equipment and devices before their manufacture, fabrication or installation. Be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.
- B. Required Resources: Become familiar with the available access and space for equipment and any potential interference requiring coordination. Coordinate with the Owner to assure that adequate electrical and HVAC, services are available. Provide the physical space for equipment, and ample access room for installation and maintenance of equipment.
- C. Positioning Members: Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Owner without additional expense.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- D. Interface Devices: Provide items necessary to complete this work in conformance with the Contract Documents or the satisfaction of the Owner without any additional expense.
- E. Equipment shall be mounted with sufficient clearance to meet applicable codes and facilitate observation and testing. Securely hang and/or fasten with appropriate fittings to ensure positive grounding, free of ground loops, throughout the entire system. Units shall be installed parallel and square to building lines.
- F. Installation shall comply with "Codes and Standards" section of this specification. Where more than one code or regulation is applicable, the more stringent shall apply.
- G. Where new equipment is replacing old equipment, Contractor is responsible for removing the old equipment and doing repair work necessary to meet standards determined by Owner.
- H. Install fire stopping for penetrations in slabs and firewalls to meet code at the completion of work and prior to final testing demonstration to Owner.
- I. Project Documentation: Review project documentation. If the Contractor perceives conflict or ambiguity in the contract documents, he shall seek interpretation from the Owner. Failure to do so may result in remedial work.
- J. Project Schedule: Immediately obtain and follow the project schedule established by the Owner. Failure to maintain the schedule may result in a requirement by the Owner to expend extra effort until the project schedule has been achieved.
- K. Schedule Changes: Time is of the essence of this agreement. In the event that it becomes necessary for the Contractor to expend "extra effort" to complete the work according to schedule changes not covered above, the Contractor agrees to cooperate with the Owner in good faith to complete the work according to schedule requirements.
- L. Supervision: Maintain a competent supervisor and supporting technical personnel acceptable to the Owner during the entire installation. A change of supervisor during the project shall not be acceptable without prior written approval from the Owner.
- M. Work and Manpower Rules: Comply with applicable jobsite work and manpower regulations.
- N. Found Conflicts: Continuously make known to the Owner, conflicts discovered which may affect the orderly completion or the specified performance of this work. Cooperate with the Owner and other trades to accommodate such changes as may be necessary to resolve found conflicts.
- O. Coordination Difficulties: Promptly notify the Owner in writing of any difficulties which may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable, to receive this work, except for defects that may develop in the work of others after its execution.

SECURITY SYSTEMS GENERAL REQUIREMENTS

- P. Environmental: Verify the intended location(s) for equipment is suitable for the equipment. If conditions such as temperature, humidity, dust level or the like require modification, make it known to the Owner immediately upon award of the contract. If equipment requires strict environmental conditions (dust limitations, etc.), notify the Owner immediately upon award of the Contract. Failure to notify the Owner of such conditions shall constitute acceptance of the conditions and any later required modifications to the equipment or the environment shall be at the sole cost of the Contractor.
- Q. Extra Effort: The Owner retains the right to require the Contractor to expend whatever extra effort as may be required, in event the Contractor fails to perform satisfactorily at any milestone date, unless such delay is approved in writing by the Owner, or it can be proved by the Contractor that such delay was caused by other contractors, or Owner's intransigence relating to Owner requested changes in the scope of work. Any costs pursuant to such extra effort will be borne solely by the Contractor. If Project Schedule delays are approved, provide the Owner with monthly revisions of the Project Schedule reflecting actual performance vs. the schedule.

3.3 SEISMIC PROTECTION

A. General

1. Seismic protection criteria: Electrical and mechanical machinery installations in any Seismic Risk Zone of the Uniform Building Code Seismic Risk Map shall be protected from earthquakes.
2. Protection criteria for these zones shall be a Horizontal Force Factor not less than required by code or agency, considered passing through the machinery center of gravity in any horizontal direction.
3. Unless vibration isolation is required to protect machinery against unacceptable structure transmitted noise and/or vibration, machinery shall be protected from earthquakes by rigid structurally sound attachment to the load supporting structure. The number shall be determined by calculations performed by a registered California professional engineer, as verified by the seismic restraint vendor.
4. Use protected spring isolators, or separate seismic restraints, to protect vibration isolation machinery.
5. Seismic snubbers and protected spring isolators shall be seismic protection-rated along three principal axes, proven by independent laboratory testing or analysis, by an independent, licensed structural engineer.

- B. The Contractor shall be responsible for the design of his method for seismic restraint systems, and shall supply all seismic calculations and details to the Owner for review. The Contractor shall supply to the Owner details of the forces exerted by his restraints, anchorages, and other points of attachment.

- C. Electrical and mechanical equipment shall be installed in accordance with the following guidelines:

1. SMACNA Publication: Guidelines for Seismic Restraints of Mechanical Systems

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

2. California Code of Regulations (CCR), Title 24, Division 22

3. NUSIG – National Uniform Seismic Installation Guidelines

- D. Contractor shall submit shop drawings for the mounting of equipment, fixtures, cabinets, consoles, conduit, and cable support racks (where required). These drawings shall be prepared, stamped, and signed by a Registered California Structural Engineer.

3.4 WORKMANSHIP

- A. The installation shall be performed in a professional and workmanlike manner.
- B. On a daily basis, clean up and deposit in appropriate containers debris from work performed under the appropriate Specification sections. Stack and organize parts, tools and equipment when not being used.
- C. Preparation, handling, and installation shall be in accordance with the Manufacturer's written instructions and technical data appropriate to the product specified.
- D. Work shall conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.
- E. At the conclusion of the installation, work areas, including panel boxes, shall be vacuumed and cleaned to remove debris and grease.

3.5 EQUIPMENT ENCLOSURES, RACK, AND CONSOLE INSTALLATION

- A. Construction: Coordinate access openings and wire paths through the cabinets for all desk mounted devices
- B. Compliance: Comply with powering, conduit entry and grounding practices as described herein and as required by code.
- C. Coordination of Access: Coordinate the installation of access covers, hinged panels or pull-out drawers to ensure complete access to terminals and interior components. Access shall be designed such that demounting or de-energizing of equipment is not required to gain access to any equipment.
- D. Enclosures: Fasten removable covers containing any wired component with a continuous hinge along one side with associated wiring secured and dressed to provide an adequate service loop. Appropriate stop locks shall be provided to hold all hinged panels and drawers in a serviceable position.
- E. Service Loop: Provide a wiring service loop allowing relocation of termination to any point within the enclosure.

SECURITY SYSTEMS GENERAL REQUIREMENTS

3.6 CUTTING, PAINTING AND PATCHING

- A. Structural members shall not be drilled, bored or notched in such a manner that shall impair their structural value. Cutting of holes in structural members, if required, shall be done with core drills and only with the specific approval of the Owner for each instance. Provide means to identify rebar in slabs prior to drilling.
- B. Walls and other architectural features that require cutting or repair during the installation process shall be returned to their original condition, including the matching of colors, and finishes to the satisfaction of Owner, and at no additional cost to Owner.

3.7 GROUNDING PROCEDURES

- A. Provide grounding of systems and equipment in accordance with manufacturer's recommendations, local electrical codes, and industry standards.
- B. Signal Ground: Signal ground shall be derived from the one main electrical panel which serves all equipment herein.
- C. Grounding procedures for wire, equipment and devices shall be in strict accordance with manufacturers' recommendations and standard installation practices.
- D. Equipment enclosures of an assembly shall be grounded to the single grounding terminal strip of each assembly.
- E. Multiple Powered System Isolation: Where powered devices of the same system exist in two or more locations and a different signal ground exists in each location, the system's communication signal shall be isolated from signal ground at both source and destination ends via modem, fiber optics or other equivalent method.
- F. Contractor shall eliminate or correct potential ground-loop problems in a manner approved by the Engineer.
- G. Shielding: Shielded cables of this section shall be grounded exclusively to Signal Ground. No shields shall be permitted to carry live currents of any kind. Shields shall be tied to Signal Ground at the signal source end only, unless otherwise noted or required by the manufacturer.

3.8 CONDUIT AND WIRE INSTALLATION PRACTICES

- A. Conduit
 - 1. Conduit shall be 1-inch minimum unless noted otherwise on the drawings
 - 2. Wires shall be installed in conduit or in another Owner approved raceway for power and exposed wiring, in areas where mechanical or environmental conditions may damage conductors, and where otherwise specified herein or required by code.
 - 3. Conduit or raceway that is not hidden must have its location and appearance be specifically approved by Owner. If approved, exposed conduit or raceway shall be

SECURITY SYSTEMS GENERAL REQUIREMENTS

run in such a fashion as to make it as inconspicuous as possible. Runs should follow existing building lines and should be square wherever possible.

4. Verify conduit has been installed, de-burred and properly joined, routed, and terminated prior to pulling of cables.
5. Apply a chemically inert conduit lubricant to wire and cable prior to pulling. Do not subject wire and cable to tension greater than recommended by the manufacturer
6. Secure wire and cable runs vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Non-coaxial cables shall be secured by screw-flange nylon cable ties or similar devices. Symmetrical clamping devices with split, circular, or other wire conforming, non-metallic bushings shall be provided for other cables.

B. Wiring Without Conduit

1. Wiring may be run in concealed spaces without conduit, in electrical trays, and where otherwise shown on drawings, provided conductors are reasonably protected from mechanical and environmental damage.
2. Any security wiring that is visually exposed must be installed in conduit
3. Conductors run without conduit shall be approved, UL Listed, rated and labeled for Plenum use.
4. Secure wire and cable with approved supports in accordance with the referenced standards and the Authority Having Jurisdiction.
5. Provide cable supports at a minimum of 4-foot intervals.
6. Equipment and devices shall be installed on approved electrical back-boxes. Do not install equipment and devices directly on walls, ceilings, or structural components without back-boxes.
7. Secure cables to cabinets, junction boxes, pull boxes and outlet boxes with approved cable clamps.
8. Independently support cables. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts).
9. Support cable independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
10. Support cable using cable trays, D-brackets, support straps, support wires or other approved cable supports.
11. Fasten cable supports to building structure and surfaces.
12. In shared electrical trays, open ducts, and other cable runs without conduit, separate and strap Access Control cable so that it is clearly distinguishable from all other cables.
13. Clearly mark security system cables at minimum intervals of every 10-feet. Marking shall be with a permanent, printed label, color-coded tag, or other distinguishing marking. Felt tip pen marking on the cable is not acceptable.

C. New Wiring

1. After installation, and before termination, wiring shall be checked and tested to insure there are no grounds, opens, or shorts on any conductors or shields. In

SECURITY SYSTEMS GENERAL REQUIREMENTS

addition, wiring between buildings or underground and all coax cables shall have insulation tested with a megohmmeter and a reading of greater than 20 megohms shall be required to successfully complete the test.

2. Run wires continuously from termination to termination without splices. Splices at junction box locations may be allowed at the discretion of the Owner. Recommendations for splices at these points shall be established with Owner. Contractor shall obtain approval from the Owner before proceeding with splices.
3. If splices are required and approved by Owner, the wire shall be joined with solder, then taped or otherwise protected in an approved manner so as to provide mechanical and electrical integrity. Wire nuts and/or electrical tape connections shall not be acceptable. Final connections shall be made at terminal boards with full tagging, labeling and documentation.
4. Water-resistant protection shall be continuous throughout the cable in parking areas, surface conduit, poles, in-slab pull-boxes, in-slab conduit, and underground conduit and pull-boxes, and in any areas subject to moisture and/or water infiltration:
 - a. Splices/Junctions: Provide water-proof protection of splices and junctions, in surface conduit and boxes, in-slab conduit and pull-boxes, underground conduit, and underground pull-boxes, to prevent the entry of moisture or water into cables, splices, or connections.
 - b. Cable Entries: Provide water-blocking sealants at all conduit entries into pull-boxes, junction boxes, back-boxes, cabinets, etc., to prevent the entry of moisture or water into the conduit and cable system.
- D. Boxes: Provide a box loop for wire and cable routed through pull boxes or controller panels. Cable loops and bends shall not be at a radius less than that recommended by the manufacturer. Coordinate pull box size with the Division 26 Contractor as necessary to accommodate this requirement.
- E. Wire Lacing and Dressing: Dress, lace, tie or harness wire and cable vertically, horizontally and at right angles to the enclosure surfaces to prevent mechanical stress on electrical connections as required herein and in accordance with accepted professional practice. No wire or cable shall be supported by a connection point.
- F. Non-Coaxial Connections: Make non-coaxial connections and approved splices within terminal cabinets (except microphone or line level) to screw-type barrier blocks with insulated crimp- type spade lugs. Size all lugs properly to assure high electrical integrity. Connect only one (1) wire per spade lug and not more than two (2) lugs per screw terminal.
- G. Non-Coaxial splicing at device locations to equipment with wire leads shall be made with pre-approved wire Dolphin Connectors.
- H. Shielded Cables: Shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, terminal cabinets, or equipment enclosures. Tin terminated shield drain wires and insulate with heat shrinkable tubing.

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

- I. Coaxial Splices: Coaxial splices, if required and approved, shall be on plate mounted dual-barrel type insulated BNC connectors, secured in such a manner that no stress is placed upon the connector.
- J. Unacceptable Conditions: Correct any unacceptable wiring conditions immediately upon discovery, and upon receiving notice to correct.

3.9 BUILDING ATTACHMENTS

- A. Equipment shall be installed level, plumb, parallel, and perpendicular to building structures and to other building systems and components, except where otherwise indicated.
- B. Equipment shall be securely fastened. Select fasteners so that the load applied to any one fastener does not exceed 25 percent of the proof-test load.
- C. Attachment of hanger rods, support cables, diagonal wall bracing, and any other connections made to the building structure after the fireproofing contractor has completed his work, shall be made with minimal impact to the existing fireproofing. The Contractor making such connections is responsible for:
 - 1. Removal of fire stopping where attachment is required.
 - 2. Scorings and over-cut as required for connection only. Contractor shall be held responsible for costs associated with the patch back of excessively removed fire stopping material by the General Contractor.
- D. Due to the nature of the site, all surface mounted/exposed conduit (EMT and liquid-tight flex) and backboxes shall be fixed to the buildings with no hanging parts.

3.10 DATABASE PREPARATION, CHECKING AND ACTIVATION

- A. Contractor to request Owner provided forms with completed nomenclature for each identified device no less than 30 days prior to programming. It is essential that the above activities be clearly identified on the Project Schedule so database preparation is accomplished in sufficient time to permit orderly and on time system activation
- B. It shall be the responsibility of the Owner to insure the accuracy of the database information entered on forms by thoroughly checking completed data entry forms.
- C. It shall be the responsibility of Contractor to ensure that the database formatting is correct prior to entry into the system and system activation.
- D. Programming
 - 1. The Contractor shall be responsible for the initial database entry for devices and equipment installed in this project into the existing system prior to activation. Location of program database entry to be confirmed with the Owner. The database shall consist of hardware and function-related information, i.e., system configuration, alarm points, software parameters for system management, graphical maps, alarm

SECTION 28 05 00

SECURITY SYSTEMS GENERAL REQUIREMENTS

information – access levels and schedules. A printout of the final database shall be provided to the Owner for review and approval prior to system activation.

2. Programming rights shall be provided the Owner. Contractor shall coordinate with the Owner prior to the completion of installation to set a schedule for access to programming resources.
3. Follow all procedures and protocols for programming the system, in accordance with Owner instructions.

- E. System activation shall be the responsibility of Contractor. Once the system and database have been demonstrated to be functioning properly according to manufacturer's guidelines and the system design, further database entries and upgrades shall be the responsibility of Owner, unless otherwise noted.

3.11 SOFTWARE UPGRADES

- A. If more recent versions of the operating system or application software are made available to or requested by the Owner prior to system acceptance, these updated versions shall be installed and verified by Contractor.
- B. Before installing upgrade software, Contractor shall ensure that existing database information is properly "backed-up" prior to any installation action.

3.12 START-UP RESPONSIBILITY

- A. Contractor shall initiate System Operation. Competent start-up personnel shall be provided by Contractor on each consecutive working day until the System is functional and ready to start the acceptance test phase. If in Owner's judgment Contractor is not demonstrating progress in solving any technical problems, Contractor shall supply Manufacturer's factory technical representation and diagnostic equipment at no cost to Owner, until resolution of those defined problems. Where appropriate, Contractor will bring the System on-line in its basic state (i.e., alarm reporting, etc.).
- B. Properly ground each piece of electronic equipment prior to applying power.
- C. Properly ground all shielded wire shields to the appropriate earth ground at the hub end only, not at the remote or device end.
- D. Use a start-up sequence that incrementally brings each portion of the system on-line in a logical order that incorporates checking individual elements before proceeding to subsequent elements until the entire system is operational.

3.13 PRELIMINARY, INSPECTION, ACCEPTANCE TESTING, AND COMMISSIONING

- A. Provide Preliminary Testing, Inspection, Acceptance Testing, Burn-In and Commissioning Performance services for systems and equipment in accordance with Testing and Commissioning, Section 28 08 00.

SECURITY SYSTEMS GENERAL REQUIREMENTS

3.14 FINAL PROCEDURES

- A. Portable Equipment: Furnish portable equipment specified herein to the Owner, along with complete documentation for the materials furnished. Portable equipment shall be presented in the original manufacturer's packing, complete with manufacturer's instructions, manuals and documents. Testing of portable equipment shall have been previously conducted by the Contractor.
- B. Post Acceptance Work: Check, inspect and adjust systems, equipment, devices, and components specified, programming updates, at the Owner's convenience, approximately sixty (60) days after Acceptance of the Installation.

3.15 NOTICE OF COMPLETION

- A. When the performance and acceptance requirements described above, including the Final Acceptance Test, have been satisfactorily completed, the Owner shall issue a Letter of Completion to Contractor indicating the date of such completion. The Notice of Completion shall be recorded by Contractor upon receipt of the Owner completion letter. This date of record shall be the start of the warranty period.

END OF SECTION

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This specification section covers the furnishing and installation of nameplates, labels, wire markers, and other identification components for security systems.
- B. Contractor shall furnish and install identification devices as specified on cables, cabinets, racks, and equipment.

1.2 PRECEDENCE

- A. Obtain, read, and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

1.3 GENERAL CONDITIONS

- A. In accordance with Section 28 05 00, Security System General Requirements

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General Conditions and Standard Guidelines referenced in Division 01 Summary Section, apply to this Section.
- B. In accordance with Section 28 05 00, Security System General Requirements
- C. In accordance with Section 28 08 00, Security System Testing, and Commissioning
- D. In accordance with Section 09 90 00, Paints and Coatings

1.5 SHOP DRAWINGS & EQUIPMENT SUBMITTALS

- A. In accordance with Section 28 05 00, Security System General Requirements
- B. Product Data:
 - 1. Submit manufacturer's catalog literature for each product required.
 - 2. Submit identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

1.6 WARRANTY

- A. In accordance with Section 28 05 00, Security System General Requirements

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

1.7 REQUIREMENTS FOR IDENTIFICATION AND TAGGING

- A. Cables, wires, wiring forms, terminal blocks, and terminals shall be identified by labels, tags or other permanent markings. The markings shall clearly indicate the function, source, or destination of all cabling, wiring and terminals. The wire marking format contained in the shop drawings shall be utilized for conductors installed under this Specification. Cables and wires shall be identified, utilizing heat-shrink, machine-printed, polyolefin wire markers (Hand written tags or marker on wiring is not acceptable.)
- B. Should a situation arise where the wire tagging format as shown on the shop drawings cannot be used, a substitute format shall be submitted which complies with the intent to provide documentation that will permit end-to-end tracing of all System wiring.
- C. Terminal points shall be appropriately identified and labeled as shown on shop drawings.
- D. Nameplates – General:
 - 1. Provide laminated, engraved plastic nameplates with 3/8-inch-high letters for all panels, enclosures and cabinets. Attach nameplates to gear with sheet metal screws where applicable. Adhesive mounted nameplates are generally not acceptable.
 - 2. Include nameplate schedule on shop drawing submittals.
 - 3. Install nameplates behind panel door in public areas and on panel face in equipment rooms.
 - 4. Nameplate Color Schedule:
 - a. Fed from Normal Building Power: Black letter on White label
 - b. Fed from Emergency/ Generator Power: White letters on Red label
- E. Panels shall be provided with permanently attached engraved lamacoid labels, as described in Item D, with identifying names and functions. Labels shall be consistent in form, color, and typeface throughout the system and must contain the name of the system or subsystem as part of the label textual information. Hand written tags or marker type identification is not acceptable.
- F. Equipment/Equipment Racks: Provide an engraved lamacoid label, as described in Item E, on the front of equipment including its designation as assigned and referenced consistently throughout this project.
- G. Enclosures and Cabinets:
 - 1. Provide an engraved lamacoid label, as described in Item E, on the front of wall mounted control enclosures and equipment racks including its designation as assigned and referenced consistently throughout this project.
 - 2. Within each equipment enclosure and/or terminal cabinet, the contractor shall place a Single Line drawing of the system(s) and the respective Equipment/Terminal Cabinet Wiring Diagram in a clear plastic 8" x 11" sleeve permanently attached to the inside cover of the terminal cabinet. Drawings shall include cable and equipment label designations to match the labeling within the cabinet.

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

3. In each equipment enclosure, the contractor shall place an as-built drawing depicting device locations served by the equipment within the enclosure, with identification that is identical to the wiring tags and with the software description of each point.
- H. Wire and Cable: Identify wire and cable clearly with permanent labels wrapped around the full circumference within one-inch of each connection. Correlate the number designated on the associated Shop or Field Drawings. Assign wire or cable designations consistently throughout a given system. Each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Product Acceptability: The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified and compatible with the existing system. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Owner shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified. Contractor may not use contractor proprietary interface modules for connections between field devices and controller.
- B. Labeling:
 1. Provide intelligible permanent engraved identification function on or adjacent to panel assemblies, power supplies, and cabinets.
 2. Provide intelligible permanent label-maker labels for relays, controls, fuses and/or circuit breakers, patching jacks, connectors, receptacles, terminal blocks, indicators, switches, monitors, and servers.
 3. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
- C. Engraving, labels, decals or other identification on any device, equipment or miscellaneous component shall be coordinated with the associated Field and Shop and Equipment Wiring Drawings.
- D. No proprietary identification on assemblies will be permitted other than the original manufacturer's labels and identification.

2.2 MISCELLANEOUS PRODUCTS

- A. Wire and Cable Labels: Provide Brady Type B-321, dot matrix and thermal transfer printable sleeves, with permanent ink ribbon printing, or Thomas and Betts EZ-W/YHS, or equal. Sleeves shall be constructed of heat shrinkable, high density polyolefin film coated and shall have an ink-receptive top-coating. Labels shall be pre-printed to match the designations shown on the shop drawings, fitted to cables in the field, and heat

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

shrunk to secure their position. Labels should be placed such that they are easily accessed and readable after the device or panel is fully dressed.

- B. Equipment Labeling: Unless otherwise noted herein, provide Laminated three-layer plastic with engraved black letters on white background color. Minimum thickness shall be 1/8". Letter size shall be 3/8"-1/2" for equipment and controls.
- C. Cabinet/Enclosure Labeling: Unless otherwise noted herein, provide Laminated three-layer plastic with engraved black letters on white background color. Minimum thickness shall be 1/8". Letter size shall be 1/2" minimum.

PART 3 - EXECUTION

3.1 GENERAL

- A. In accordance with Section 28 05 00, Security System General Requirements.

3.2 LABEL AND NAMEPLATE INSTALLATION PRACTICES

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.
- C. Install identifying devices after completion of painting and finishes.
- D. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each control equipment enclosure with corrosive-resistant mechanical fasteners.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners.
 - 4. Secure nameplate to equipment front using screws.
- E. Wire Marker Installation:
 - 1. Install wire marker for each conductor at each connection.
 - 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
 - 3. Install labels at data outlets identifying patch panel and port.

3.3 PRELIMINARY INSPECTION AND TESTING

- A. Provide preliminary inspection and testing services for systems and equipment in accordance with Testing and Commissioning, Section 28 08 00.

SECTION 28 05 53

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY

3.4 FINAL PROCEDURES

- A. Perform final procedures in accordance with section 28 05 00, Security System General Requirements.

END OF SECTION

SECTION 28 08 00

SECURITY TESTING AND COMMISSIONING

PART 1 - GENERAL

1.1 WORK INCLUDES

- A. General Description: This specification section covers the provision of preliminary testing, acceptance testing, burn-in performance testing, and the commissioning of various security systems at LAC facilities.
- B. Provide Testing to assure that electrical equipment and wiring is operational, within industry and manufacturers tolerances and is installed in accordance with other sections of these specifications.
- C. Conduct tests in the presence of the Owner and the Owner's agents for the purpose of demonstrating the equipment or systems' compliance with specifications. Demonstrate electrical and mechanical tests to the Owner and the Owner's agents that the entire installation is functioning properly and that circuits, including power, control, instrumentation, relaying, integration, and communication, will function properly and as specified.
- D. Furnish, install and maintain tools, instruments, material, test equipment, test connections and power. Furnish personnel including supervision and "stand-by" labor required for the testing, setting, and adjusting of electrical facilities and component parts including putting the above into operation.
- E. Make tests with proper regard for the protection of equipment and personnel.
- F. Protect equipment from subsequent testing of other equipment and systems after equipment has been tested, checked for operation, and accepted by the Owner.
- G. Record test values of equipment, giving both "as-found" and "as-left" for existing conditions.
- H. The witnessing of any test by the Owner does not relieve the Contractor of warranties for material, equipment, and workmanship, as specified in the General Conditions.
- I. Check circuits for conformance with the wiring diagrams furnished by manufacturers.

1.2 RELATED SECTIONS AND REFERENCES

- A. Drawings and general provisions of the Contract, including General Conditions and Standard Guidelines referenced in Division 01 Summary Section, apply to this Section.
- B. In accordance with Section 28 05 00, Security System General Requirements
- C. In accordance with Section 28 05 53, Identification for Electronic Safety and Security

SECTION 28 08 00

SECURITY TESTING AND COMMISSIONING

- D. In accordance with Section 28 23 00, Video Surveillance System
- E. Inspections and tests shall be performed in accordance with applicable codes and standards including the most current versions of NEC, ANSI, IEEE, NFPA, NEMA and OSHA.
- F. International Electrical Testing Association, Acceptance Testing Specifications (NETA ATS), latest edition.

1.3 SUBMITTALS

- A. In addition to the requirements of Section 28 05 00, four (4) bound copies of the certified test reports shall be submitted to the Owner within seven (7) days after the completion of the work. The final report shall be signed and include the following information:
 - 1. Summary of the project.
 - 2. Description of the equipment tested.
 - 3. Visual inspection report
 - 4. Description of the tests
 - 5. Pre-Acceptance and Final Acceptance Test results
 - 6. Conclusions and recommendations
 - 7. Appendix including appropriate test forms
 - 8. Identification of the test equipment used

1.4 WARRANTY

- A. Provide the work in accordance with Section 28 05 00, Security Systems General Requirements.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. Furnish labor, instruments, products, temporary power, and sufficient materials required for testing at each test.
- B. Correct deficiencies found as a result of tests and make replacements or repairs to tested products that are damaged as the result of the tests. This included Burn In Performance report reviews

SECTION 28 08 00

SECURITY TESTING AND COMMISSIONING

- C. Schedule tests at a time convenient to witnesses thereto or persons affected by the tests.
- D. Provide fourteen (14) day written notification to the Owner for test procedures prior to the test.
- E. Make records of all tests in a neat and legible form. Identify the equipment or system tested and the test data.
- F. Check control, instrumentation, and power cables and conductors for proper connections, workmanship, and identification.
- G. Test disconnect switches through an open and closed cycle for proper operation, alignment, and contact.
- H. Additional tests required shall be as outlined under the various Sections of Division 26 and 28.
- I. Submit to the Owner certified reports on all tests indicating full compliance with test requirements.

3.2 COORDINATION

- A. Provide the work in accordance with Section 28 05 00, Security System General Requirements.

3.3 WORKMANSHIP

- A. Provide the work in accordance with Section 28 05 00, Security System General Requirements.

3.4 PRELIMINARY INSPECTION & TESTING

- A. Coordination: Coordinate testing of components of the system in cooperation with other trades.
- B. Verification: Prior to performing Preliminary Testing, inspection, and/or final testing procedures, Contractor shall insure the following:
 - 1. Safe and proper operation of all components, devices or equipment, and the absence of extraneous or interfering signals
 - 2. Proper grounding of devices and equipment
 - 3. Integrity of signal and electrical system ground connections
 - 4. Proper powering of devices and equipment
 - 5. Integrity of all insulation, shield terminations and connections
 - 6. Integrity of soldered connections and absence of solder splatter, solder bridges, debris of any kind
 - 7. Proper dressing of wire and cable with labels matching as-build documents

SECTION 28 08 00

SECURITY TESTING AND COMMISSIONING

8. "Wire-checking" of all circuitry, including phase and continuity
 9. Preliminary targeting and setup of video camera assemblies
 10. Mechanical integrity of all support and positioning provisions, i.e.: as provided for video cameras, monitors, and any other equipment
 11. Sequencing: If applicable, determine and record the sequence of energizing systems to minimize the risk of damage from improper startup
 12. Proper operation of devices and systems in accordance with specified performance requirements
 13. System is programmed for alarm reporting of each device and associated with the graphical maps
 14. Verify system programming is defined.
 15. Verify with Owner the provided designations for all devices.
- C. Perform a Preliminary Inspection and Test to determine the operating status of components and systems prior to Final Acceptance Testing.
1. Testing Security Equipment, Enclosures, and Cabinets
 - a. Test each power supply battery or UPS for power loss alarm reporting
 - b. Test 120VAC power loss alarm
 - c. Test for communication loss with server reporting
 2. Test power stand-by provisions (UPS, battery backup, generator backup)
 3. Testing Video Surveillance System
 - a. Live viewing
 - 1) Verify each camera live viewing at the monitoring workstation is in focus
 - 2) Verify each camera live viewing at Central Command Post is in focus
 - 3) During an alarm event verify camera and pre-programmed views associated with alarm event are displayed at the viewing location(s)
 - 4) Verify camera identification match Owner defined description.
 - b. Recorded Images
 - 1) Verify each camera viewing of recorded images at the monitoring workstation
 - 2) Verify each camera viewing of recorded images at Central Command Post
 - 3) Verify alarm event is recorded as specified in 28 23 00
- D. Adjustments and Documentation: After successfully energizing and testing the systems, make adjustments, and document the setting of controls, configurations, as applicable. Tabulate all data along with an inventory of test equipment, a description of testing conditions and a list of test personnel.
- E. Test Documentation: Create and provide complete test reports documenting the results of the each performed on each device, control panel, power supply, and other elements of the system. Copies of preliminary test data shall accompany copies of performance testing data as part of the Operating and Maintenance submittal.

SECURITY TESTING AND COMMISSIONING

3.5 PREPARATION FOR ACCEPTANCE (PRIOR TO FINAL INSPECTION)

- A. Temporary facilities and utilities shall be properly disconnected, removed, and disposed of off-site.
- B. Systems, equipment, and devices shall be in full and proper adjustment and operation, and properly labeled and identified.
- C. Materials shall be neat, clean, and unmarred, and parts securely attached.
- D. Broken work, including glass, raised flooring, and supports, ceiling tiles and supports, walls, doors, etc., shall be replaced or properly repaired, and debris cleaned up and appropriately discarded.
- E. Extra materials as specified shall be delivered and stored at the premises as directed by the Owner at the completion of the phase.
- F. Preliminary Test reports of each system and each system component, and Record project documents shall be complete and available for inspection and delivery upon completion of each phase as directed by Owner.

3.6 ACCEPTANCE TESTING AND ADJUSTING PROCEDURES

- A. Purpose: Conduct testing and adjusting procedures to realize and verify the performance criteria specified herein and identified in Preliminary Testing procedures listed above. Successfully demonstrate the acceptable performance of each specified system in the presence of the Owner and Engineer.
- B. Scope: Conduct all performance testing, adjustment, and documentation procedures to verify and realize compliance with the performance specifications herein. Make available at least one (1) engineer familiar with this work, and all required test equipment for the duration of performance testing verification, at the convenience of the Owner.
- C. Acceptance Testing Readiness: Acceptance testing will be performed after the system is installed and pre-tested completely.
 - 1. The contractor shall have successfully tested the system prior to scheduling formal acceptance testing and provided forms with each test for each portal. Contractor shall correct any and all deficiencies found at that time.
 - 2. Acceptance testing will be conducted in accordance with the approved Acceptance Testing Plan with a minimum of testing listed in Preliminary Testing section.
 - 3. Deliver equipment, devices and materials required for the work to the site at least fourteen (14) working days prior to the scheduled Completion Date.
 - 4. Install, test and ready all of the work for final Acceptance Testing of the Installation ten (10) working days prior to the Completion Date.
- D. Acceptance Testing Schedule: Contractor shall confirm in writing to the Owner when the system is ready for acceptance testing. Contractor shall then schedule a complete Acceptance Test at the convenience of the Owner.

SECURITY TESTING AND COMMISSIONING

E. Acceptance Testing

1. Contractor shall test and verify the performance of all equipment, systems, interfaces and peripheral equipment in the presence of the Owner and Engineer.
2. Tests shall be performed in accordance with the requirements of individual systems as specified herein and in related specification sections. Test shall incorporate testing described in preliminary inspection and testing.
3. Contractor shall furnish communication equipment between the field testing team and the monitoring team.
4. Contractor shall furnish testing forms for each location.

F. An Observation Report will be generated by the reviewing team, Owner, Design Engineer and Contractor for contractor to review.

G. Correction of Jobsite Observation Report Items: Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner within ten (10) working days of the completion date. Corrective work shall be performed at no additional cost to the Owner. Contractor shall provide a written report each week of repairs made and plan to complete repairs in progress.

H. Test Documentation: Document all acceptance testing, calibration and correction procedures described herein with the following information:

1. Performance date of the procedure
2. The names of personnel conducting the procedure
3. The equipment used to conduct the procedure
4. Type of procedure and description
5. Condition during performance of procedure
6. Parameters measured and their values, including values measured prior to calibration or correction as applicable

3.7 BURN-IN PERFORMANCE PERIOD

- A. Prior to Final Acceptance by the Owner, the Contractor shall be responsible for performing testing and inspections, as specified herein, to verify that the installation equipment and materials are performing in compliance with the specifications.
- B. Upon satisfactory completion of Acceptance Testing and inspection, the Owner shall notify the Contractor, and the Burn-In Performance Period shall commence.
- C. Contractor shall obtain weekly reports of alarm events related to this project and make system repairs or corrections to minimize false alarms. A report shall be provided by the Contractor to the Owner indicating corrections required and locations corrected. Engineer may provide additional comments to the report for contractor to review and provide corrective action.

SECURITY TESTING AND COMMISSIONING

- D. A Performance Period of thirty (30) consecutive calendar days of operating without fault in accordance with the specifications, subsequent to testing and inspection, shall constitute a successful Performance Period.
- E. Upon successful completion of the Performance Period, the Owner and design team shall meet to confirm Acceptance, and the Final Acceptance Form shall be executed.
- F. If a successful Performance Period cannot be accomplished within ninety (90) consecutive calendar days after commencement of the first Performance Period, the Owner reserves the right to find the Contractor in default, and terminate the Contract. In that event, the Contractor shall remove the equipment, and the Owner shall not be responsible for any payment whatsoever to the Contractor, except for any materials (i.e., wiring) left in place and elected to be reused by the Owner.
- G. Obtain system alarm and event reports at a minimum of four (4) times during the burn in period. Review reports with Owner and repair system equipment and/or adjust system parameters as requested by the Owner or required for system performance.

3.8 COMMISSIONING AND VALIDATION

- A. Commissioning is a "fine tuning" process used for complex systems that occurs after acceptance testing, during the Burn-In Performance period and before final acceptance.
- B. This process includes participation by the Owner, Contractor, the Consulting Engineer, A third party testing agent may also be hired by the Owner to plan, conduct, and verify the Commissioning process.
- C. The Contractor shall include a minimum of sixteen (16) hours of participation in the commissioning and validation process by a minimum of two (2) employees familiar with the specific project and installation. Contractor shall adjust device installation where alarms are determined to be false.
- D. Scheduling of Commissioning and Validation testing will be by the Owner, and may occur after the Notice of Completion, but before the end of the Warranty period.
- E. Revisions to the configuration and programming of the system which are recommended by the Commissioning Team as a result of validation testing, shall be performed by the Contractor under the direction of the Owner, at no additional charge. The Warranty provisions of this specification shall apply to any configuration and programming revisions resulting from the validation testing process.
- F. Revisions and improvements recommended by the Commissioning Team which require physical modifications or additions to the approved and accepted system, including the provision or relocation of new equipment, wiring, and installation, shall be treated as additional changes to the contract, and shall be processed as defined in the Project General Provisions. Where such requested work was part of the Contractors' original scope of work, as defined in the design drawings and specifications, or in contract revisions and agreements, the Contractor shall provide the work at no additional charge.

SECTION 28 08 00

SECURITY TESTING AND COMMISSIONING

3.9 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 28 05 00, Security System General Requirements.

END OF SECTION

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General Description: This specification section covers the furnishing and installation of a complete expansion to a low-voltage, enterprise-wide video surveillance system (VSS).
- B. Contractor shall furnish licenses and install VSS hardware devices, mounting brackets, power supplies, servers, workstations, recorders, controls, consoles and other components of the system as shown and specified.
- C. Furnish and install special boxes, cable, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with the Division 26, Electrical Work.
- D. Outlets, junction boxes, pull boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation, will be provided in accordance with the projects' Division 26, Electrical Work specifications, and coordinated with VSS requirements.
- E. General Conditions: Provide the work in accordance with Section 28 05 00, Security System General Requirements.

1.2 QUALIFICATIONS

- A. Provide the work in accordance with Section 28 05 00, Security System General Requirements.

1.3 GENERAL CONDITIONS

- A. In accordance with Section 28 05 00, Security System General Requirements

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General Conditions and Standard Guidelines referenced in Division 01 Summary Section, apply to this Section.
- B. In accordance with Section 28 05 00, Security System General Requirements
- C. In accordance with Section 28 05 53, Identification for Electronic Safety and Security
- D. In accordance with Section 28 07 00, Security System Integration
- E. In accordance with Section 28 08 00, Security System Testing and Commissioning

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

F. In accordance with Section 28 23 00, Video Surveillance System

1.5 APPLICABLE PUBLICATIONS

A. In accordance with Section 28 05 00, Security System General Requirements

1.6 PRECEDENCE

A. Obtain, read and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

1.7 SHOP DRAWINGS & EQUIPMENT SUBMITTAL

A. In accordance with Section 28 05 00, Security System General Requirements

1.8 OPERATING AND MAINTENANCE MANUALS

A. In accordance with Section 28 05 00, Security System General Requirements

1.9 WARRANTY

A. In accordance with Section 28 05 00, Security System General Requirements

1.10 SERVICE AND MAINTENANCE

A. In accordance with Section 28 05 00, Security System General Requirements

1.11 TRAINING

A. In accordance with Section 28 05 00, Security System General Requirements

1.12 OWNER'S RIGHT TO USE EQUIPMENT

A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

1.13 TECHNICAL REQUIREMENTS, VIDEO SURVEILLANCE SYSTEM

A. General

1. The following information is provided to establish required system performance for the complete operating Video Surveillance System (VSS) system. Some of the performance requirements noted herein are supported and supplied by existing

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

systems in concert with new equipment and software which shall be provided by the Contractor under this scope of work. Contractor shall provide equipment, wiring and software programming at all sites as necessary to provide a complete system as described herein and as shown on the drawings.

2. Contractor shall be responsible for providing equipment, licenses and software to achieve the specified system performance described herein.
3. Contractor shall ensure system additions and modifications provided under this scope of work have no negative effect on the existing systems and operations, and no permanent effect beyond that specified or implied by the scope of work unless otherwise noted herein.

B. Purpose

1. The System shall provide the ability to record images received from cameras located throughout LAC probation camp facilities in a digital format.
2. The System shall allow operators to view live and recorded video images in single and multiple-camera formats based on parameters requested by the user.

C. Environment

1. The system shall be wholly contained within the facilities shown on the plans.
2. Video Processing and Recording Components: Network Video Recorders (NVR) shall be centralized as shown on the plans.
3. Building Administrative Post: Where applicable, Video Client workstations shall be located as shown on the drawings. Site surveillance, site camera configuration, and review of recorded images shall occur at this location.
4. Infrastructure and Connectivity
 - a. The video camera and processing components at each site shall utilize a combination of standard copper cable, fiber optic cable, IP or wireless transmission schemes, depending on individual site conditions.
 - b. Local Sites: The wired network cameras, video encoders, network video appliances, and Client Workstations shall reside on the building's local area network (LAN) or network segment. Recording, live viewing, switching, long-term storage, reviewing, and configuration shall be implemented over this infrastructure. Coordinate LAN/WAN requirements for this project with the Owner and IT Contractor.
 - c. The system design shall provide the capability to move to a cloud recording solution in the future.

D. Attributes

1. General
 - a. The Digital Video Management System (DVMS) is existing.
 - b. The system shall comprise network video appliances, video clients, digital storage devices, router/switches, and ancillary equipment assembled into a fully operating system.
 - c. Field Components: Field Components shall comprise video cameras, positioning devices, lenses, camera mounts and housings, and other video system devices and wiring as described herein and shown on the drawings.

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

- d. Video Processing Components: Video processing components shall comprise computer video servers, encoders / decoders, digital storage devices, computer video monitoring stations, and other video processing devices as described herein and as needed to provide the required functionality.
 - e. Quality: The initial quality/compression parameters shall be set as determined by the Engineer and the Owner at the time of commissioning. Minimum video quality shall be equivalent to 4k, or the selected camera's highest supported resolution, unless otherwise approved by the Owner.
2. Integrated Digital Video Management System
- a. The Contractor shall incorporate the following application software features and functionality into the new work, and configure the system and devices to make use of these and any other features offered by the application software, as required by the Owner.
 - b. The VSS shall support an integrated Digital Video Management recording solution utilizing a Network Video Recorder (NVR) appliance that provides the following features and capabilities:
 - 1) The VSS shall support Digital Network Video Recorders manufactured by the VSS manufacturer and from third party manufacturers.
 - 2) The VSS/EACS shall support analog and IP video sources
 - 3) The Digital Video Management Software (DVMS) shall incorporate a modular architecture and be able to support an unlimited number of cameras
 - 4) The DVMS shall be able to simultaneously record and display live video and display recorded video
 - 5) The DVMS shall support both event based and continuous recording
 - 6) The DVMS shall mark all events and they shall be available for playback and or archiving at any time
 - 7) User defined profiles for tailored granular access to configuration and operation
 - 8) Independent camera setup for, compression rate, brightness, contrast and other factor setups.
 - c. DVMS Network Interface
 - 1) The network interface shall allow remote access of the DVMS from anywhere with established connectivity on the LAN/WAN.
 - 2) The DVMS shall have the ability to playback stored video over the LAN / WAN for remote access of video images.
3. Real Video Time Monitoring: The DVMS / IPDVMS shall allow monitoring of real time video from any Alarm Monitoring client workstation. DVMS and Camera status shall be displayed on a System Hardware Tree.
4. Matrix View: The DVMS / IPDVMS shall support an advanced Matrix View of On-line camera views. Up to 32 channels shall be able to be simultaneously displayed in the video matrix. The 32 channels shall be any combination of Live or Recorded video.
5. Pan / Tilt / Zoom Control from Alarm Monitoring: Video cameras so equipped, shall be capable of pan/tilt/zoom positioning and remote control functions. Video camera positioning and imaging signals shall be transmitted by LAN networks as described

VIDEO SURVEILLANCE SYSTEM

herein, to permit remote viewing and camera control “on demand” on any LAN-connected device, from any location, with appropriate software and authorization.

6. Still Image Capture / Save: During playback or monitoring of video, the System shall have the ability to create and save a still picture.
7. Export Video Clip to File: The VSS shall have to ability to save and export recorded video to a file for the purpose of sharing and reviewing video clips. The start and end times for each video segment shall be user defined.
8. Video Loss Detection: The VSS shall detect video loss from cameras and activate an alarm.
9. Automated Motion Video Searching

E. Functional Requirements

1. Video Recording Protocols: Initially, configure the system as directed by the Owner, based on the following recording protocol definitions:
 - a. Recording Modes:
 - 1) Time Lapse Mode: 8 frames per second (fps) per camera. Cameras shall be continuously recorded at this rate. (15 fps on motion)
 - a) Applies to all exterior cameras and Max Security Dorm interior cameras.
 - 2) Real Time Mode: 30 fps per camera
 - 3) Event/Alarm Mode: 15 fps per camera (or camera’s highest FPS if below 15fps)
 - a) Applies to interior cameras except Max Security Dorm.
 - b. Compression Codec: H.264 or better
 - c. Compression Quality: Compression rates shall always be set at their highest quality. Automatic throttling can be used where network bandwidth is restricted, when approved by the Owner.
 - d. Resolution: Cameras should be configured to deliver streams in their highest native resolution.
 - e. Motion-Based Recording Modes: Motion detection recording modes may be implemented where directed by the Owner, but assumptions on motion cannot be used to calculate storage capacity.
2. Recording and Retrieval
 - a. Provide a minimum hard-disk storage capacity of 365 days of recording, for cameras installed as a part of this project. Storage media shall be located in the security equipment room, communications room, security monitoring center, or where shown on the plans. Storage capacity shall be calculated based on the following parameters:
 - 1) Time Lapse Mode (8 frame per second (fps) per camera, high-quality compression): 24-hours per day, 7-days per week, at highest native resolution, plus;
 - 2) Real-Time Mode (30fps per camera at high-quality compression): 10% of the total number of cameras, 2-hours per day, 7-days per week, at highest native resolution.
 - 3) Assume 100% motion and complexity within the viewing area at all times for storage calculations.

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

- 4) Recording shall be simultaneously performed at two separate locations for each camera with the use of multicast data transmission. Provide all network programming necessary.
- b. Storage Locations
 - 1) North School Building MDF
 - a) This will house the primary storage recorders. All cameras shall record at this location.
 - b) Provide 365 days of storage within this MDF.
 - 2) South School Building MDF
 - a) This will house the secondary storage recorders. All cameras shall record at this location.
 - b) Provide 120 days of recording within this MDF.
 - 3) In the event that one of the CCTV server locations goes offline, the servers at the opposite location will continue to record all camera channels. 100% failover shall be achieved via multicast recording and the requirements listed herein.
 - 4) In the event that both of the CCTV server locations go offline, the internal SD storage card shall be used for archival recording until the server connections are restored, at which point the archived video shall be automatically transferred to the primary archiver.
3. Forensic Recording: Provide a means of recording video clips for transport such as DAT, DVD or DVD-ROM, for forensic and evidentiary purposes.
4. Software routines required to accomplish the required functionality will be fully developed, installed, tested and supported by the Contractor and Manufacturer. Provide proof of manufacturer certification for any new software provided.
5. Alarm Mode
 - a. One or more cameras may be associated with a controlled door or gate, or alarm monitored portal or area.
 - b. Associated cameras shall be programmed to be automatically pre-positioned and "called" into alarm mode by VSS event commands, to be displayed in full-screen view on a video workstation and recorded in "alarm/event mode".
 - c. The system shall allow an individual alarm input to initiate pre-positioning, viewing and recording sequences of two or more alarm point-associated cameras, simultaneously. When two or more cameras are simultaneously designated for event recording, they shall each be recorded in "alarm/event" mode.
6. Video Storage/Retrieval
 - a. Stored video will be time/date stamped and synchronized with the VSS clocks.
 - b. The system shall retrieve any stored video based on time/date parameters entered by the operator.
 - c. The system shall be capable of performing activity detection on stored video. Any recorded video channel may be selected and a zone may be selected within the view of the camera scene. The stored video can then be searched and will only display clips of video that identify motion in the selected zone.

VIDEO SURVEILLANCE SYSTEM

- d. Video export and sharing shall be restricted to specific users as indicated by the Owner. Coordinate appropriate users with this functionality.
- 7. Surveillance/Display Modes
 - a. Cameras may be used for assessment, to view areas of concern and provide video escort functions.
 - b. The system shall process video signals for primary display on video workstation display monitors. Video signals may be displayed in single or multi-view formats.
 - c. Selection of display formats shall be under the control of the operators, via their local video monitoring software, video control keyboards, or by computer-controlled graphical user interfaces.
 - d. Display Modes: The system shall enable one or more cameras from any combination of areas or sites to be displayed on one or more video workstations or display devices, simultaneously.
 - 1) Single Camera Display: Any individual camera may be called-up and displayed on a video workstation, and by any other properly configured computer or LAN device, with VSS monitoring software.
 - 2) Multiple Display: Up to 16 cameras may be called-up and displayed simultaneously on each video monitor with VSS monitoring software. Cameras may be called-up for multiple display without regard to their location in the system, or on the network, such that each of the 16 cameras may be from 16 different sites or areas, displayed simultaneously on a video workstation.
 - e. The system shall support independently configured display modes at each video workstation or LAN device, simultaneously. Display mode configured at one video monitoring device shall not affect the others.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Product Acceptability: The Products section contains lists of acceptable products. If product substitutions are proposed, they must be made based upon a comparison of equivalence to the product specified. Considerations may include but shall not be limited to functional, physical, aesthetic and/or interface aspects. The Owner shall be the sole judge of whether or not a submitted substitution is deemed to be "equivalent" to that specified.

2.2 VIDEO SURVEILLANCE (VSS) EQUIPMENT

- A. General
 - 1. Network Video Recorder: Provide the number of NVR recorders necessary to manage and record video cameras at the project site, as shown on the drawings and as noted herein or directed by the Owner.
 - 2. Software

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

- a. Provide FLIR United VMS, IPDVMS software NVR component, to support the required monitoring, surveillance and recording capabilities and functionality, as specified. Ensure compatibility between the NVR application and the existing DVMS application.
 - b. Camera/Video Licenses: Provide additional number of camera licenses equal to the number of cameras shown on the drawings and added throughout the course of the project.
 - c. Client Workstations: Provide FLIR viewing software to support monitoring, surveillance, and review capabilities and functionality at the client workstations.
 - d. Provide Failover Directory licensing.
 - e. Provide Failover Channel licensing.
 - f. Software support agreement (5) years.
 - g. User Connection License
 3. Provide VSS Client Workstations where shown on the drawings and described herein.
- B. Network Video Recorder (NVR) Hardware Platform
1. The recording platform shall be FLIR Latitude.
 2. FLIR Network Recorder License: Provide One per camera
 3. DDN Storage Fusion Architecture Appliance Parts:
 - a. Storage Base Unit
 - 1) SFA7990-FC16
 - b. SFA OS Licenses for each set of 20 drives in SFA7990
 - 1) LIC-SFA7990-OS20
 - c. Hard Drive 14TB
 - 1) H09C1400234NH27
 - d. Fiber Channel Card
 - 1) I-239-2NFC8
 - e. Expansion Storage Unit
 - 1) SS9012-SBOD
 - f. 12Gb/s HDmSAS to HDmSAS Copper Cable, 3m
 - 1) CBL-HMSHMS12C-3
 - g. Support Services – (Premium) 5 years
 - 1) SUP-PROS-5
 - h. Installation and Configuration of SFA block storage systems
 - 1) INS-SFA-2
 - i. Custom professional services delivered per agreed upon Scope of Work
 - 1) PS-CUSTOM
- C. Directory Server
1. (2) per site (1 per MDF)
 2. FLIR USS-ENT-00N0-00

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

- D. Archiver Server
 - 1. (2) per site (1 per MDF)
 - 2. FLIR USS-ENT-24R5-16
- E. Uninterruptable Power Supply (UPS)
 - 1. MDF(s)
 - a. APC SRT6KRMXLT-5KTF UPS
 - b. APC SRT192RMBP Battery
 - 1) Provide sufficient quantity of batteries to provide 4 hours of runtime.
 - c. APC AP9630 Network Card
 - 2. IDF(s)
 - a. APC SRT3000RMXLA UPS
 - b. APC AP9630 Network Card
- F. Power Distribution Unit (PDU) for MDF(s)
 - 1. APC AP8841
 - a. (1) per MDF
- G. KVM Monitor and Cables for MDF(s)
 - 1. Chatsworth 37203-161
 - a. (1) per MDF
- H. Workstations
 - 1. FLIR USS-WKS-QM2-HPS Workstation
 - 2. Dell UltraSharp 4K Monitor - U2723QE 27" Monitor
 - a. Provide (2) monitors per workstation shown on plans.
- I. Video Cameras
 - 1. IP-Ready Cameras
 - a. All new cameras shall be IP-ready cameras, unless the conditions of installation or other special requirements dictate that an analog type camera must be used. Any such condition must be submitted for approval, and approved by the Owner, prior to installation.
 - 2. Mini-Dome Network Fixed Position Camera:
 - a. FLIR CM-3308-11-I
 - 3. Mini-Dome Network 180/360 degree Fixed Position Camera:
 - a. FLIR MC-6308-P1-I
 - 4. Mini-Dome Network PTZ Camera:
 - a. FLIR CP-6302-31-P & CP-POE-60W-US
 - 5. High Definition Corner IP Camera:
 - a. FLIR CC-3103
 - 6. Camera Integral Storage
 - a. (1) MicroSDXC 64GB per camera

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

b. Sandisk Ultra SDSQUNC-064G-AN6IA

J. Camera Mounting Hardware

1. Provision for mounting hardware: Contractor shall include provision and installation of miscellaneous hardware and mounting extensions at each camera location to provide acceptable viewing performance.
2. Ancillary Hardware shall be provided by the Contractor, if required, and shall be compatible with and comparable in strength to other attached hardware.
3. Provide wall mount, pendent mount, parapet mount, or ceiling mount as required by each location.
4. Typical FLIR parts:
 - a. Pendant cap
 - 1) CM-CAPX-31
 - b. Short wall mount arm
 - 1) CM-ARMX-G3
 - c. Pole mount adapter
 - 1) CX-POLE-G3
 - d. Corner mount adapter
 - 1) CX-CRNR-G3
 - e. Surface Mount Back Box
 - 1) CM-BKBX-31
 - f. 4S Box Adapter
 - 1) CM-4S-31

K. Camera Power Supply (CPS)

1. POE Cameras: Cameras with direct IP compatibility shall be compatible with Power over Ethernet (POE+) standards, and will utilize POE/POE+ power from Contractor supplied Cisco network switches.

L. Wiring

1. General: Cables that are not installed in conduit shall be rated for plenum use.
2. Video:
 - a. IP Cameras, Interior or Protected Wiring: For cameras 100 meters or less from the applicable network switch, provide Category 6 (CAT6) cable. See division 27 for category cable requirements.
3. Exposed Camera Wiring: Wiring between camera enclosures and their respective 'J' Box shall be in "Sealtite" flexible conduit. Sealtite shall be firmly affixed to 'J' Box cover plate and camera enclosure. Refer to camera details.
4. Other cable and cable/interface combinations must be pre-approved by both the manufacturer and the Owner, prior to installation.

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

2.3 AUDIO CONNECTION

- A. Separate microphones shall be connected to an audio interface adapter with output to the camera audio input.
- B. Audio Interface Adapter
 - 1. Louroe Model IF-2, IF-4 or IF-8
 - a. Size according to inputs shown on plans.
- C. Microphone
 - 1. Louroe Model Verifact D-V.
- D. Wiring
 - 1. General: Cables that are not installed in conduit shall be rated for plenum use.
 - 2. Audio:
 - a. Microphone Wiring: Provide West Penn 452, 22/2 AWG shielded miniature audio cable.

PART 3 - EXECUTION

3.1 GENERAL

- A. In accordance with Section 28 05 00, Security System General Requirements.

3.2 SYSTEM CONFIGURATION

- A. Camera recording and display configurations shall be arranged via a combination of the Video Server, Network Video Recorders, Video Monitoring Workstations, and LAN/Wireless LAN network.
- B. Contractor shall coordinate with the Owner to determine the required pre-programmed surveillance and event-initiated configurations.
- C. Audio connection: Microphones shown on plans shall be connected to the audio interface adapter input. Output from the audio interface adapter shall be connected to the audio line in interface on the camera nearest the microphone. Provide RCA to terminal block adapters as necessary.

3.3 SECURITY SYSTEM INTEGRATION

- A. Provide Access Control system integration equipment, software and programming, in accordance with Section 28 05 00, Security System General Requirements.

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

3.4 EQUIPMENT, RACK, AND CONSOLE INSTALLATION

- A. In accordance with Section 28 05 00, Security System General Requirements.

3.5 GROUNDING PROCEDURES

- A. Provide grounding of all systems and equipment in accordance with Section 28 05 00, Security System General Requirements.

3.6 WIRE AND CABLE INSTALLATION PRACTICES

- A. Provide wire and cable installation in accordance with Section 28 05 00, Security System General Requirements.

3.7 DATABASE PREPARATION, CHECKING, AND ACTIVATION

- A. Provide database preparation, checking and activation for systems and equipment in accordance with Security System General Requirements, Section 28 05 00.

3.8 START-UP RESPONSIBILITY

- A. Provide start-up services for all systems and equipment in accordance with Security System General Requirements, Section 28 05 00.

3.9 PRELIMINARY INSPECTION AND TESTING

- A. Provide preliminary inspection and testing services for systems and equipment in accordance with Testing and Commissioning, Section 28 08 00.

3.10 SYSTEM PERFORMANCE TESTING AND ADJUSTING PROCEDURES

- A. Provide performance testing, burn-in, and adjusting of systems and equipment in accordance with Testing and Commissioning, Section 28 08 00.
- B. VSS Performance Testing
 1. Demonstrate acceptable picture quality and camera views on each camera.
 2. Demonstrate acceptable picture quality on each video monitoring workstation, and display devices accessible over the Wireless LAN.
 3. Demonstrate no negative effects on of video image is observed while Pan-Tilt-Zoom cameras are being repositioned.
 4. Demonstrate switching, recording and playback functions for the video server, and digital video recorders.
 5. Demonstrate camera positioning functionality, on pan/tilt/zoom cameras, throughout the entire range of possible camera positions.

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

6. Ensure primary views are acceptable. Demonstrate the view obtained by each pre-programmed camera position.
7. Demonstrate automatic event-initiated recording sequences, including camera pre-positioning, where applicable.

3.11 BURN-IN PERFORMANCE PERIOD

- A. Provide a burn-in performance period to demonstrate the stability of the system, in accordance with Testing and Commissioning, Section 28 08 00.

3.12 COMMISSIONING AND VALIDATION

- A. Provide commissioning and validation services to prove and improve the effectiveness of the system, in accordance with Testing and Commissioning, Section 28 08 00.
- B. Coordinate with the Owner for the provision of these services.

3.13 FINAL PROCEDURES

- A. Perform final procedures in accordance with Section 28 05 00, Access Control General Requirements.

END OF SECTION

SECTION 32 1216 ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Paving for playground, parking areas, areas between buildings, synthetic track surfacing adjacent to planting and turf areas as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 2200 - Grading.
3. Section 32 0117 - Pavement Repair.
4. Section 31 2326 - Base Course.
5. Section 32 1236 - Seal for Bituminous Surfacing.
6. Section 32 1313 - Site Concrete Work.

1.02 SUBMITTALS

- A. Shop Drawings: Submit site plan indicating extent of paving and accessories.
- B. Product Data: Manufacturer's technical data for materials and products.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction.

1.04 PROJECT CONDITIONS

- A. Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B. A copy of the soils report is available for examination in the office of the Architect during regular office hours of the Architect.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS

- A. Provide materials of the class, grade, or type indicated on the Drawings, conforming to relevant provisions of Section 203 - Bituminous Materials of the Standard Specifications for Public Works Construction.

2.02 HEADERS

- A. Concrete: Per specification Section 32 1313 - Site Concrete Work.
- B. Wood:
 - 1. Redwood, Construction Heart Grade, size 2 by 6, unless otherwise indicated.
 - 2. Stakes: 2 by 4 redwood or 2 by 3 Douglas fir, Construction Grade.
 - 3. Nails: Common, galvanized, 12d minimum.

PART 3 - EXECUTION

3.01 HEADERS

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of adjacent undisturbed earth.
- C. Where wood headers are indicated on drawing, fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on center with top of stakes set one inch below top of header. Provide a minimum of two 12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and anchorage as required to fasten headers in place.

3.02 CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

- A. Thickness of Surfacing: Unless otherwise indicated on Drawings or specified, install bituminous surfacing to a compacted thickness of 2 inches.
- B. Provide surfacing material over base course as specified in Section 31 2326 - Base Course.
- C. Surfaces of walls, concrete, masonry, or existing bituminous surfacing indicated to be in direct contact with installed bituminous surfacing shall be cleaned, dried and uniformly coated with an asphaltic emulsion film.
- D. Thicken edges of bituminous surfacing that do not abut walls, concrete, or masonry, and edges joining existing bituminous surfaces. Remove headers at existing bituminous surfacing where new bituminous surfacing is to be installed. Thicken edges an additional 2 inches and taper to the indicated or specified thickness 6 inches back from such edges.
- E. At stairways, adjust thickness of paving such that the first tread is equal in height to all other treads.

- F. Provide adequate protection for concrete, planting areas, and other finish Work adjacent to areas indicated to receive bituminous surfacing.
- G. Placing:
1. Do not install bituminous surfacing when atmospheric temperature is below 40 degrees F; or when fog or other unsuitable weather conditions are present. Temperature of mixture at time of installation shall not be lower than 260 degrees F in warm weather or higher than 320 degrees F in cold weather.
 2. Where 2-inch or 3-inch thick surfacing is indicated or specified, install surfacing in one course. Where surfacing is indicated or specified 4 inches or more in thickness, except for thickened edges, install bituminous surfacing in courses of approximately equal thickness, each course not exceeding 2 ½ inches in thickness.
- H. Stakes or Screeds: Provide grade or screed stakes spaced not more than 15 feet apart in flow lines with grades of less than one percent. Continuous screeds may be provided instead of stakes.
- I. Spreading: Install bituminous surfacing in a manner to cause least possible handling of mixture. In open areas and wherever practicable, install by mechanical means with a self-propelled mechanical spreader. In confined or restricted areas, install mixture with hot shovels and rakes, and smooth with lutes.
- J. Joints: Provide vertical joints between successive runs. Install joints true to line, grade, and cross section. Lapped joints are not permitted.
- K. Rolling:
1. Finish roll with a self-propelled tandem roller weighing at least 8 tons. Break down roll with a self-propelled roller weighing between 1 ½ tons and 8 tons.
 2. Roll in a manner that preserves flow lines and the established finished grades. Break down roll in areas adjacent to flow lines parallel to flow lines. Break down roll after bituminous surfacing is installed without shoving or cracking of mixture under roller.
- L. Continue finish rolling until surfacing is unyielding, true to grade, and meets requirements for specified smoothness. Areas inaccessible to finish roller may be finish rolled with breakdown roller or tamped with hot tamping irons and smoothed with hot smoothing irons or hand roller.
1. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth to properly compact.
 2. Compacted bituminous surfacing shall be provided with a bulk specific gravity of at least 2.31 when tested in accordance with ASTM D1188.

3.03 TOLERANCE

- A. Smoothness: Surface of bituminous surfacing after rolling, shall be even, smooth and uniform in texture with no voids or rock pockets, free of roller marks or other irregularities,

and not varying by more than 0.03 foot, except at local depressions or raised areas as indicated, when a 10-foot straightedge is placed on surface.

- B. Grade: Finished grade shall not vary more than 0.02 foot above or below required grade. Variations within prescribed tolerance shall be compensating so that average grade and cross-section are provided.
- C. Premium paving tolerances and requirements for synthetic track:
 - 1. General: Test in-place asphalt concrete courses for compliance with requirements or thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Owner's representative.
 - 2. Thickness: Tolerances for thickness shall be ¼ inch, plus or minus.
 - 3. Planarity: The asphalt substrate shall not vary from the planned cross slope by more than plus or minus 0.1 percent. The finished asphalt shall not vary, plus or minus, under a 10 feet straight edge greater than 1/8 inch. Flood test the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, "bird baths" are evident at a depth more than 1/8 inch repair using the best method of correction.

3.04 TESTING

- A. After first coat of surface seal has been installed and after a 24 hour period, the flood test shall be completed of the bituminous surfacing in presence of the Project Inspector. Repair areas of standing water or puddles and flood test locally; install surface seal and retest as necessary.

3.05 SURFACE SEALING

- A. After bituminous surfacing has passed flood test, clear and allow to dry and provide one more coat of surface seal as specified in Section 32 1236 - Seal for Bituminous Surfacing.
- B. Where indicated, provide multiple coats of surface seal to existing bituminous surfacing.
- C. Where new bituminous surfacing joins existing bituminous surfacing, overlap surface seal a minimum of 12 inches onto existing bituminous surfacing.

3.06 PROTECTION

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

3.07 CLEANUP

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

END OF SECTION

SECTION 32 3113
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Chain link fences and gates as indicated.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit plans and details indicating extent of fences, locations of gates, and details of attachment and footings. Indicate means and methods for surface preparation and finishing.

1.03 QUALITY ASSURANCE

- A. Chain Link Fence Manufacturers Institute: CLFMI Product Manual.
- B. ASTM A123: Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A392: Specification for Zinc-Coated Steel Chain Link Fence Fabric. ASTM F567: Practice for Installation of Chain Link Fence.
- E. ASTM F626: Specification for Fence Fittings.
- F. ASTM F900: Specification for Industrial and Commercial Swing Gates.
- G. ASTM F1083: Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- H. ASTM F1553: Guide for Specifying Chain Link Fence.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete Materials and Properties: Comply with requirements of Section 03 3000 - Cast-in-Place Concrete to provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 psi, 4-inch slump, and one inch maximum size aggregate.

1. Concrete may be provided in the following volumetric proportions:

Portland Cement	1 part
Fine Aggregate	2 parts
Coarse Aggregate	4 parts (1/4 inch to 1-1/2 inches)
Water	7 ½ gallons, maximum per sack of cement

- B. Chain Link Fence Fabric: Conforming to ASTM A 392, Class C2 zinc coating, 2.00 ounces minimum per square foot of uncoated wire surface, hot-dipped galvanized after weaving, and top and bottom edges knuckled.

1. Fabric for perimeter fencing and interior fencing shall be 9 gage woven wire with 2 inch mesh, unless otherwise specified.
2. Installed fence fabric shall be free from barbs, icicles, or other projections and installed fence fabric with such defects will be deemed defective Work.

- C. Posts, Top Rails, Brace Rails and Gate Frames: Standard weight, galvanized, welded or seamless steel pipe conforming to ASTM F 1083, with a minimum yield strength of 35,000 psi. Embed posts into footing 6 inches less than the depth of the footing unless noted otherwise on drawings.

- D. Schedule of Posts and Footings:

Item	Height	Nominal Pipe Size (inches)	Outside Diameter (inches)	Weight (pounds per foot)	Footings*	
					Diameter (inches)	Depth (inches)
Top Rail, Brace Rails and Transom Rails	Up to 10'-0"	1-1/4	1.660	2.27	N/A	N/A
	10'-1" to 16'-0"	1-1/2	1.900	2.72	N/A	N/A
Line Posts	Up to 6'-0"	2	2.375	2.65	12	24
	6'-1" to 8'-0"	2	2.375	2.65	12	36
	8'-1" to 10'-0"	2-1/2	2.875	5.79	12	36
	10'-1" to 16'-0"	3	3.5	7.58	14	60
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	2-1/2	2.875	5.79	12	36
	8'-0" to 10'-0"	2-1/2	2.875	5.79	14	42
	10'-1" to 16'-0"	3	3.5	7.58	14	60
Pedestrian Gate Posts	Up to 8'-0"	2-1/2	2.875	5.79	14	36
Gate Frames	Up to 8'-0"	1-1/2	1.900	2.72	N/A	N/A
Driveway Double-Leaf Swing Gate Posts: Opening						
Up to 17'-3-1/2"	Up to 8'-0"	3 1/2	4	9.11	16	42
17'-4" to 20'-3-1/2"	Up to 8'-0"	3-1/2	4	9.11	16	42

- E. Post Caps: Malleable iron, ASTM F 626, , designed to fit snugly over posts with a minimum projection of 1- 1/2 inches below top of posts. Post caps shall be manufactured with a curved top.

- F. Eye Tops: Malleable iron, ASTM F 626, , designed to fit over line posts, and for through passage of top rail.

- G. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.
- H. Rail Ends for Top Rails and Brace Rails: Malleable iron, ASTM F 626, , with holes to receive 3/8 inch bolts for securing to rail end bands.
- I. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be 3/8 inch by 1 ½-inch.
- J. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.
- K. Tension Wire for Installation at Bottom of Fabric: 6 gage steel spring wire, conforming to requirements of AISI Steel Products Manual, Carbon Steel Wire, Section 16, merchant quality, galvanized, soft temper with Type I coating. Wavy type wire is not acceptable.
- L. Turnbuckles for installation with Tension Wires: Eye and hook type, drop forged steel, right and left hand threads, at least 3/8 inch screw diameter with at least 4 ½-inches of take-up.
- M. Tie Wire: Aluminum ties 6 gage for fastening fabric to posts, top rails and brace rails. At bottom tension wire 9 gage galvanized hog rings shall be installed.
- N. Finish of Metal Parts: Post caps, couplings, rail ends, tension bands, tension bars, turnbuckles, rivets, bolts, and other metal parts and fittings shall be hot-dipped galvanized after fabrication, except bolts, which may be galvanized or cadmium-plated. Galvanizing shall conform to ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, and ASTM F 626 Specification for Fence Fittings.
- O. Paints for Refurbishing Existing Fence Posts, Rails, and Accessories: As required to provide the galvanized color of a new installation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install fences to heights indicated on Drawings.
- B. Space fence posts at equal intervals between terminal, angle, corner, and gate posts, and not more than 10 feet apart measured from center to center of posts. Install posts so that top of eye of post caps are level with top of fabric.
- C. Install angle or corner posts at each change in direction of 15 degrees or more, at change of 5 percent or more in grade of fencing, and at the beginning and end of curved fence sections.
- D. Install terminal posts at ends of runs of fencing. Install gateposts on both sides of driveway and pedestrian gates. For double-leaf gates, net opening between gate posts shall be gate size as indicated on Drawings, plus 3 ½-inches; for single leaf gates, net opening shall be gate size plus 2 ½-inches.

- E. Where a fence is to be installed on a curb, construct footings with top of footing level with the lower finish grade. Align posts, set plumb and true before placing footings. Remove splattered concrete from exposed pipe surfaces while concrete is still soft. In bituminous surfaced areas, install seal coat on top of concrete footings.
- F. Install fences with top rail. Top rail shall pass through eye tops and be secured at ends with rail-end fittings and bands.
- G. Install bottom tension wire a minimum of 3 inches from grade for fencing, and provide a turnbuckle for each 150 feet of wire or fractional part thereof. Turnbuckles are not required in runs of 15 feet or less. Install ends of tension wires to posts in a manner to prevent slipping or loss of tension. Wrap should start from fence side of post. Turn end of wire around post tightly twisted at least three times around wire. At turnbuckles, wire through eye and tightly twist end at least three times around wire. Cut tail of bottom wire flush.
- H. Install fence fabric on outward facing side of posts, except for tennis courts. Install fence fabric with top edge projecting above top rail of fence.
- I. Install bottom of fence fabric to clear finish grades, except on bituminous surface install 3/4 inch above such surface. Locally shape and trench ground surfaces where necessary to provide uniform top and bottom alignment of fence.
- J. Tightly stretch fabric and at terminal, pull corner, angle, and gateposts, secure with tension bars extending full height of fence. Secure tension bars to posts with bolted tension bands spaced not more than 14 inches apart.
- K. Bands and Ties: Install bands and ties in accordance with following schedule:

15 bands on 16 feet fence	16 ties on 16 feet fence
11 bands on 12 feet fence	12 ties on 12 feet fence
7 bands on 8 feet fence	7 ties on 8 feet fence
6 bands on 6 feet fence	6 ties on 6 feet fence
4 bands on 4 feet fence	4 ties on 4 feet fence
- L. Fasten fabric to line posts with wire ties spaced not more than 16 inches apart. Where 6 gage aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.
- M. Fasten fabric to top rails, mid-rails, brace rails, with wire ties spaced not more than 18 inches apart. Bend back ends of tie wires so as not to be a hazard. At bottom tension wire, install hog rings spaced not more than 18 inches apart. Where 2 fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gage wire or 6 gage aluminum ties to midrails.
- N. Grind all field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with galvanizing repair coating as specified in Section 05 5000; or equal product approved by Owner's Office of Environmental Health and Safety. Install coating in accordance with written recommendations of manufacturer.
- O. Fabrication of Gates:
 - 1. Frames: Fabricate gate frames from steel pipe of size specified, with joints at corners miter cut and continuously welded to sides.

2. Fabric: Install fence fabric to side members with tension bars and tension bands as specified, spaced not more than 14 inches apart. Tension bars shall extend full height of gate. Install fence fabric to top and bottom members and to brace rail with wire ties as specified for top rails, spaced not more than 12 inches apart.
3. Latches: Gate latches and strikes will be furnished by the Contractor. Lock to be provide by owner. Weld gate latches and strikes to gate posts and frames. Welding shall be performed before gate frames are galvanized, or welds shall be finished as specified for field welds.
4. Hinges: Install and adjust hinges; burr or center punch threads of gate hinge bolts to prevent removal of nuts. Install 3 hinges on each post for swing gates more than 16 feet wide. Hinges will be provided by the Owner.
5. Grind welds flush and smooth. Hot-dip galvanize fabricated parts after welding, or finish weld as specified for field welds.

3.05 REINSTALLED FENCING

- A. Where existing fencing is indicated to be reset or relocated, remove existing concrete footings from posts and legally dispose of off the Project site. Construct new concrete footings, as specified, in their designated location. Replace parts of fencing broken or damaged during removal and re-installation with new parts as specified to complete reinstallation. New materials shall closely match design of existing installation. Top rail will be required in reinstalled fencing, which does not have top rail in its existing condition. Install as specified for new installations.
- B. Existing fences shall be reset where finish pavement is raised or lowered more than 6 inches from existing grade. Remove and reinstall entire fence assembly as specified.

3.06 FENCING ADJUSTMENTS

- A. Where the finish grade is raised 6 inches or less, cut and re-knuckle the existing fence fabric. Adjust tension wire and tie to fabric. Bottom of fence fabric shall be installed $\frac{3}{4}$ " above finish grade.
- B. Where the finish pavement is lowered 6 inches or less, demolish the fence footing flush with the finish grade and adjust the fabric and its attachments. Bottom of fence fabric shall be installed $\frac{3}{4}$ inches above finish grade.
- C. Post footings and fabrics that require readjustment after installation shall be entirely replaced.

3.07 INSTALLATION OF GATES

- A. Provide gates of the sizes indicated on Drawings. Allow clearance on gates of 1-1/2 inches at bottom and one inch at top. Construct gates installed in sloping areas to conform to the grade. Provide an opening in each gate for access to locking device or padlock. Knuckle ends of fabric cut for opening to eliminate hazards.
- B. Sliding Gates and Swing Barricade Gates: Fabricate and install as indicated on Drawings. Wheel housing must be designed to fit tightly to roll track and prevent gate from rolling over objects. Unsupported cantilever type roll gates are not acceptable. Install gate stops in accordance with the drawings. Both top and track stops are required.

3.09 COMPLETION

- A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.
- B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.10 PROTECTION

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

3.11 CLEANUP

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

END OF SECTION

SECTION 32 9000

PLANTING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide labor, material, equipment, and appliances necessary to provide trees, plants, and ground cover as indicated on Drawings, specified, and as required for a complete installation.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 01 4524 - Environmental Import/Export Material Testing.
 - 3. Section 31 2200 - Grading.
 - 4. Section 32 1313 - Site Concrete Work.
 - 5. Section 32 8413 - Potable Water Irrigation.
 - 6. Section 32 8426 - Reclaimed Water Irrigation.

1.02 SUBMITTALS

- A. Comply with provisions of Section 01 3300.
- B. Submit complete lists of landscape materials and equipment to be used, including manufacturers name and address, specific trade names, catalog numbers complete with illustrations and descriptive literature and clearly mark or underline proposed items; list sources of landscape topsoil.
- C. Shop Drawings: Required for any landscape structure.
- D. Material List: Plant materials list.
- E. Certification: In addition to other required certification, furnish a certificate with each delivery of bulk material, including topsoil, planter mix soil, bark mulch, stating its source, quantity, type of material furnished and that such item or material conforms to requirements of this section.
- F. Sample: Submit topsoil Sample and soil amendments with analysis.
- G. Fertilizer analysis: Provide labels of each fertilizer used and quantities used at each applications recommended in Soil Analysis Report.
- H. Soil Test: After completing soil rough grading, have soil tested for fertility and agricultural suitability. Soil shall be tested from minimum of (3-4) locations per acre of planted area. Record locations where samples were taken. A copy of soil test results shall be submitted to District and Architect before landscape work begins. Pay cost of soil test.

- I. Sod: Furnish certificate by grower for type, and trueness to name of grass variety or strain. Where or seed issued, provide quality to be delivered.

1.03 QUALITY ASSURANCE

- A. Workers: Furnish skilled workers thoroughly trained and experienced in required crafts and familiar with specified requirements for proper performance of Work of this section.
- B. Codes and Regulations: Materials, fabrication, and installation in this section shall comply with applicable State Codes and Regulations. Deliver permits and testing certifications to Project Inspector.
- C. Quality and Size: Comply with current edition of "Horticultural Standards" for number one nursery stock as adopted by "American Association of Nurserymen".
- D. Plants:
 - 1. True to name, with name of plants in accordance with standards of practice of "American Association of Nurserymen."
 - 2. Botanical names take precedence over common names.

1.04 GENERAL REQUIREMENTS

- A. Project Inspector will verify that irrigation systems are operating before starting Work of this section.
- B. Inspection: Notify Architect at least 72 hours in advance to schedule following inspections:
 - 1. Plant material at time of delivery to Project site.
 - 2. Final location of plants prior to preparation of planting pits.
 - 3. Trees of 24-inch box size and larger at their source before delivery to Project site.
 - 4. Finish grades prior to sodding or seeding areas.
 - 5. Landscape construction items prior to start of maintenance of plant establishment period.
 - 6. Final inspection.
- C. Existing Utilities and Plant Materials:
 - 1. Protect utilities and plant materials from damage.
 - a. Perform modifications only as permitted by Architect, in accordance with applicable provisions noted or specified on Drawings, or in other sections of these Specifications.

2. Replace damaged plant material with like type and size material. Architect shall determine cost of irreplaceable plant material according to "square inch" method as described by Council of Tree and Landscape Appraisers' "Manual for Plant Appraisers" handbook, Current Edition, and "Guide for Establishing Values of Trees and Other Plants".

D. Verification of Dimensions and Quantities:

1. Verify scaled dimensions and quantities before starting landscaping Work.
2. Promptly notify Architect of any discrepancies between Drawings, Specifications or actual Project site conditions.

E. Tree Tagging: Architect will tag 24-inch box and larger trees at nursery. Request tree tagging from Architect by providing 3 days advance notice.

F. Pest Management Method and Products:

1. Contractor shall ensure that plants provided are clean, healthy, free of physical damage, and show no symptoms of abiotic injury. Plants must also be free of diseases, arthropod pests, and any other type of plant pests. Before applying pesticides to plants on District property, the following criteria must be met:
 - a. Individuals who apply pesticides on behalf of contractor's company must have a Qualified Applicator License in appropriate category of pest control issued by California Department of Pesticide Regulation and registered to conduct pest control for hire as a business by Los Angeles County Agricultural Commissioner's Office.
 - b. Products used must be listed on LAUSD's OEHS approved product list.
 - c. Length of time from date of use of a pesticide products until beneficial occupancy by Owner may not be less than five half lives of products used.
 - d. Contact District's Pest Management Department at (213) 743-1102 prior to any pesticide application to verify items above.
 - e. Complete written records of pesticide applications made by a contractor and or their representative on District property, must be provided to District's Pest Management Department within 10 days of applications.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Plants shall be protected in transit and after delivery to Project site. Plants in broken containers and plants with broken branches or injured trunks will be deemed defective Work.
- B. Plant materials damaged in planting operations shall be replaced.

1.06 WARRANTY

- A. Shrubs and groundcover shall be growth and health guaranteed by installer for a period of 90 days after completion of maintenance period. Trees shall be installer guaranteed to live and grow in upright position for a period of one year after completion of maintenance period.
- B. Within 15 days after notification by Owner, remove and replace failed plantings. Replacement plantings shall be guaranteed as specified for original plantings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Designated as imported topsoil as specified herein. Soil test will determine suitability of topsoil before installation. Transport topsoil from source to its final position unless stockpiling is specified. Test in compliance with Section 01 4524.

- 1. Imported Soil:

- a. Shall be from a source outside Project site and in compliance with this section.
- b. Architect may make such inspections and perform such tests as deemed necessary to determine material meets all requirements.
- c. At least 30 days before scheduled installation, submit proposed source of topsoil and a sample to Architect. Submit a written request for review, accompanied by a written report stating that proposed source complies with these specifications by a testing laboratory registered by State of California for agricultural soil evaluation.
- d. Comply with recommendations of soils testing laboratory and provide any soil amendments necessary to achieve proper nutrient levels to support healthy plant growth.
- e. Imported topsoil shall be of a uniform composition and structure, fertile and friable sandy loam soil, and be free of roots, decay, subsoil, clods and stones larger than $\frac{1}{4}$ inch in greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush and other litter and not be infested with nematodes or other undesirable insects and plant disease organisms. Imported topsoil shall meet following additional requirements:
 - 1) Gradation Limits: Sand – 50 to 80 percent, clay – 20 percent maximum, and silt – 30 percent maximum. Sand, clay and silt gradation limits shall be as defined in ASTM D422.
 - 2) Agricultural Suitability and Fertility: Topsoil shall be fertile and friable garden soil suitable for sustaining and promoting growth of specified plants.
 - 3) Electrical conductivity less than 2.0 milliohms/centimeter or DS/m.
 - 4) Boron content maximum of 1.0 part per million.

B. Fertilizers and Conditioning Materials: Comply with applicable requirements of State of California Agricultural Code:

1 General:

- a. Fertilizing materials shall be packaged, first grade, commercial quality products identified as to source, type of material, weight and manufacturer's guaranteed analysis.
- b. Fertilizing material shall not contain toxic ingredients and fillers in quantities harmful to animal, human or plant life.
- c. Submit a certificate of compliance stating material substantially meets Specifications in accordance with provisions of Article 1.03B.

2. Materials:

- a. Bone Meal: Commercial raw bone meal shall be finely ground, steamed dry material with a minimum analysis of 2.5 percent nitrogen and 22 percent phosphoric acid.
- b. Gypsum: Hydrated calcium sulfate produce containing 23 percent calcium and 18 percent sulfur with a guarantee analysis of 84 percent calcium sulfate.
- c. Soil Sulfur: Guarantee analysis of 99 percent sulfur.
- d. Superphosphates: First grade finely ground phosphate rock used for agricultural purpose, containing minimum 18 percent phosphoric acid by volume.
- e. Commercial Fertilizer: Pellets or granular product having a chemical analysis of 14-14-14, with a minimum of 68 percent of nitrogen from slow release nitrogen unless otherwise specified in Soil Analysis Report: it should be a free flowing material delivered in unopened bags, do not install material which becomes caked or otherwise damaged.
- f. Nitrogen Fortified Wood Product: Derived from redwood, fir or cedar sawdust or from bark of fir or pine treated with a non-toxic agent to quickly absorb water and comply with following requirements:

1). Gradation:

SIEVE SIZE	PERCENT PASSING
1/4-inch	95 percent minimum
#8	80 percent minimum
#35	30 percent minimum

Nitrogen Content:

NITROGEN CONTENT	PERCENT DRY WEIGHT
Redwood	0.4 to 0.6 percent
Fir	0.56 to 0.84 percent
Cedar	0.56 to 0.84 percent

Fir Bark	0.8 to 1.2 percent
Pine Bark	0.8 to 1.2 percent

3) Salinity: Maximum saturation extract conductivity 2.5 milliohms/centimeter at 25 degrees Celsius.

4) Absorption: When one teaspoon of water is applied to 4 cubic inches of air-dried products, material shall become completely damp in a period of less than 2 minutes. Kellogg KRA, Sequoia Redwood/Cedar Blend or White Fir, Long Beach Soil Preparation, Bandini #101 Redwood Soil Builder of nitrogenized wood amendment.

g. Organic Fertilizer: Treated, relatively dry friable organic compost derived from sewage sludge processed for agricultural use; containing at least 1 percent nitrogen by dry weight, 2 percent phosphoric acid and comply substantially with gradation noted in subsection 2.1, B6. Milorganic, Kellogg's Nitrohumus, or equal.

C. Prepared Backfill mix:

1. To be based upon recommendations from soils test performed by a certified laboratory.

2. Mix (for bidding purposes):

a. Seventy percent by volume clean excavated topsoil/import soil.

b. Thirty percent by volume nitrogen stabilizer wood residual.

c. One pound per cubic yard gypsum.

d. Two pounds fertilizer per cubic yard (14-14-14 with a minimum 68 percent of nitrogen from slow release nitrogen. Additional secondary and micronutrients preferred).

3. Mix (acid plants)

a. Thirty percent by volume clean excavated soil/imported soil.

b. Seventy percent by volume nitrogen stabilized wood residual.

c. Two pounds .per cubic yard. soil sulfur.

d. Two pounds. fertilizer per cubic yard (14-14-14 with a minimum 68 percent of nitrogen from slow release nitrogen. Additional secondary and micronutrients preferred).

D. Plants (General): Plant names indicated or listed on Drawings shall conform with Sunset, Western Garden Book, latest edition.

1. Type and Size: Plant materials shall be listed on Drawings.

2. Plants shall be true name, and one of each bundle or lot shall be tagged with Botanical/Common name and size of each plant in accordance with standards of practice recommended by American Association of Nurseryman
3. Tag one plant of each variety for identifying purposes.
4. Plantings shall be inspected before installation.
5. Substitutions: When plants of a specified kind or size are not available, substitution may be requested in accordance with General Conditions.
6. Plants shall have a growth habit normal to species in accordance with USA Standards for Nursery Stock, latest editions; shall be sound, healthy, vigorous, and free from insect pests, plant disease, sun scalds, fresh bark abrasions, excessive abrasions or other objectionable disfigurements. Tree trunks shall have normal well developed branch systems and vigorous and fibrous root systems, not root bound and shall be free of kinked or girdling roots.
7. No pruning shall be performed before inspection at nursery by Architect. (Other than normal pruning during growth period).
8. Plantings specified for adverse conditions shall be Project site acclimated before planting. Purchase from local nurseries or store on Site for a period of 10 weeks for autumn planting and six weeks for spring planting.

E. Plant Material:

EDIT NOTE: NO TREES SMALLER THAN 24-INCH BOX TO BE SED.

1. Trees: Trees shall conform to type and size noted on Drawings. Measure height from root crown to last division of terminal leader and measure diameter 1 ft. above root crown. Measure height of palm trees from ground line to base of growing bud. Palms shall stand reasonably erect without support.
2. Shrubs: Specified type and size selected from high quality well shaped nursery stock.
3. Flatted Plants: Grown and remain in flat until transplanted at Project site. Soil and spacing of plants in flat shall insure minimum disturbance of root system at time of transplanting. Maximum plants per flat to be 64 to 100 plants, or as indicated in Drawings.
4. Sod: Mixture of specified proportions of well established sod grass, vigorous well rooted healthy sod, free from disease, insect pests, weeds, other grasses, stones, and other harmful or deleterious matter.
5. Grass Seed: First quality from a new crop seed.
6. Use non-hulled seed except during months of May through September. During remaining months provide hulled seed.

EDIT NOTE: EDIT FOLLOWING SECTION BASED ON PROJECT TYPE AND SELECT INSTALLATION METHOD.

F. Elementary School/Primary Center

1. General Sod Areas are to be sod or roll sod: Tall Fescues.
2. Multi Purpose field:
 - a. Sod or Roll Sod: Hybrid Bermuda.

G. Middle Schools/High Schools:

1. General Sod Areas:
 - a. Sod or Roll Sod: Tall Fescues.
2. Baseball/Softball Outfield (enclosed):
 - a. Sod or Roll Sod: Hybrid Bermuda.
3. Baseball Diamond/Backstop Area:
 - a. Sod or Roll Sod: Hybrid Bermuda.
4. Football/Soccer Field:
 - a. Sod or Roll Sod: Hybrid Bermuda.
5. Multi Purpose Fields:
 - a. Sod or Roll Sod: Hybrid Bermuda.

H. General Materials:

1. Pipe: Galvanized steel, standard weight (schedule 40) complying with ASTM A120.
2. Nails, fasteners, etc.: Galvanized and commercial quality materials.
3. Fabricated metal items: Steel conforming to ASTM A36.
4. Concrete items: Standard 2000 psi concrete.

I. Concrete headers: 6-inch by 8-inch size, complete with pre-molded expansion joint material 10 ft. apart or as indicated on Drawings.

J. Composite Headers: Headers and stakes shall be composite material sizes as indicated on Drawings. Screws shall be plated deck screws. Stakes shall be 1 inch by 2-inch by 12-inch in length and headers shall be furnished in 2-inch by 4-inch by 20-foot in length and shall be of uniform width and thickness.

K. Tree Stakes: Steel stakes shall be the R2 Stake System (also known as the Reddy Stake System) manufactured by J. R. Partners or equal. Provide two R2 Stakes per tree. Use 7 feet R2 Stake for 15 gallon size trees and smaller and the 9 feet R2 Stake for 24-inch box size trees or smaller. Use the Mega Stake for 36 inches and 48 inches box size trees. If trees are surrounded by steel grates, utilize the Grate Stake for 24-

inch box size trees and smaller and the Mega Grate Stake for 36-inch box size trees or smaller.

L. Tree Ties:

1. Wire Type: No. 10 gage BMG galvanized soft steel wire covered with garden hose.
2. Cinch Tie: Flexible vinyl with adjustable interlocking capability.

M. Tree-Root Control Barrier: Shall be fabricated from a high density and high impact plastic such as polyvinyl chloride, ABS or polyethylene, and have a minimum thickness of 0.06 inch. Plastic shall be furnished with $\frac{1}{2}$ inch to $\frac{3}{4}$ inch high raised vertical ribs on inner surface spaced at least 6 inches but not more than 8 inches apart. Install a plastic root control barrier with each new tree planted within a tree well. Deep Root Corp., or equal.

N. Pest Management Methods and Products: Refer to paragraph 1.04.F for details pertaining to Contractor applying pesticides.

O. Jute matting shall be of a uniform open plain weave, single jute yarn, not varying in thickness by more than one half its normal diameter. Jute matting shall be furnished in rolled strips as follows: Length, approximately 50 to 75 yards, width, 45 inches to 50 inches. Ludlow Soil Saver No. 48, or equal.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine areas and conditions under which Work of this Section will be performed. Correct detrimental conditions before commencing Work of this section.

3.02 GRADING AND SOIL PREPARATION

- A. Initial Rough Grading: Specified in Division 32.
- B. Earthwork and Topsoil Placement: Shall include excavation and backfilling for irrigation system and preparation for spreading, densification, cultivation, and raking of topsoil, including fertilization and conditioning.
- C. Preliminary Grading: Scarify existing soil to a depth of 6 inches before backfilling with topsoil. During preliminary grading operation, remove stones over $\frac{3}{4}$ inch.
- D. In Previously Paved Areas: Remove top 6 inches of existing soil and legally dispose of off Project site. Replace with approved imported topsoil to indicated finish grade.
- E. Topsoil Preparation and Conditioning:
1. Type and Thickness: Topsoil shall have a minimum depth of 6 inches above subgrade or as indicated on Drawings, whichever is greater.
 2. Before installing topsoil, subgrade shall be cleared of weeds, rock $\frac{3}{4}$ inch and larger and other extraneous materials from designated planting areas to a depth of 6 inches. The tools acceptable for this cleaning process are a Rock

Picker by Harley Enterprise, Track Screener by Cherrington, Screen USA Inc. or other tools or machines designed for the purpose. The finished planting bed preparation is subject to the approval of the Owner's representative. OAR shall coordinate with the Owner's Landscape Office for a site visit and approval prior to plant/lawn installation.

3. Do not process topsoil when it is so wet or dry as to cause excessive compaction or forming of hard clods or dust.
 4. Existing soil can be used as topsoil only if it meets the requirements of Article 2.01.A of this section.
- F. Fertilizing and Conditioning: Provide planting areas to finish grades, including mounds, before installation of specified fertilizer or soil conditioning materials.
1. Mechanically install following amount of fertilizer or soil conditioning materials at a uniform rate per 1,000 square feet of planting area:
 - a. Three cubic yards of nitrogen fortified wood compost.
 - b. Two cubic yards of organic fertilizer.
 - c. One hundred pounds. of gypsum.
 - d. Thirty pounds of commercial fertilizer.
 2. Quantities of required materials for planting areas shall be at Project site. Furnish Project Inspector with delivery tickets before installation to verify source, kind, and quantities delivered.
 3. After installation of fertilizer and soil conditioning materials, uniformly cultivate materials into upper 6 inches of soil with suitable equipment operated in at least two directions at approximate at right angles. Process soil until friable.
- G. Finish Grading:
1. Provide a finish grade, smooth, uniform, and free of abrupt grade changes and depressions to insure proper surface drainage.
 2. Finish grades adjacent to paving curbs or headers shall be 1 inch lower in sod areas and 2 inches lower in shrub or ground cover areas.
 3. Irrigate soil after installation of fertilizer and soil conditioning materials. Allow soil to settle. Provide a stable surface. After soil has dried out to a workable condition, re-grade, rake, and smooth to required grades and contours. Finished surfaces to be left clean and suitable for planting.
 4. Areas to be planted shall be graded and floated to provide complete surface drainage; water holding depressions and pockets shall be eliminated. Undulations and unsightly variations in grade which will not permit the use of normal mowing equipment without scalping or missing shall be removed so that proper use of mowing equipment can be performed.

5. Areas to be planted shall also be finished graded to meet any walks, paths or other adjoining surfaces so that, after compaction, no water pockets or ridges remain.
 6. Areas where sod will interface with other modes of planting at catch basins and paved areas shall be finish shaped so as to counter sink the sod one inch such that once sod is placed, it shall be at grade with adjacent planting bed.
- H. Contour mounds: Construct with imported topsoil and specified soil amendments. Install and shape mounds to minimize settlement or erosion and to provide adequate footing for placement of boulders. Referenced dimensions of mound contours refer to height above finish grade.
- I. Trenching: After completion of soil conditioning or finish grading operations, backfill upper portion of trench so specified topsoil thickness in trench is restored.
- J. Weeding: Once site has been cleared, grubbed and rough graded, landscape areas shall be maintained free of vegetation growth until start of irrigation and planting phase of work.

3.03 HEADER INSTALLATION

- A. Install at locations and grades shown on Drawings, before planting.

3.04 PLANTING

- A. General: Planting materials shall be inspected before planting, including those tagged at nursery.
1. Perform planting with material, equipment and according to procedures favorable to optimum growth of plant. Do not plant during windy conditions.
 2. Except as noted for specimen planting in sub-section 3.04D, commence planting operations immediately following completion of irrigation system.
- B. Protection and Storage:
1. Maintain plantings delivered to Project site in a healthy condition.
 2. Do not allow plantings to dry out.
 3. Separate bare root stock and "heal in" in moist earth or other suitable material.
 4. Cover root ball of baled or burlap wrapped plantings with moist sawdust, wood chips, or other permitted materials.
- C. Layout and Plant Locations:
1. Plant locations indicated on Drawings are approximate.
 2. Plants may be re-spotted before planting as required by Architect.
 3. Provide a detailed layout of plants and landscape elements in planting areas and obtain review of Architect before actual planting operations.

4. Locate first row of plantings in areas designated for on center spacing at one-half the designated spacing from edge of area.
- D. Specimen Planting: Plantings in boxes 24 inches or larger shall be installed before installation of lateral irrigation lines. Re-route irrigation lines in conflict with specimen locations to clear root ball.
- E. Tree and Shrub Installation:
1. Excavate planting holes approximately square with vertical sides shall be twice the width of plant container or root ball; larger if necessary to permit handling and installation without damage to root ball system. Bottom of plant container or root ball shall be placed on existing undisturbed soil.
 2. Do not install plantings having a broken or cracked root ball.
 3. Containers should be opened and removed in such a manner not to damage root system.
 4. Remove balled plant wrappings after plant is positioned in hole.
 5. Scarify native soil at bottom half of holes to a depth of 6 inches.
 6. Backfill bottom half of hole with specified backfill mix minus fertilizers. Settle with water.
 7. After water settling bottom half of hole, set planting approximately in center of hole and adjust root flush to finish grade.
 8. Backfill balance of hole with specified backfill mix and fertilizer and water settle.
 9. Prune or remove any broken or damaged limbs.
 10. Form a circular watering basin slightly larger than hole; 4-inch high for trees and 2-inch high for shrubs. Shape bottom of basin to be slightly lower than finish grade.
 11. Restore area around plantings to finish grade.
 12. After installation, plantings shall be plumb with root crown at its natural depth with respect to finish grade.
 13. New trees in sod areas to be installed with tree trunk protector.
- F. Backfill Planting Mix: Consists of 70 percent specified topsoil, and 30 percent nitrogen fortified sawdust mulch plus the amendments indicated in soil analysis report.
- G. Raised Planter Mix: Backfill mix for raised planters and tree pits in raised planters shall be of following materials.
1. Planter Mix by B.D. White Topsoil Co., Culver City, LAUSD Mix by AE Schmidt Co, Planter Mix by Gale Materials or equal.
 2. Weights shall be 45 pounds per cubic foot.

3. Raised planters shall be backfilled with finish grade at 2 inches below the planter top.
4. Required system for draining planters shall be in place prior to placing backfill.

H. Ground Cover Planting:

1. Complete soil preparation and fine grading before installation of ground cover plantings.
2. Install ground cover in moist soil, spaced as indicated on Drawings.
3. Install each plant with its proportionate amount of flat soil to minimize root disturbance.
4. The degree of soil moisture in flat shall be such that soil does not crumble when removing planting.
5. Following installation of ground cover, restore finish grade to insure proper surface draining.

I. Sod:

1. Complete fine grading and specified soil preparation before lawn installation.
2. Apply starter fertilizer per supplier's recommendations.
3. Sod or Roll Sod: type, thickness, and areas of installation shall be in accordance with Drawings and Specifications.
4. Remove roll sod netting prior to installation.
5. Thickness of sod or roll sod shall be recommended thickness below finish grade. Complete soil conditioning and fine grading before installation. Do not operate heavy equipment over completed sub-grade. Sub-grade shall be moist when sod is installed. Install sod with closely fitted joints and stagger ends of strips. Plug opening with sod or topsoil.
6. Lightly irrigate within two hours after installing sod and before rolling. Roll seams and joints until sod is well bonded to sub-grade.
7. Water area thoroughly to penetrate sub-grade at least 8 inches. Repeat watering as necessary to keep sod moist until rooted in sub-grade. Protect sod areas against foot traffic until sod is well established. Replace damaged areas with new sod.
8. Sod installation shall be complete at least 12 weeks prior to the opening of school.

J. Repair of existing or newly installed sod area:

1. Rake, drag, float and roll seed bed as often as necessary to produce a true, uniform, and smooth seed bed. Remove debris, stones, etcetera.

2. Prior to any lawn installation, obtain approval on fine grading of bed for sod areas.
3. Water seed bed thoroughly until a moisture penetration of 8 inches is achieved.
4. Seed mixture shall be sown at following rates:
 - a. Common Bermuda: 4 pounds per 1000 square feet or as recommended by manufacturer.
5. Seeding by hand, "Cyclone" type seeder, or pushed seeder shall be done in two passes at right angles to each other using 50 percent of specified rate for each pass. After seeding, apply a top dressing of wood residuals at rate of $\frac{3}{4}$ cubic yards per 1,000 square feet.
6. Large sod areas shall be seeded by using "Brillion" type seeder. Areas inaccessible to seeder shall be hand seeded and seed raked lightly into top $\frac{1}{4}$ inch of seed bed.
7. Irrigate immediately after completion and irrigation as frequently as necessary to assure complete germination of seed without creating run-off.
8. Areas that do not germinate satisfactorily shall be reseeded at proper intervals until an overall acceptable stand of grass is produced. Good turf coverage will be required before final acceptance of work.
9. Protect new sod from damage by erosion, trespass or any source. Safeguards and temporary fencing shall be erected where necessary, and precautions taken to prevent excessive runoff.

K. Hydro-Seeding (Supplement of Sod Area):

1. Mix slurry of seeds and fertilizer to produce a homogeneous slurry mixture in designated proportions. Discharge system shall apply slurry at a continuous and uniform rate.
2. Immediately after application, irrigate seeded areas thoroughly. Application pattern shall conform to irrigation system so that watering can be accomplished in a timely sequence.
3. Program watering so that repeated watering at short application times can be made to prevent excessive runoff and to prevent erosion.
4. Prior to planting, hydro-seeding shall be done. Abutting ground cover beds shall be neatly trimmed to forms and lines shown on drawing.
5. Areas that do not germinate satisfactorily shall be reseeded at 14-day intervals until an overall acceptable stand of vegetation is achieved.

L. Hydroseed slurry: Proportions to be as follows:

	Manufacturers
Seed mix (see paragraph 2.01)	Recommendation
Wood Cellulose fiber (dyed green)	2000 pounds per acre

M-Binder Soil Stabilizer	100 pounds per acre
Triple Super Phosphate	250 pounds per acre
Water and Dye	As needed

M. Transplanting of Existing Plant Material: In accordance with current horticulture practices.

1. Box or root system as necessary to maintain plant materials in a healthy, growing condition.
2. Equivalent size and kind of plantings may be provided instead of transplanting an existing planting.

N. Fertilizing: At 30 day intervals after sod or ground cover installation, install an all purpose 15-15-15 commercial fertilizer at rate of 10 pounds per 1,000 square feet of installed area. Thoroughly water area after applying fertilizer. Fertilizer applications shall be performed under observation of Project Inspector.

3.05 SKINNED BALLFIELDS / JOGGING TRACKS AND WALKWAY AREAS

EDIT NOTES:

1. **USE SPECIFICATION SECTION 32 1827 FOR DECOMPOSED GRANITE ATHLETIC RUNNING TRACKS AT HIGH SCHOOLS.**
2. **DECOMPOSED GRANITE SHOULD ONLY BE USED NEXT TO NATURAL TURF AND SUBSTANTIALLY AWAY FROM BUILDING ENTRANCES. WHEN USED PROVIDE ADEQUATE TRANSITIONAL SPACE AND DRAINAGE TO STOP DG FROM GOING INTO THE STORM RUN-OFF SYSTEM, AND FROM REACHING THE ARTIFICIAL TURF AREA.**

A. Baseball/Softball surfacing shall be a minimum of 4-inch thick after compaction.

1. Proportions to be as follows:

Sandy loam	at 55 to 65 percent
Clay	at 25 to 35 percent
Decomposed Granite – at 2mil track fine	at 5 to 15 percent

2. Supplier, West Coast Sand and Gravel, AE Schmidt and Company, Gail Materials or approved equal:

B. Skinned area sand pitcher's mound shall be installed to finish grades prior to installing sod or seeding. Mound pitcher's area to District standards.

C. Jogging trails and walkway surfacing shall be a minimum 4-inch thick after compaction and shall be 2 mil "trackfine" decomposed granite.

D. Installation:

1. Compact base to 90 percent and grade for proper drainage.
2. Loosen compressed sub-grade at least 4-inch deep, but not over 6 inches and remove stones larger than ¾-inch in diameter.

3. After sub-grade has been loosened, install gypsum at rate of 300 pounds per 1,000 square feet and uniformly cultivate into top 4 inches of sub-grade.
- E. Surfacing of General Areas: Spread surfacing material over entire area to be covered, in an equal minimum thickness of 4" after uniform compaction of not less than 95 percent. Surface shall be dragged or floated and finished to required grades.
- F. After grading and shaping, areas shall be rolled with a 4-ton water ballast roller. Any irregularities shall be re-raked or scarified for bond, cut or filled as required, and again rolled until finished surface is true, uniform, free from lumps or depressions, and surface irregularities.
 1. Apply water as required, to maintain surfacing material in proper condition for working and compacting.
 2. Where 4-ton roller is impractical such as on running lanes and pitcher's mound, provide equivalent methods in order to provide 95 percent relative compaction.

3.06 MAINTENANCE AND PLANT ESTABLISHMENT

- A. Required: Maintain areas on a continuous basis as they are completed during progress of Work and during establishment period. Maintenance shall include continuous operations of watering, weeding, trimming, rodent control, reseeding, planting replacement irrespective of cause or any other operations necessary to assure normal plant growth.
- B. Keep planting areas free of debris and weeds. Cultivate at intervals not to exceed 10 days.
- C. Sod Maintenance:
 1. Perform first mowing of sod areas when grass is 2 1/2 inches high and repeat as often as is necessary to maintain sod at a height of 2 inches. In no case shall sod be cut lower than 1 1/2 inches in height unless otherwise indicated.
 2. After each cutting, edge of grass shall be trimmed to a neat and uniform line.
 3. Grass clippings shall be removed and legally disposed of off Project site.
- D. Pruning: Required pruning of plants at start of plant establishment period shall be as required by Architect.
- E. Plant Establishment Inspection:
 1. Request an inspection to begin plant establishment period after plantings and related Work has been completed in accordance with Contract Documents.
 2. Upon successful completion of inspection, effective commencement date of plant establishment period shall begin.
 3. Plant establishment period for shrubs and ground cover, shall be 90 calendar days and for trees shall be one year or as otherwise indicated in Contract Documents.

4. Architect may recommend extension of plant establishment period if planting areas are improperly maintained, appreciable plant replacement is required, or other defective Work.

F. Damage:

1. Immediately replace failed or damaged plantings.
2. Provide replacement plantings of same type and size to match adjacent plantings. Furnish plantings and fertilizer as specified. New plantings shall be subject to a 30 day establishment period.
3. Damage to planting areas shall be repaired immediately. Depressions caused by vehicles or foot traffic shall be filled with topsoil and leveled.

G. Final Inspection:

1. Upon completion of plant establishment period, Architect will perform a final inspection.
2. If plant establishment period is completed before Substantial Completion, planting areas shall be maintained until Final Completion.

3.07 PESTICIDE APPLICATION

- A. Contractor must comply with specifications outlined in paragraph 1.04.F.

3.08 PROTECTION

- A. Unless noted otherwise, protect Work of this section until Substantial Completion.

3.09 CLEANUP

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

END OF SECTION