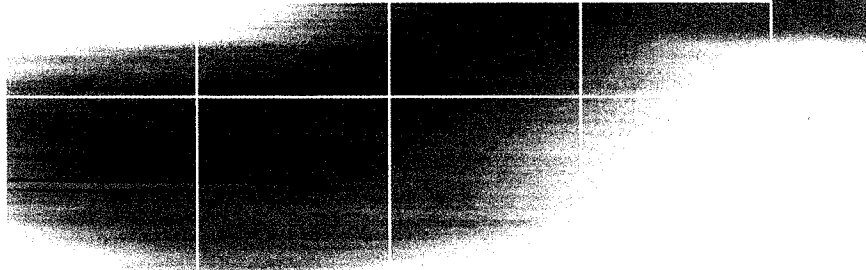


PROJECT MANUAL // HMC ARCHITECTS



**PALOMAR COLLEGE -  
NORTH EDUCATION CENTER -  
PHASE 3 15 STANDARD MODULARS**

PROJECT NO. 5015019-102// 12.05.2017

PALOMAR COMMUNITY COLLEGE

35090 Horse Ranch Creek Road  
Fallbrook, CA 92028





**PALOMAR COLLEGE - NORTH EDUCATION CENTER  
INTERIM VILLAGE - PHASE 3 15 STANDARD MODULARS  
FALLBROOK, CA**

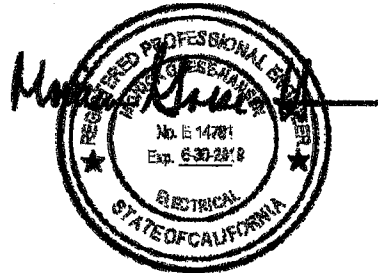
December 5, 2017  
HMC # 5015019-102



HMC ARCHITECTS  
Architect



PS2 ENGINEERING, INC.  
Mech/Plumb/Fire Prot/Low Voltage Engineers



JCE, Inc  
Elect/Fire Alarm Engineers, Inc

IDENTIFICATION STAMP  
DIV. OF THE STATE ARCHITECT

04 116581

ACS FLS DT SS bbs  
DATE DEC 08 2017

RES: SCOTT DALTON  
FES: D. TRUGINT



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NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that [ ] invites sealed proposals for the construction of:

[ ] at [ ] in [ ], California. Bid Forms together with required Attachments to the Bid Form shall be delivered to the office of [ ] not later than [ ] on [ ], 20\_\_. Bid Forms received within the stipulated time will be promptly opened in public and read aloud at said address. Bid Forms or Attachments thereto received after the stipulated time will be rejected without consideration.

OBTAINING BID SETS: Each Bid Form shall be in accordance with Contract Documents dated: [ ], 20\_\_, and prepared by \_\_tbd\_\_ Architects, address, city, zip \_\_\_\_\_. General Contractors and Subcontractors may purchase Contract Documents at local print shop, as directed by Owner.

INSPECTION OF PROJECT SITE; PRE-BID CONFERENCE: A Mandatory Pre-Bid Conference will be held on [ ] 20\_\_, at [ ] at [ ] which all General Contractors bidding the project are required to attend. Bids will not be accepted from bidders that did not attend the Mandatory Pre-Bid Conference.

BID SECURITY: Each proposal shall be accompanied by cash, a cashier's check, certified check or bid bond executed by an admitted surety insurer for ten percent (10%) of the amount of the base bid in the proposal, made payable to the order of the District.

PERFORMANCE AND PAYMENT BONDS: The successful bidder, simultaneously with the execution of the Agreement, will be required to furnish a Labor and Material Bond in an amount equal to 100 percent of the Contract sum and a Faithful Performance Bond in an amount equal to 100 percent of the Contract Sum. Said bonds shall be from an admitted California Surety satisfactory to the District and listed in the Federal Register, issued by the Department of Treasury and licensed in California. Said bonds shall remain in full force and effect through the guarantee period. Facsimile of each required bond is appended to the Bidding Documents.

PREVAILING WAGES: The District has initiated and enforces a Labor Compliance Program ("LCP") that has received initial approval from the Director of the Department of Industrial Relations ("DIR") in accordance with Labor Code 1770, et seq., which requires the payment of the general rate of per diem wages or the general rate of per diem wages for holiday and overtime work for any State Funded School Facilities project. Wage rates, holidays, overtime, travel and subsistence provisions for this project shall be in accordance with "General Wage Determination Made by the Director of Industrial Relations Pursuant To California Labor Code, Part 7, Chapter 1, Article 2, Sections 1770, et seq., for [ ] County. Wage Rates shall conform with those posted in the District Office.

All Contractors and subcontractors who bid or work on a public works project must register and pay an annual fee to the Department of Industrial Relations (DIR).

No Contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

No Contractor or subcontractor may work on a public works project unless registered with DIR.

No Contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

**EXAMINATION OF RECORDS:** Government Code Section 10532 requires that the records of both the School District and the Contractor shall be subject to the examination and audit of the Auditor General for a period of three (3) years after final payment of the contract.

**SUBSTITUTION FOR RETENTIONS:** Pursuant to Public Contract Code Section 22300, Contractor will be permitted the option to deposit securities with an escrow agent as a substitute for retention earnings withheld by District to ensure performance.

**HAZARDOUS MATERIALS:** Pursuant to Public Contract Code, Section 7104, the Contractor shall agree to the provisions of said section concerning sub-surface hazardous materials. Certification is contained in the Agreement Form.

**LICENSE REQUIREMENTS:** Bidders are required pursuant to California Business and Professions Code 7028.15 to hold a valid State Contractor's License, Type [\_\_\_\_\_], as classified in Public Contract Code Section 3300 prior to execution of the Agreement. Bidders shall conform to California Business and Professions Code 7059 for Specialty Contractor's Licensing Provisions. Certification is contained in the Bid Form.

**DISTRICT REQUIREMENTS TO MATCH PRODUCTS:** In accordance with Public Contract Code Section 3400 (c) notice is given to bidders the District requires certain products specified by brand name followed by "no equals permitted", "District Standard" or "no Substitutions permitted" in the Specifications in order to match products in use on a particular public improvement either completed or in the course of construction. Subsection (b) of 3400 is not applicable for that particular product.

BOARD OF EDUCATION [TRUSTEES]  
[SUPERVISORS]

\_\_\_\_\_

\_\_\_\_\_

By \_\_\_\_\_

Clerk

Dates Published:

## SECTION 00 21 13

### INFORMATION FOR BIDDERS

PROJECT: The Work shall consist of everything necessary for and incidental to executing and completing all work required to comply with the Contract Documents referring to:



~~BID SET DEPOSITS: Bid Set Deposits will be returned in full to Bidders when all sets issued have been received at the designated pickup location in good condition within 14 calendar days after date of bid opening. Sets received after 14 calendar days, or sets received in marked, defaced, annotated or otherwise unusable condition for construction purposes will not qualify for deposit return and said deposit shall be forfeited. Sets not returned shall not be used for construction purposes. The successful bidder may retain bid sets without forfeiture; the number of such sets will be deducted from the number allowed for construction purposes as provided for herein. Subcontractors shall obtain construction sets ONLY from the successful bidder.~~

ADDENDA: Addenda issued during time of bidding shall be included in bid and shall be made a part of the Contract. Bidder shall list in the Bid Form each addendum received.

1. Addenda will be prepared and issued to Bidders at the option of the Architect.
2. Name, address, telephone number and fax number of the individual who is responsible for the bidding procedure and the receipt of Addenda shall be filed at the pick-up location.
3. Addenda will be issued only to Bidders who have obtained bid sets at the designated pick-up location and to Plan Rooms where bid documents are on file.
4. Addenda issued more than 4 working days prior to the day that Bids are designated to be opened shall be mailed to Bidders and Plan Rooms via UPS or Golden State Overnight, with no prior telephone notification.
5. Bidders who have obtained bid sets at the designated pick-up location will be notified by telephone when Addendum is issued less than 4 working days prior to day bids are to be opened. The Addendum will be transmitted to Bidders and Plan Rooms via UPS or Golden State Overnight. However, Bidders may obtain copies at the Architect's Office.

BID SECURITY: As stipulated in the Notice Inviting Bids, each bid shall be accompanied by cash, a cashier's check or certified check payable to the District, or a satisfactory bid bond in favor of the District, executed by the bidder as principal and an admitted surety company as surety, in an amount not less than 10 percent of the base bid in the Bid Form. The cash, check or bid bond shall be given as a guarantee that the bidder shall execute the contract if it be awarded to him, in conformity with the contract documents and shall provide the surety bonds as specified in the General Conditions. In case of refusal or failure to enter into said contract, the cash, cashier's check, certified check or bid bond, as the case may be, shall be paid to the District, as liquidated damages.

BID FORM: Bids to receive consideration shall be made in compliance with the following instructions:

- A. Bids shall be delivered in accordance with Notice Inviting Bids.

- B. Bids shall contain no recapitulation of work to be performed. Bid Forms other than those specifically requested will not be considered.
- C. Bids shall include all items of expense pertinent to contract.
- D. Bids shall be presented for consideration on the Bid Form included herein. Use of other forms constitutes grounds for rejection.
- E. Bidders shall carefully examine drawings, read specifications and all forms contained in the Project Manual, shall visit the site of work and fully inform themselves as to all existing conditions and limitations and shall include in their bids a sum to cover cost of all items included in the Contract Documents.

No Contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code Section 1771.1(a)].

**WITHDRAWAL OF BIDS:** Any bidder may withdraw his bid, either personally or by telegraphic or written notice at any time prior to the time scheduled for receiving bids. No bid, once opened and read, may be withdrawn for a period of sixty (60) days after opening.

**OPENING OF BIDS:** Bids shall be opened and publicly read aloud at the time and place stipulated in the Notice Inviting Bids.

**AWARD OR REJECTION OF BIDS:**

- A. (a)The lowest bid shall be the lowest bid price on the base contract without consideration of the prices on the additive or deductive items.

[(b)The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that were specifically identified in the bid solicitation as being used for the purpose of determining the lowest bid price. ]

[(c)The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that, when taken in order from a specifically identified list of those items in the solicitation, and added to, or subtracted from, the base contract, are less than, or equal to, a funding amount publicly disclosed by the local agency before the first bid is opened. ]

[(d)The lowest bid shall be determined in a manner that prevents any information that would identify any of the bidders or proposed subcontractors or suppliers from being revealed to the public entity before the ranking of all bidders from lowest to highest has been determined. ]

\*\*\*OR\*\*\*

- A. The contract will be awarded to the lowest responsible bidder based on the lowest



total bid determined by the Base Bid adjusted by adding to or subtracting from the Base Bid each accepted Alternate, if any, as selected by the Owner.

- B. The Owner, however, reserves the right to reject any or all bids and to waive any irregularities and informalities in any bid or in the bidding for any reason.
- C. Qualified bids are not acceptable to the District. Bids with qualifications will be rejected without consideration.
- D. Bidders are advised that bids or attachments thereto received after the stipulated time will be rejected.
- E. Bidders are advised that CERTIFICATIONS TO BID FORM 1, 2 and 3 described herein, are required and shall be submitted as stipulated herein. Missing, incomplete, or non-responsive certificates will serve as grounds for rejection of entire bid.

**AGREEMENT:** Contract (Agreement Form) which the successful bidder as contractor will be required to execute is included in this Project Manual and shall be carefully examined by the bidder prior to submitting his Bid Form.

**INTERPRETATION OF DRAWINGS:** If any person contemplating submitting a bid for proposed Work is in doubt as to true meaning of any part of the drawings, specifications or other forms in the Project Manual, or finds discrepancies in, or omissions from said documents, he shall submit to Architect a written Request For an Interpretation or Request for Information (RFI) thereof. Person submitting request will be responsible for its prompt delivery. Any interpretations of proposed documents will be made by addendum duly issued and a copy of such addendum will be transmitted to each person receiving a set of such documents as provided herein. District will not be responsible for any other explanation or interpretation of documents. Bidders are cautioned to accept interpretations in writing only.

**SUBCONTRACTORS:** Bidders are hereby notified that District and Architect will not recognize subcontractors as having any function in work other than employees of General Contractor. Bidders shall refer to the General Conditions with reference to employees and to the Bid Form and the General Conditions with reference to subcontractors. The Bidders shall be responsible that subcontractors have read the General Conditions, Supplementary General Conditions and are familiar with terms and conditions of the Contract Documents as said terms and conditions may affect their work, prior to submitting bid.

**DRAWINGS AND PROJECT MANUALS FURNISHED:** Architect shall furnish successful bidder with Fifteen (15) complete sets of drawings and project manuals pertinent to work for construction purposes. Additional copies required may be purchased from Architect for an amount equal to printing costs. Bidders are hereby notified that all such drawings and project manuals are the property of the District and are loaned to the successful bidder for duration of work. Any re-use, in whole or in part, for any purpose, is prohibited.

**TIME FOR COMPLETION:** Time is of the essence in execution of this contract. Bidder shall refer to the Bid Form with reference to time of execution.

**OTHER REQUIREMENTS:** The bidder's attention is specifically directed to requirements of the General Conditions as they may be modified herein by the Supplementary Conditions, with

reference to liability and property insurance, and to the provisions in the Agreement for progress payments, hold harmless agreement, final payment, subsurface hazard materials encountered and liquidated damages. In this contract, cost of premiums for insurance coverage shall be as follows:

1. Comprehensive General Liability: Contractor's cost, included in contract sum. Refer to Article 11, Supplementary Conditions for Required Amount of Coverage.
2. Property Damage Liability: Contractor's cost, included in contract sum.
3. Workers' Compensation: Contractor's cost, included in contract sum.
4. Owner's Liability Insurance: District's option.
5. Property Insurance: Contractor's cost included in contract sum.
6. Boiler and Machinery Insurance: District's option.

REQUIRED CERTIFICATIONS, BID FORM: All bidders are required to execute and submit together with the BID FORM, the following certifications:

1. Bidder's Non-Collusion Affidavit, identified herein as Attachment No. 1 to Bid Form.
3. Site Visit Certification herein as Attachment No. 3 to Bid Form.

REQUIRED CERTIFICATIONS, AGREEMENT: Prior to execution of the AGREEMENT, the successful bidder shall submit the following certifications:

1. Bidder's Certificate Regarding Worker's Compensation, identified herein as Attachment No. 1 to Agreement.
2. Drug-Free Work Place Certification, identified herein as Attachment No. 2 to Agreement.
3. Contractor Certification – Education Code 45125.2 [45125.1], identified herein as Attachment No. 3 to Agreement.
4. **[Prevailing Wage Certification, identified herein as Attachment No. 4 to Agreement.]**
- [5. Pre-Job Conference Checklist herein as Attachment No. 5 to Agreement.]**
6. Performance Bond and Payment Bonds.

All bidders are advised to retain certifications until the successful bidder has been confirmed and an Agreement for the work has been executed.

BID DEPOSIT RETURN: The cash, check or Bid Bond of three or more low bidders, the number being at the discretion of the District, will be held for sixty (60) days or until posting by the successful bidder of the bonds and certificates of insurance required and return of executed copies of the appropriate agreement form, whichever first occurs, at which time the deposits will be returned. Cash, check or Bid Bond of other bidders will be returned after opening of the bids.

- A. supported by competent, admissible and creditable evidence.

END OF SECTION

**SECTION 00 31 00**

**AVAILABLE PROJECT INFORMATION**

PROJECT NAME:

The following document(s) are available for bidders' review and can be obtained from the Owner's Representative.

1. Geotechnical Investigation Report (Soils Report).
2. Site Surveys.
3. Hazardous Materials Surveys.
4. Boundary Survey.
5. [                    ]

Specific Requirements are included in the provided information that Bidders are required to comply with. Bidders are requested to review documents carefully for information contained therein affecting the bidders' proposal.

**END OF SECTION**

**SECTION 00 41 00**

**BID FORM**

Name of Bidder \_\_\_\_\_

Date \_\_\_\_\_

Address \_\_\_\_\_

Telephone \_\_\_\_\_

**BASE BID**

The undersigned, having carefully examined the site and having carefully examined the Information for Bidders, Contract Forms, General Conditions, Supplementary Conditions, Project Manual and Drawings prepared by tbd Architects, xxxxx Street., city, CA zip for construction of:

<>

hereby proposes to furnish everything necessary for and incidental to the execution and completion of the work, in strict conformance with the Drawings and the Project Manual, dated \_\_\_\_\_, **20**\_\_\_\_, including all work specified in Addenda Nos. \_\_\_\_\_ dated \_\_\_\_\_, and all Allowances, for the sum of:

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_), including all applicable taxes, permits and licenses.

**CASH ALLOWANCE**

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_), per Section  
**01 20 00. Include in the Base Bid.**

**ALTERNATE NO. [ \_\_\_\_\_ ] [Additive] [Deductive] TO BASE BID in accordance with Section  
01 20 00.**

**[Additive Alternate, THE SUM OF:]  
[Deductive Alternate, THE SUM OF:]**

\_\_\_\_\_ DOLLARS  
(\$ \_\_\_\_\_), including all applicable taxes, permits and  
licenses.

**UNIT COST ITEM**

\_\_\_\_\_, per Section **01 20 00**

**LICENSES:** Bidders are required pursuant to California Business and Professions Code 7028 to hold a valid State Contractor's License, **Type B [ A ] [ C - \_\_\_\_\_ ]**, as classified in Public Contract

Code Section 3300 prior to execution of the Agreement. Bidders shall conform to California Business and Professions Code [7055 for Specialty Contractor's Licensing Provisions. The undersigned hereby certifies that prior to award of contract, he will be licensed by the State of California, as required by California Business and Professions Code 7028.15 [7028], that such license will be in full force and effect and that any and all subcontractors employed by him on the work will be similarly licensed. License Number: (\_\_\_\_\_). License Expiration Date: (\_\_\_\_\_). This information is provided under penalty of perjury.

**[TIME FOR PROJECT COMPLETION: All work under this Contract shall be completed within a period of \_\_\_\_\_ consecutive calendar days commencing five (5) days from and after notice by District to Contractor to begin work.]**

**[TIME FOR COMPLETION: All work under this contract shall be completed on or before \_\_\_\_\_. It is the intent of the District to issue a Notice to Proceed immediately after the regularly scheduled meeting of the board on \_\_\_\_\_. Should the Notice to Proceed be delayed more than 5 calendar days beyond the date of the board meeting, through no fault of the Contractor, the completion date will be extended by the amount of the delay.]**

**LIQUIDATED DAMAGES FOR DELAYED PROJECT COMPLETION:** The State of California Government Code, Section 53069.85 provides that public work projects may establish time limits within which the whole or any specified portion of the work contemplated shall be completed and that for each day completion is delayed beyond the specified time, the Contractor shall pay to such agency involved, a specified sum of money to be deducted from any payments due or to become due to the Contractor. In accordance with said Government Code, Section 53069.85, the undersigned hereby agrees that if all work is not completed as set forth above under the section **TIME FOR PROJECT COMPLETION**, or as specifically extended by written consent of the District, the undersigned will pay to the District the sum of **[THREE HUNDRED DOLLARS (\$300.00)] [FIVE HUNDRED DOLLARS (\$500.00)] [ONE THOUSAND DOLLARS (\$1,000.00)]** per day for each and every consecutive calendar day delay in the completion of all work and that the District may deduct the amounts thereof from any monies due or that may become due to the Undersigned. This article does not exclude recovery of damages under provisions of the contract documents.

**EXECUTION OF CONTRACT:** The undersigned further agrees that if he is notified of the acceptance of his Bid Form within sixty (60) consecutive calendar days after time set for opening of bids, he will execute and deliver to District, within five (5) days after having received written notice thereof, the contract attached herein as a part of these documents, including the bonds and certificates of insurance specified herein.

**BID SECURITY:** The required bid security is hereto attached.

**BONDS:** The undersigned further agrees to provide a Performance Bond in the amount of one hundred (100) percent of the contract sum and a Payment Bond in the amount of one hundred (100) percent of the contract sum. Said bonds shall be from an admitted California Surety satisfactory to the District and listed in the Federal Register issued by the Department of Treasury and licensed in California. Said bonds shall remain in full force and effect through the guarantee period.

**BIDDER'S NONCOLLUSION AFFIDAVIT:** Executed Affidavit identified as Attachment No. 1 to Bid Form, is hereto attached.

SITE VISIT CERTIFICATION: Executed certificate identified as Attachment No. 3 to Bid Form, is hereto attached.

#### DESIGNATION OF SUBCONTRACTORS

- A. In accordance with Section 4104.(a) (1), Public Contract Code, the undersigned hereby sets forth below the name and address of each and every subcontractor who will perform work or labor or render service to the Contractor in relation to the work or improvements to be performed under this contract in an amount in excess of one-half of one percent of the total bid.
- B. If the undersigned fails to specify a subcontractor for any portion of the work to be performed under the Contract, it is hereby agreed the General Contractor is Fully Qualified and shall perform that portion of work himself and that he shall not be allowed to subcontract that part of work except as expressly provided for hereinafter. Fully Qualified means holding the specialty license required for that trade.
- C. Subletting or subcontracting of any portion of the work to which no subcontractor was designated in the original Bid Form shall only be permitted in case of public emergency or necessity and then only after specific written agreement by District.

SUBCONTRACT                      SUBCONTRACTOR                      ADDRESS                      LICENSE NO.

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(use additional sheets if necessary)

Name of Bidder \_\_\_\_\_

Signed \_\_\_\_\_

Title \_\_\_\_\_

**END OF SECTION**

**SECTION 00 43 95**

**(ATTACHMENT NO. 1 TO BID FORM)**

**BID BOND**

KNOW ALL PERSONS BY THESE PRESENTS, that we

As CONTRACTOR/PRINCIPAL and \_\_\_\_\_  
As Surety, an admitted Surety insurer pursuant to code of Civil Procedure, Section 995.120,  
legally doing business in California at \_\_\_\_\_  
are held and firmly bound unto the \_\_\_\_\_  
hereinafter called the OWNER, in the penal sum of TEN PERCENT (10%) OF THE TOTAL  
AMOUNT OF THE BID of the CONTRACTOR/PRINCIPAL submitted to the said OWNER for  
the Work described below for the payment of which sum is lawful money of the United States,  
well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors  
and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the  
CONTRACTOR/PRINCIPAL has submitted the accompanying bid dated \_\_\_\_\_,  
20\_\_\_, for the construction all Work for the complete project known as:

<Project Name>

NOW THEREFORE, the CONTRACTOR/PRINCIPAL shall not withdraw said bid within 60  
calendar days after said opening; and the CONTRACTOR/PRINCIPAL, when given Notice of  
Award, shall within FIVE (5) calendar days after the prescribed forms are presented to him for  
signature, return executed copies of the Agreement to the OWNER, in accordance with the bid  
as accepted and give bond with good and sufficient surety or sureties, as may be required, for  
the faithful performance and proper fulfillment of such contract and for the payment for labor  
and materials used for the performance of the contract, or in the event of the withdrawal of said  
bid within the period specified or the failure to enter into such contract and give such bonds  
within the time specified, the CONTRACTOR/PRINCIPAL shall pay the OWNER the difference  
between the amount specified in said bid and the amount for which the OWNER may procure  
the required work and/or supplies of the latter amount be in excess of the former, together with  
all costs incurred by the OWNER in again calling for bids, then the above obligation shall be  
void and of no effect, otherwise to remain in full force and effect.

Surety, for value received, hereby stipulates and agrees that no change, extension of time,  
alteration or addition to the terms of the contract on the call for bids, or to the work to be  
performed thereunder, or the specifications accompanying the same, shall in any way affect its  
obligation under this bond, and it does hereby waive notice of any such change, extension of  
time, alteration or addition to the terms of said contract or the call for bids, or to the work, or the  
specifications.

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



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

(Corporate Seal) \_\_\_\_\_  
CONTRACTOR/PRINCIPAL

BY: (Signature) \_\_\_\_\_

Print Name \_\_\_\_\_

(Corporate Seal) \_\_\_\_\_  
Surety

BY: (Signature) \_\_\_\_\_

Print Name \_\_\_\_\_

TITLE \_\_\_\_\_

Address \_\_\_\_\_

Telephone Number \_\_\_\_\_

(Attach Attorney-in-Fact Certificate)

**END OF SECTION**

**SECTION 00 45 46**

**ATTACHMENT NO. 4 TO BID FORM**

**SITE VISIT CERTIFICATION**

I certify that I have visited the site of the proposed work and have fully acquainted myself with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the work under contract.

I certify under penalty of perjury under the laws of the State of California at the foregoing is true and correct.

I fully indemnify [ \_\_\_\_\_ ], the Architect, the Construction Manager (where applicable), and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit to the site.

\_\_\_\_\_  
(Signature of Bidder)

\_\_\_\_\_  
(Typed name of Bidder)

SUBSCRIBED BEFORE ME on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
(Notary Public)

My commission expires: \_\_\_\_\_

**END OF SECTION**

SECTION 00 52 00

AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS CONTRACT made in 5 copies on this \_\_\_\_\_ day of \_\_\_\_\_ in the year 20\_\_\_\_, BY AND BETWEEN [ \_\_\_\_\_ ] [ \_\_\_\_\_ ] County, California, hereinafter called the OWNER and [ \_\_\_\_\_ ] hereinafter called the CONTRACTOR. (Contractor's License No. \_\_\_\_\_).

WITNESSETH: That the OWNER and Contractor for the considerations hereinafter named agree as follows:

ARTICLE 1

SCOPE OF THE WORK: Contractor shall furnish all of the materials and perform all of the work indicated on the drawings and described in the Project Manual entitled:

Title <>

prepared by: tbd Architects \_\_\_\_\_ Street \_\_\_\_\_, CA zip

acting as and in these contract documents entitled the Architect; and shall do everything required by the Agreement, the General Conditions of the Contract for Construction, Supplementary Conditions, Technical Specification Sections and Drawings dated \_\_\_\_\_, 20\_\_\_\_, and Addenda Nos. \_\_\_\_\_ dated \_\_\_\_\_.

ARTICLE 2

[TIME FOR PROJECT COMPLETION: All work under this Contract shall be completed within a period of \_\_\_\_\_ consecutive calendar days commencing five (5) days after receiving written notification from the OWNER to proceed with the work.] [All work under this contract shall be completed on or before \_\_\_\_\_].

[TIME FOR COMPLETION: All work under this contract shall be completed on or before \_\_\_\_\_. It is the intent of the OWNER to issue a Notice to Proceed immediately after the regularly scheduled meeting of the board on \_\_\_\_\_. Should the Notice to Proceed be delayed more than 5 calendar days beyond the date of the board meeting, through no fault of the Contractor, the completion date will be extended by the amount of the delay.]

ARTICLE 3

THE CONTRACT SUM: The OWNER shall pay the Contractor for the performance of this Contract, subject to the additions and deductions provided herein, the sum of:

\_\_\_\_\_ DOLLARS

(\$ \_\_\_\_\_), including all applicable taxes and licenses.

#### ARTICLE 4

**PROGRESS PAYMENTS:** Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the OWNER shall make progress payments on account of the Contract Sum to the Contractor **[as provided in Article 9 of the General Conditions and amended by the Supplementary Conditions.]**

#### ARTICLE 5

**PERFORMANCE RETENTION:** Pursuant to Public Contract Code Section 22300, Contractor has the option to deposit securities with an escrow agent approved by the OWNER as a substitute for retention earnings withheld by the OWNER to ensure performance.

#### ARTICLE 6

**HOLD HARMLESS AGREEMENT:** The Contractor agrees to and does hereby indemnify and hold harmless the OWNER, its officers, agents, and employees from every claim or demand made and every liability, loss, damage, or expense of any nature whatsoever, which may be incurred by reason of:

- A. Liability for damages for (1) death or bodily injury to persons, (2) injury to property, or (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the Contractor or any person, firm or corporation employed by the Contractor upon or in connection with the work called for in this Agreement except for liability for damages referred to above which result from the sole negligence or willful misconduct of the OWNER, its officers, employees, agents or independent contractors who are directly employed by the OWNER, or for defects in design furnished by such persons.
- B. Any injury to or death of persons or damage to property, sustained by any person, firm, or corporation, including the OWNER, arising out of, or in any way connected with the work covered by this Agreement, whether said injury or damage occurs either on or off school OWNER property, except for liability for damages which result from the sole negligence or willful misconduct of the OWNER, its officers, employees, agents or independent contractors who are directly employed by the OWNER, or for defects in design furnished by such persons.
- C. The Contractor, at his own expense, cost, and risk, shall defend any and all actions, suits, or other proceeding that may be brought or instituted against the OWNER, its officers, agents, or employees on any such claim, demand, or liability and shall pay or satisfy any judgment that may be rendered against the OWNER, its officers, agents, or employees in any action, suit, or other proceedings as a result thereof.

#### ARTICLE 7

- A. Wage rates for this project shall be in accordance with the "General Wage Determination Made By The Director of Industrial Relations Pursuant To California Labor Code, Part 7, Chapter 1, Article 2, Sections 1770, et seq., for

\_\_\_\_\_ County. Wage rates shall conform with those posted in the OWNER Office.

B. The following labor code sections are hereby referenced and made a part of this agreement:

1. Section 1735, Anti-Discrimination Requirements.
2. Section 1775, Penalty for Failure to Comply with Prevailing Wage Rates.
3. Section 1776, Payroll Records.
4. Section 1773.3, Wages.
5. Section 1777.5 and 1777.6, Apprenticeship Requirements.
6. Section 1810 and 1811, Working Hour Restrictions.
7. Section 1813, Penalty for Failure to Pay Overtime.
8. Section 1815, Overtime Pay.

[F. Mandatory Attendance at Pre-Job Conference: Contractor [and Sub-Contractors] are required to attend the OWNER's Pre-Job Conference. At the Pre-Job Conference, the OWNER's Labor Compliance Program (LCP) Plan will be explained and its Pre-Job Conference checklist will be reviewed. Contractor and Sub-Contractors are required to sign the Checklist to verify attendance of the Pre-Job Conference. The Checklist is included in the LCP Plan and Attachment \_\_\_\_\_ to the Agreement.]

#### ARTICLE 8

RECORD AUDIT: In accordance with Government Code, Section 10532, records of both the OWNER and the Contractor shall be subject to examination and audit by the Auditor General for a period of three (3) years after final payment.

#### ARTICLE 9

##### CERTIFICATIONS:

A. Certifications of compliance with requirements for Worker's Compensation (Attachment No. 1 to Agreement), Drug-Free Work Place (Attachment No. 2 to Agreement) and Contractor Certification Education Code 45125.2 (Attachment No. 3 to Agreement) [Prevailing Wage Certification (Attachment No. 4 to Agreement)] are hereby made a part of this Agreement.

#### ARTICLE 10

FINAL PAYMENT: Final payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the OWNER to the Contractor 35 days after a Notice of Completion has been recorded, unless otherwise stipulated in the Notice of Completion, provided the Work has then been completed, the Contract fully performed, and a final Certificate for Payment has been issued by the Architect.

#### ARTICLE 11

THE CONTRACT DOCUMENTS: The General Conditions of the Contract for Construction, Supplementary Conditions, Technical Specification Sections, Drawings and Addenda thereto, the

Performance Bond and Payment Bond, together with this Agreement form the Contract. They are fully a part of the Contract as if hereto attached or herein repeated.

## ARTICLE 12

### SUBSURFACE HAZARDOUS MATERIALS:

- A. In the event trenches or other excavations extend deeper than four (4) feet below the surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the OWNER in writing of any:
1. Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II or Class III disposal site in accordance with the provisions of existing law.
  2. Subsurface or latent physical conditions at the site differing from those indicated.
  3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in the contract.
- B. Upon receipt of said notification the OWNER will investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of or the time required for performance of any part of the work, the OWNER will issue a change order under the procedures described in the General Conditions.
- C. In the event that a dispute arises between the OWNER and the Contractor whether the conditions materially differ, or involve hazardous waste or cause a decrease or increase in the Contractor's cost of or time required for performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

## ARTICLE 13

**LIQUIDATED DAMAGES:** It is agreed that the Contractor will pay the OWNER the sum of **[THREE HUNDRED DOLLARS (\$300.00)] [FIVE HUNDRED DOLLARS (\$500.00)] [ONE THOUSAND DOLLARS (\$1,000.00)]** per calendar day for each and every day of delay beyond the time prescribed herein for finishing said work, as Liquidated Damages and not as a penalty or forfeiture. In the event the same is not paid, the Contractor further agrees that the OWNER may deduct the amount thereof from any money due or that may become due the Contractor under the Contract. This Article does not exclude recovery of damages under provisions of the Contract Documents.

## ARTICLE 14

**BACKGROUND CHECK:** Contractor agrees to comply with all provisions of Education Code Section 45125.2. Contractor shall certify that pursuant to Education Code Section 45125.2 that at least one supervising employee, for whom a background check has been conducted by the

Department of Justice and has ascertained that said supervising employee has not been convicted of serious or violent felonies, as specified in Penal Code Section 1192.7(c), and 667.5(c), respectively will be supervising on site at all times with employees for whom background checks have not been conducted.

**Or**

[BACKGROUND CHECK: Contractor agrees to comply with all provisions of Education Code Section 45125.1. Contractor shall conduct criminal background check of all employees assigned to the OWNER, and will certify that no employees who have been convicted of serious or violent felonies as specified in Education Code 45125, will have contact with students, pursuant to this Agreement. Contractor must provide the OWNER with a list of all employees providing services pursuant to this Agreement, and designate to which sites they will be assigned. Failure to comply with this law may result in, at OWNER's sole discretion, termination of this Agreement.]

**ARTICLE 15**

The Architect shall be the Initial Decision Maker to render decisions in accordance with the General Conditions of the Contract for Construction.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
OWNER

By \_\_\_\_\_

By \_\_\_\_\_

\_\_\_\_\_  
Official Title

\_\_\_\_\_  
Official Title

\_\_\_\_\_  
Address

\_\_\_\_\_  
Legal Counsel

**END OF SECTION**

**SECTION 00 54 30**  
**ATTACHMENT NO. 4 TO AGREEMENT**  
**PREVAILING WAGE CERTIFICATION**

PROJECT / CONTRACT NO.: \_\_\_\_\_ between the \_\_\_\_\_  
\_\_\_\_\_ SCHOOL (the DISTRICT and \_\_\_\_\_  
\_\_\_\_\_ CONSTRUCTION CO. (the CONTRACTOR or the BIDDER) (the  
Contract or the Project).

In accordance with the Department of Industrial Relations workers who perform certain off-site sheet metal and electrical work must be paid prevailing wages.  
([www.dir.ca.gov/DLSR/Coverage/2000-027.pdf](http://www.dir.ca.gov/DLSR/Coverage/2000-027.pdf) and <http://www.dir.ca.gov>.)

Date: \_\_\_\_\_  
Proper Name of Bidder: \_\_\_\_\_  
Signature: \_\_\_\_\_  
By: \_\_\_\_\_  
Its: \_\_\_\_\_

**END OF SECTION**



SECTION 00 61 13.13

PAYMENT BOND  
CALIFORNIA PUBLIC WORK

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the [ \_\_\_\_\_ ] District (sometimes hereinafter referred to as "Obligee") has awarded to (hereinafter designated as the "Contractor"), an agreement dated: \_\_\_\_\_, for work described as follows:  
[ \_\_\_\_\_ ]

(hereinafter referred to as the "Public Works Contract") and

WHEREAS, said Contractor is required to furnish a bond in connection with said Public Works Contract, and pursuant to Section 3247 of the California Civil Code;

Now, therefore, we, \_\_\_\_\_, the undersigned Contractor, as Principal; and \_\_\_\_\_ a corporation organized and existing under the laws of the State of California, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the [ \_\_\_\_\_ ] District and to any and all persons, companies or corporations entitled to file stop notices under Section 3181 of the California Civil Code in the sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), said sum being not less than one hundred (100%) percent of the total amount payable by the said Obligee under the terms of the said Public Works Contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors, successors, administrators, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if said Contractor, his or its heirs, executors, administrators, successors or assigns, or Subcontractors, shall fail to pay for any materials, provisions or other supplies, implements, machinery or power used in, upon, for, or about the performance of the Public Work contracted to be done, or to pay any person for any work or labor of any kind, or for bestowing skills or other necessary services thereon, or for amounts due under the Unemployment Insurance Code with respect to such work or labor, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Contractor and his Subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor as required by the provisions of Section 3247 through 3252 of the Civil Code, the Surety or Sureties hereon will pay for the same in an amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void.

In case suit is brought upon this bond, the same Surety or Sureties will pay a reasonable attorney's fee to be fixed by the Court. In addition to the provisions hereinabove, it is agreed that this bond will insure to the benefit of any and all persons, companies and corporation entitled to serve stop notices under Section 3181 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or additions to the terms of the said Public Works Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its

obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the specifications.

No final settlement between the Obligee and the Contractor hereunder shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

Principal and Surety agree that if the Obligee is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the Obligee's reasonable attorney's fees incurred, with or without suit, in addition to the above sum.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

PRINCIPAL:

\_\_\_\_\_

By: \_\_\_\_\_

SURETY:

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-In-Fact

IMPORTANT: Surety companies executing Bonds must possess a certification of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in Section 105 of the California Insurance Code, and if the work or project is financed, in whole or in part, with federal grant or loan funds, must also appear on the Treasury Department's most current list (Circular 570 as amended).

THIS IS A REQUIRED FORM.

(Name and Address of Surety)

\_\_\_\_\_

\_\_\_\_\_

(Name and Address of Agent or Representative for service of process in California, if different from above)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Telephone number of Surety and Agent or Representative for service of process in California)

\_\_\_\_\_

\_\_\_\_\_

STATE OF CALIFORNIA )  
COUNTY OF \_\_\_\_\_ ) ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, in the year 20\_\_\_\_, before me, \_\_\_\_\_, a Notary Public in and for said state, personally appeared \_\_\_\_\_, known to me to be the person whose name is subscribed to the within instrument as the Attorney-In-Fact of the (Surety) acknowledged to me that he subscribed the name of the \_\_\_\_\_ (Surety) thereto and his own name as Attorney-In-Fact.

Notary Public in and for said State

(SEAL)

Commission expires:

NOTE: A copy of the Power-of-Attorney to local representatives of the bonding company must be attached hereto.

**END OF SECTION**

SECTION 00 61 13.16

CONTRACT PERFORMANCE BOND  
CALIFORNIA PUBLIC WORK

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the [ \_\_\_\_\_ ] District (sometimes referred to hereinafter as "Obligee") has awarded to \_\_\_\_\_, hereinafter designated as the "Contractor" an agreement for the work described as follows:  
[ \_\_\_\_\_ ]

(Hereinafter referred to as the "Public Work" and WHEREAS, the work to be performed by the Contractor is more particularly set forth in that certain contract for the said Public Work dated \_\_\_\_\_, incorporated herein by this reference; and

WHEREAS, the Contractor is required by said Public works Contract to perform the terms thereof and to provide a bond both for the performance and guaranty thereof.

NOW, THEREFORE, we, \_\_\_\_\_ the undersigned Contractor, as Principal, and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business under the laws of the State of California, Surety, are held and firmly bound unto the [ \_\_\_\_\_ ] District in the sum of Dollars (\$ \_\_\_\_\_), said sum being not less than one hundred (100%) percent of the total amount payable by the said Obligee under the terms of the said Public Works Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the bounded Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Public Works Contract and any alteration thereof made as therein provided, on his or its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill the one-year guarantee of all materials and workmanship; and shall indemnify and save harmless the Obligee, its officers and agents, as stipulated in said Public Works Contract, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. In case suit is brought upon this bond, the said Surety will pay to Obligee a reasonable attorney's fee to be fixed by the Court.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Public Works Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

No final settlement between the Obligee and the Contractor shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

Principal and Surety agree that if the Obligee is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the Obligee's reasonable attorney's fees incurred, with or without suit, in addition to the above sum.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

PRINCIPAL:

\_\_\_\_\_

By: \_\_\_\_\_

SURETY:

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-In-Fact

The rate of premium on this bond is \_\_\_\_\_ per thousand. The total amount of premium charges, \$\_\_\_\_\_.  
(The above must be filled in by corporate attorney.)

IMPORTANT: Surety companies executing Bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write surety insurance defined in Section 105 of the California Insurance Code, and if the work or project is financed, in whole or in part, with federal grant or loan funds, must also appear on the Treasury Department's most current list (Circular 570 as amended).

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety)

\_\_\_\_\_  
\_\_\_\_\_

(Name and Address of Agent or Representative for service of process in California, if different from above)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Telephone number of Surety and Agent or Representative for service of process in California)

\_\_\_\_\_  
\_\_\_\_\_

STATE OF CALIFORNIA )  
COUNTY OF \_\_\_\_\_ ) ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, in the year 20\_\_\_\_, before me, \_\_\_\_\_, a Notary Public in and for said state, personally appeared

\_\_\_\_\_, known to me to be the person whose name is subscribed to the within instrument as the Attorney-In-Fact of the (Surety) acknowledged to me that he subscribed the name of the \_\_\_\_\_ (Surety) thereto and his own name as Attorney-In-Fact.

Notary Public in and for said State

(SEAL)

Commission expires:

NOTE: A copy of the Power-of-Attorney to local representatives of the bonding company must be attached hereto.

Federal regulations (Code Sections 6041 and 6209) require non-corporated recipients of \$600.00 or more to furnish their taxpayer identification number to the payer. The payer then in turn must furnish Form 1099 to both the payee and Internal Revenue Service showing the total payments.

The regulations also provide that a penalty may be imposed for failure to furnish taxpayer identification number.

In order to comply with these regulations, we request your federal tax identification number or social security number, whichever is applicable.

Please complete the information below:

COMPANY NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_  
Street City State Zip

TYPE OF BUSINESS ENTITY

TAXPAYER IDENTIFICATION #

\_\_\_\_ Individual \_\_\_\_\_

\_\_\_\_ Sole Proprietorship

Employer identification #

\_\_\_\_ Partnership \_\_\_\_\_

\_\_\_\_ Corporation

Social Security #

\_\_\_\_ Other \_\_\_\_\_

Date:

\_\_\_\_\_  
Signature

Title

Under penalties of perjury, I certify that the number indicated on this form is my correct taxpayer identification number.

**END OF SECTION**

 **AIA<sup>®</sup> Document A201<sup>™</sup> – 2007****General Conditions of the Contract for Construction**

for the following PROJECT:  
*(Name and location or address)*

THE OWNER:  
*(Name, legal status and address)*

THE ARCHITECT:  
*(Name, legal status and address)*

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "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.

#### **§ 1.1.4 The Project**

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 construction by the Owner and by separate contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 Instruments Of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

### **§ 1.2 Correlation and Intent of the Contract Documents**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.



§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### § 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

### § 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### § 1.5 Ownership and Use of Drawings, Specifications and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

### § 1.6 Transmission of Data in Digital Form

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

## ARTICLE 2 OWNER

### § 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### § 2.2 Information and Services Required of the Owner

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.



**§ 2.2.2** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.2.3** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 2.2.4** The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

**§ 2.2.5** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

**§ 2.3 Owner's Right to Stop the Work**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

**§ 2.4 Owner's Right to Carry Out the Work**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

**ARTICLE 3 CONTRACTOR**

**§ 3.1 General**

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**§ 3.1.3** The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

**§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### § 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

### § 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

### § 3.5 Warranty

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

### § 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

### § 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

### § 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### § 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

**§ 3.8.3** Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

### **§ 3.9 Superintendent**

**§ 3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### **§ 3.10 Contractor's Construction Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

**§ 3.10.2** The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

**§ 3.12.2** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**§ 3.12.3** Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

**§ 3.12.4** Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

**§ 3.12.5** The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

**§ 3.12.6** By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**§ 3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

**§ 3.12.8** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

**§ 3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled



to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

### **§ 3.13 Use of Site**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **§ 3.14 Cutting and Patching**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

### **§ 3.15 Cleaning Up**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 Access to Work**

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

### **§ 3.17 Royalties, Patents and Copyrights**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

### **§ 3.18 Indemnification**

**§ 3.18.1** To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce

other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

#### **ARTICLE 4 ARCHITECT**

##### **§ 4.1 General**

**§ 4.1.1** The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 4.1.2** Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

**§ 4.1.3** If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

##### **§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

##### **§ 4.2.4 Communications Facilitating Contract Administration**

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

**§ 4.2.5** Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.



§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

#### § 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

#### § 5.3 Subcontractual Relations

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

#### § 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

#### **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

##### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

##### **§ 6.2 Mutual Responsibility**

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

### § 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

### § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

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

### § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 Minor Changes in the Work

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

### ARTICLE 8 TIME

#### § 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

#### § 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be

furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### § 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

### § 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

### § 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the



Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

#### § 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### § 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of:

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

#### § 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

#### § 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

#### § 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

### **§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### **§ 9.10 Final Completion and Final Payment**

**§ 9.10.1** Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.



§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

### § 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

### § 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

**§ 10.2.8 Injury or Damage to Person or Property**

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

**§ 10.3 Hazardous Materials**

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

#### § 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### ARTICLE 11 INSURANCE AND BONDS

#### § 11.1 Contractor's Liability Insurance

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

#### § 11.2 Owner's Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

#### § 11.3 Property Insurance

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's

risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

#### § 11.3.2 Boiler and Machinery Insurance

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

#### § 11.3.3 Loss of Use Insurance

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

#### § 11.3.7 Waivers of Subrogation

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

#### § 11.4 Performance Bond and Payment Bond

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

### ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

#### § 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.



§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

## § 12.2 Correction of Work

### § 12.2.1 Before or After Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

### § 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

## § 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

### § 13.3 Written Notice

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

### § 13.4 Rights and Remedies

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

### § 13.5 Tests and Inspections

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

#### § 13.6 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

#### § 13.7 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

### ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

#### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

#### § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.



§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

#### § 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

#### § 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

### ARTICLE 15 CLAIMS AND DISPUTES

#### § 15.1 Claims

##### § 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

##### § 15.1.2 Notice of Claims

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker.

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Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

#### **§ 15.1.3 Continuing Contract Performance**

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

#### **§ 15.1.4 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.5 Claims for Additional Time**

**§ 15.1.5.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

**§ 15.1.5.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

#### **§ 15.1.6 Claims for Consequential Damages**

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### **§ 15.2 Initial Decision**

**§ 15.2.1** Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

**§ 15.2.2** The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

**§ 15.2.3** In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### § 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

### § 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

**SECTION 00 73 00**

**SUPPLEMENTARY CONDITIONS**

**ARTICLE 1: GENERAL PROVISIONS**

1.1.1 CHANGE the second sentence to read:

A modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the work issued by the Architect.

1.2.1 ADD the following:

In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

1. The Agreement.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.
5. Drawings and Technical Specifications.
6. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.
7. Any work called for in the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

1.2.2 ADD the following sentence:

Such organization shall not operate to make the Architect an arbiter to establish subcontract limits.

**ARTICLE 2: OWNER**

2.1.2 DELETE subparagraph.

2.2.1 DELETE subparagraph.

2.2.3 ADD the following sentence:

The Owner will establish lot lines, restrictions and a permanent bench mark. All other grade lines, levels and bench marks shall be established and maintained by the Contractor.

2.4 CHANGE the second sentence to read:

In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including the cost of additional Architectural, Engineering, Managerial,

and Administrative Services made necessary by such default, neglect or failure.

### **ARTICLE 3: CONTRACTOR**

3.2.1 ADD the following sentence:

No allowance shall subsequently be made on behalf of the Contractor on account of an error on his part or his negligence or failure to acquaint himself with the conditions of the site.

3.5 WARRANTY

3.5.1 ADD the following new subparagraphs:

Besides warranties required elsewhere, Contractor shall, and hereby does, warrant all work for a period of one year after date of certified completion and shall repair or replace any or all such work, together with any other work, which may be displaced in so doing, that may prove defective in workmanship and/or materials within a one-year period from date of certified completion without expense whatsoever to Owner, ordinary wear and tear, unusual abuse of neglect excepted. Owner will give notice of observed defects with reasonable promptness. Contractor shall notify Owner upon completion of repairs.

In the event of failure of Contractor to comply with above-mentioned conditions within seven calendar days after being notified in writing, Owner, under provisions of Article 12, will proceed to have defects repaired and made good at expense of Contractor who hereby agrees to pay costs and charges therefor immediately on demand.

3.5.2 ADD the following new subparagraph:

If, in the opinion of the Owner, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the Owner or to prevent interruption of operations of the Owner, the Owner will attempt to give the notice required by this article. If the Contractor cannot be contacted or does not comply with the Owner's request for correction within a reasonable time as determined by the Owner, the Owner may, notwithstanding the provisions of this article, proceed to make such correction or provide such attention and the costs of such correction or attention shall be charged against the Contractor. Such action by the Owner will not relieve the Contractor of the warranties provided in this article or elsewhere required in the specifications.

3.5.3 ADD the following new subparagraph:

This article does not in any way limit the warranty on any items for which a longer warranty is specified or on any items for which a manufacturer gives a warranty for a longer period. Contractor shall furnish Owner all appropriate warranty certificates upon the date of certified completion.

3.7.1 ADD the following sentence:

Conform to Division 01 General Conditions.

3.13.1 ADD the following new subparagraph:

The Contractor shall verify all grades, lines, levels, and dimensions indicated on the drawings and shall report all inconsistencies to the Architect before commencing work.

ADD the following new paragraph:

3.19 RECORDS, ACCOUNTS AND AUDITS

3.19.1 Notwithstanding any provisions herein to the contrary, Contractor agrees to furnish upon written request a breakdown of the Contract Price which will follow Owner's cost accounting system to be used by Owner for accounting purposes and will form the basis for establishing progress payments to be made to Contractor as herein provided.

#### **ARTICLE 4: ADMINISTRATION OF THE CONTRACT**

4.1.2 ADD the following sentence:

Duties of the Architect, Structural Engineer or Professional Engineer per California Administrative Code, Part 1, Title 24, California Code of Regulations.

4.2.10 ADD the following sentence:

The Owner will provide one or more project inspector(s) to work under the technical direction of the Architect. His duties and responsibilities shall be as set forth per California Administrative Code, Part 1, Title 24, California Code of Regulations.

#### **ARTICLE 5: SUBCONTRACTORS**

5.2.1 DELETE that portion of the first sentence which reads:

"As soon as practicable after award of the contract".

#### **ARTICLE 7: CHANGES IN THE WORK**

7.3.7 DELETE from the first sentence the words: "a reasonable amount" and SUBSTITUTE "an allowance for overhead and profit in accordance with Subparagraph 7.3.11 below."

ADD the following subparagraph:

7.3.11 In Subparagraph 7.3.7, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:

- .1 Ten percent (10%) overhead, five percent (5%) profit, of the estimated cost of the portion of the extra work to be performed by the General Contractor. This amount shall be adjusted to fifteen percent (15%) overhead, and ten percent (10%) profit on changes totaling less than two thousand dollars

(\$2,000).

[\*\*\*\*\*OR\*\*\*\*\*]

[1 **Zero percent (0%) overhead, five percent (5%) profit, of the estimated cost of the portion of the extra work to be performed by the General Contractor. This amount shall be adjusted to Five percent (5%) overhead, and ten percent (10%) profit on changes totaling less than two thousand dollars (\$2,000).]**

.2 Ten percent (10%) overhead, five percent (5%) profit of the estimated cost of that portion of the extra work to be performed by the Subcontractor, plus five percent (5%) handling cost by the General Contractor. This amount shall be adjusted to fifteen percent (15%) overhead, ten percent (10%) profit on changes totaling less than one thousand dollars (\$1,000), plus five percent (5%) handling cost by the General Contractor.

[\*\*\*\*\*OR\*\*\*\*\*]

[2 **Zero percent (0%) overhead, five percent (5%) profit of the estimated cost of that portion of the extra work to be performed by the Subcontractor, plus five percent (5%) handling cost by the General Contractor. This amount shall be adjusted to Five percent (5%) overhead, ten percent (10%) profit on changes totaling less than one thousand dollars (\$1,000), plus five percent (5%) handling cost by the General Contractor.]**

3 Ten percent (10%) overhead, five percent (5%) profit of the estimated cost of that portion of the extra work to be performed by the Sub-Subcontractor, plus five percent (5%) handling to the Subcontractor plus five percent (5%) to the General Contractor. This amount shall be adjusted to fifteen percent (15%) overhead, ten percent (10%) profit on changes totaling less than one thousand dollars (\$1,000), plus five percent (5%) handling to the Subcontractor, plus five percent (5%) handling cost by the General Contractor.

[\*\*\*\*\*OR\*\*\*\*\*]

[3 **Zero percent (0%) overhead, five percent (5%) profit of the estimated cost of that portion of the extra work to be performed by the Sub-Subcontractor, plus five percent (5%) handling to the Subcontractor plus five percent (5%) to the General Contractor. This amount shall be adjusted to Five percent (5%) overhead, ten percent (10%) profit on changes totaling less than one thousand dollars (\$1,000), plus five percent (5%) handling to the Subcontractor, plus five percent (5%) handling cost by the General Contractor.]**

7.4.1 REVISE subparagraph as follows:

Begin subparagraph with sentence "All minor changes to the Work require Change Orders." Replace phrase "written order" with "Change Order".

## ARTICLE 8: TIME

DELETE Paragraph 8.1.1. SUBSTITUTE the following:

Time is of the essence. Unless otherwise provided, the Contract Time is the period of time allocated in the Contract Documents for FINAL COMPLETION of the work as defined in the Proposal and/or Agreement, and as further defined in



Subparagraph 9.10.1 including authorized adjustments thereto.

8.1.4 DELETE subparagraph. SUBSTITUTE the following:

In this Contract, the term "day" shall mean a calendar day of 24 hours beginning at 12:00 midnight. The term "working day" shall mean any calendar day except Saturdays, Sundays and legal holidays at the place of building.

8.3.1 DELETE subparagraph 8.3.1. Substitute the following:

If the Contractor should claim that any instruction, request, drawing, specification, action, condition, omission, default, or other situation obligates the Owner to pay additional compensation to the Contractor or to grant an extension of time for the completion of the contract, he shall notify the Owner in writing, of such claim within ten (10) days from the date he has actual or constructive notice of the factual basis supporting the claim. The Contractor's failure to notify the Owner within such ten (10) day period shall be deemed a waiver and relinquishment of the claim against the Owner. If such notice be given within the specified time, the procedure for its consideration shall be as stated above in this Article. If the Contractor is delayed in completing the work by reason of any change made pursuant to this Article, the time for completion of the work shall be extended by Change Order for a period commensurate with such delay. The Contractor shall not be subject to any claim for liquidated damages for this period of time, but the Contractor shall have no claim for any other compensation for any delay.

DELETE subparagraphs 8.3.2 and 8.3.3.

ADD the following new subparagraph:

8.3.4 The Contractor shall have all materials delivered at the site in such quantities as required for the uninterrupted progress of the Work and the least obstruction of the premises and any adjoining property. No extension of time will be allowed for failure by the Contractor to order the material on time or in sufficient quantities.

8.3.5 EXCUSABLE DELAY

At the end of the sentence, ADD the following sentences:

Rain days shall be considered as "unusually severe weather" only when the rainfall exceeds the normal and expected precipitation for the time period in question and the location in question, as described in the Weather Channel [www.weather.com](http://www.weather.com) or other similar weather tracking database. Normal and expected rainfall shall not constitute a claim for delay nor justify an extension of contract time. Additionally, "Normal and expected rainfall" shall not interrupt progress on the work in general. Progress may only be interrupted on specific tasks which cannot be accomplished in the rain or due to saturated soil.

ADD the following new subparagraph

8.3.6 CONDITIONS FOR EXTENSIONS OF TIME

The Contractor shall have all materials delivered at the site in such quantities as required for the uninterrupted progress of the Work and the least obstruction of the premises and any adjoining property. No extension of time will be allowed

for failure by the Contractor to order the material on time or in sufficient quantities. Allowable time extension for any change in the work the Contractor shall be entitled only to such adjustment in time by which completion of the entire work is delayed due solely to performance of the changed work. However, no extension of time shall be granted for a change in the work unless the Contractor demonstrates to the satisfaction of the Owner that the work is on the Critical Path and submits an updated schedule showing that an extension of time is required and that the Contractor is making, or has made, every reasonable effort to guarantee completion of the additional work caused by the change within the time originally allotted for the contract. No additional compensation for delays shall be granted unless delays can be demonstrated and substantiated having impacted the Critical Path schedule.

## **ARTICLE 9: PAYMENTS AND COMPLETION**

ADD the following new subparagraph:

- 9.2.2 Use data from Schedule of Values to prepare Applications for Payment. Provide dollar value in each column for each line item for portion of work performed and for stored products. List each authorized change order on AIA G703, listing change order number and dollar amount.
- 9.2.3 The schedule of values shall, as a minimum, list a separate line item for each of the following: Mobilization, General Requirements, General Contractor's overhead for Project, General Contractor's fee for Project, Bond and Insurance costs, and a value for each specification section heading.

DELETE Subparagraph 9.3.1. SUBSTITUTE the following:

On or about the 15th of each month, the Contractor shall prepare a typewritten or electronic media form draft of the application for payment for review by the Architect, which provides for a progress payment to the Contractor based on 90% of the proportion of the Contract Sum properly allocable to labor, materials and equipment incorporated in the Work and 90% of the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, up to the 25th day of that month, less the aggregate of previous payments in each case; and upon Certified Completion of the entire Work, 90% of the Contract Sum, less such retainages as the Architect shall determine for all incomplete work and unsettled claims upon approval by the Architect, three notarized copies of AIA Document G702 "Application and Certificate for Payment," or other document approved by the Owner and Architect, and an updated construction schedule shall be submitted.

- 9.8.3.1 ADD the following new Clause:

Costs of Multiple Inspections: More than two (2) requests of the Owner to make inspections required under paragraph 9.8.3 shall be considered an additional service of Architect and its consultants, and all subsequent costs will be invoiced to Contractor and withheld from remaining payments.

ADD the following new subparagraphs:

9.9.4 Upon approval of the Architect and Surety, the Owner may release the ten percent (10%) retention on those areas accepted for Beneficial Occupancy by the Owner, prior to completion of the entire project. If such release is requested by the Contractor, he shall submit to the Architect a written request for said release together with all lien waivers for approval.

9.9.5 The Contractor agrees to Owner use and Beneficial Occupancy of a portion or unit of the Project before formal acceptance by the Owner under the following conditions:

- .1 Occupancy by the Owner shall not be construed by the Contractor as being an acceptance of that part of the Project to be occupied.
- .2 The Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from the Owner's occupancy.
- .3 Occupancy by the Owner shall not be deemed to constitute a waiver of existing claims in behalf of the Owner or Contractor against each other.
- .4 If the Project consists of more than one building, and one of the buildings is to be occupied, the Owner, prior to occupancy of the building, shall secure permanent property insurance on the building to be occupied and necessary beneficial occupancy permits from the governmental agencies in jurisdiction. Final approval and occupancy permits from agencies in jurisdiction are still the responsibility of the Contractor, which may be required for use and occupancy.
- .5 The Contractor shall make available in the areas occupied, on a 24-hour day and seven-day week basis if required, any utility services, heating and cooling as are in condition to be put in operation at the time of early occupancy. All responsibility for the operation and maintenance of said equipment shall remain with the Contractor while it is so operated. However, an itemized list of each piece of equipment so operated with the date operation commences shall be made and certified by the Architect. This list shall be the basis for the commencement of Guarantee Periods on the equipment being operated for the benefit of the Owner's early occupancy. The Owner shall pay for all utility costs which arise out of the occupancy by the Owner during construction.
- .6 With the exception of Clause 9.9.5.4, use and occupancy by the Owner prior to Project acceptance does not relieve the Contractor of his responsibility to maintain all insurance and bonds required of the Contractor under the Contract until the Project is complete and the NOTICE OF COMPLETION is recorded by the Owner.

9.10.6 Upon completion of the work, the Contractor shall deliver to the Architect all required Certificates of Inspection.

## **ARTICLE 11: INSURANCE AND BONDS**

11.1.1 After the words "is located" insert "or, if not so licensed or otherwise lawfully authorized to do business so as to protect Owner and claimants under the Insolvency or Guarantee Fund, in a company or companies approved by Owner following examination of company financial, reinsurance and other data requested by Owner or Owner's representative."

11.1.1.1 DELETE the semicolon at the end of Clause 11.1.1.1 and ADD: including private entities performing Work at the site and exempt from the coverage on account of

number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project.

11.1.1.2 DELETE the semicolon at the end of Clause 11.1.1.2 and ADD: persons or entities excluded by statute from the requirements of Clause 11.1.1.1 be required by the Contract Documents to provide the insurance required by that Clause.

11.1.1.4 ADD the word "non-bodily" after the word "personal."

ADD the following new clause:

11.1.1.9 Without limiting the scope of required insurance coverage described above, Contractor shall also provide the specific types and amounts of insurance listed in Subparagraph 11.1.2. Owner does not represent that compliance with the requirements of Subparagraph 11.1.2 satisfies the obligation imposed by Subparagraph 11.1.1.

ADD the following new clause:

11.1.1.10 "Occurrence" coverage is a requirement.

11.1.2 DELETE first sentence. MODIFY second sentence to read:

Coverages shall be made on an occurrence basis, and shall be maintained without interruption from date of commencement of the work until date of final payment and termination of any coverage required to be maintained after final payment.

ADD the following new clause:

11.1.2.1 Contractor shall, at its expense, procure and maintain in effect for the duration of this Contract, or as otherwise specified, insurance providing at least the following scope of coverage, or any greater scope of coverage required by law, under forms of policies satisfactory to the Owner. Coverages shall be maintained without interruption from date of commencement of the Work, or earlier required date, until date of final payment and termination of any coverage required to be maintained after final payment. The cost of such insurance shall be included in the Contract Sum. The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Workers' Compensation or Certified Self-Insurance:

a. State: Statutory

b. Applicable Federal (e.g., Longshoremen's): Statutory

c. Employer's Liability:

\$1,000,000 per Occurrence

\$1,000,000 Disease, Policy Limit

\$1,000,000 Disease, Each Employee

2. Comprehensive or Commercial, or Commercial General Liability (including Premises-Operations; Independent Contractors' Protective; Products and

Completed Operations; Broad Form Property Damage), such general liability coverage not to be subject to deductibles or self-insured retentions exceeding \$25,000 per occurrence unless approved by Owner. If Commercial General Liability coverage is provided, the policy shall be amended to provide that the general aggregate limit shall apply, in total, to this Project only.

- a. Bodily Injury: \$2,000,000 Each Occurrence, \$4,000,000 Aggregate.
  - b. Property Damage: \$2,000,000 Each Occurrence, \$4,000,000 Aggregate.
  - c. Products and Completed Operations: \$2,000,000 Aggregate.
  - d. Property Damage Liability Insurance shall provide X, C and U coverage, \$2,000,000.
  - e. Broad Form Property Damage Coverage shall include Completed Operations, \$2,000,000.
3. Contractual Liability:
- a. Bodily Injury: \$2,000,000 Each Occurrence, \$2,000,000 Aggregate.
  - b. Property Damage: \$2,000,000 Each Occurrence, \$2,000,000 Aggregate.
4. Personal Injury, with Employment and Contractual Exclusions deleted: \$2,000,000 Aggregate.
5. Business Auto Liability or Its Equivalent (including owned, non-owned and hired vehicles):
- a. Bodily Injury: \$2,000,000 Each Person, \$2,000,000 Each Occurrence.
  - b. Property Damage: \$2,000,000 Each Occurrence.
6. If the General Liability coverages are provided by a Commercial Liability policy, the:
- a. General Aggregate shall be not less than \$2,000,000 and it shall apply, in total, to this Project only.
  - b. Medical Expense Limit shall be not less than \$5,000 on any one person.
7. Umbrella Excess Liability:
- a. \$10,000 retention for self-insured hazards each occurrence.
8. Contractor shall require its subcontractors to take and maintain similar public liability and property damage insurance and comprehensive automobile liability insurance in amount of \$1,000,000 each occurrence

and \$2,000,000 aggregate.

11.1.3 DELETE subparagraph. SUBSTITUTE the following:

Certificates of Insurance acceptable to the Owner and specifically setting forth evidence of all coverage required by Subparagraphs 11.1.1, and 11.1.2 shall be filed by Contractor with the Owner prior to commencement of the Work. These Certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be cancelled, allowed to expire, nor materially reduced in scope of coverage, except exhaustion of aggregate limits, until at least 60 days' prior written notice has been given to the Owner. Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2.

ADD the following new clause:

11.1.2.3 The Contractor shall either (1) require each of his Subcontractors to procure and to maintain during the life of his Subcontract, Subcontractor's Comprehensive General Liability, in the same amounts as specified above, or (2) insure the activity of his Subcontractors in his own policy.

ADD the following new clause:

11.1.2.4 The Owner, Architect and Engineers shall be named as additional insureds under each required insurance and each insurance shall include a waiver of subrogation right with respect to the Owner, Architect and Engineers.

11.2.1 DELETE subparagraph. SUBSTITUTE the following:

The Owner shall be responsible for purchasing and/or maintaining the Owner's usual liability insurance or self-insurance, and may also purchase and/or maintain other insurance or self-insurance for protection against claims which may arise from operations under the Contract.

11.3.1 INSERT after the word "Project," in the fourth line, "excluding property and/or work commonly excluded under standard property insurance policies, such as grading and underground piping, and excluding property and equipment and tools owned by Contractor, Subcontractors or others which is not to be installed in the project."

11.3.1.1 After the words "malicious mischief" in the third line, INSERT, "excluding earthquake, flood and other perils commonly excluded under all-risk insurance policies."

11.4.1 DELETE subparagraph. SUBSTITUTE the following:

The Contractor shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract Sum as security for the faithful performance of this Contract and also a Labor and Material Payment Bond in an

amount not less than one hundred percent (100%) of the Contract Sum or in a penal sum not less than that prescribed by State or local law as security for the payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. The Performance Bond and the Labor and Material Payment Bond may be in one or in separate instruments in accordance with local law and shall be delivered to the Owner not later than the date of execution of the Contract. The cost of said bonds shall be included in the contract sum.

## **ARTICLE 12: UNCOVERING AND CORRECTION OF WORK**

12.3 DELETE paragraph. SUBSTITUTE the following:

If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, but which meets minimum Code requirements, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced by an amount equal to the entire cost of replacing the Work to make it as originally specified or intended. Such adjustment shall be effected whether or not final payment has been made.

ADD the following new subparagraphs:

12.3.2 A reduction, "reduced" as used in subparagraph 12.3.1, is hereby defined as an amount equal to the entire cost of replacing the Work to make it as originally specified or intended.

12.3.3 Changes in the Work shall comply with Article 7.

## **ARTICLE 13: MISCELLANEOUS PROVISIONS**

13.5.3 ADD the following sentence:

Costs of retesting, re-inspections, and re-approvals as described herein, including compensation for the Architect's services and expenses, shall be paid for by the Owner and deducted from the contract sum by a change order.

ADD the following new Article:

## **ARTICLE 16: ADDITIONAL CONDITIONS**

16.1 STANDARDS

16.1.1 Any item or method specified or noted by reference to a number, symbol or title of a standard specification, designation, procedure or the like (such as Commercial Standards, Federal Specifications or Trade Association) shall comply with the specified standard, including amendments, as of the date of the Contract Drawings and Specifications. The standards shall have full force and effect as they may be

modified or further amended hereinafter in these Specifications and excepting any conflict with the law of the place of building.

16.1.2 Any item or method specified or noted by reference to manufacturer's instruction or specifications shall be installed accordingly as if said instructions or specifications were fully repeated in the Documents with exceptions as in the paragraph next above.

16.1.3 The Contractor, upon entering into an Agreement with the Owner to do the Work of this contract, shall, by that act, agree that the Contract Documents are adequate and proper for this work.

## 16.2 FAIR EMPLOYMENT PRACTICE

16.2.1 In connection with the performance of work under this contract the Contractor agrees as follows:

- .1 The Contractor will not discriminate against any employee or applicant for employment because of sex, race, creed, color, or national origin. The Contractor will take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their sex, race, creed, color or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other form of compensation, and selection for training, including apprenticeship.
- .2 The Contractor will, in all solicitation or advertisements for employees placed by or on the behalf of the Contractor, state that all applicants will receive consideration for employment without regard to sex, race, creed, color or national origin.

**END OF SECTION**



**SECTION 01 10 00**

**SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.01 SUMMARY OF WORK**

- A. This Contract includes work necessary for and incidental to execution and completion of

Project Name  
Client  
Location

- B. in accordance with Contract Documents dated \_\_\_\_\_ prepared by \_\_\_\_\_ Architects, Address Street, City, California 9\_zip\_\_.

**1.02 GENERAL DESCRIPTION OF WORK**

- A. Work under this Contract includes furnishing all labor, materials, services and transportation, except as specifically excluded which is required for completion of Project in accordance with provisions of Contract Documents.
- B. The intent of these Contract Documents is to modify the facility for compliance with 2016 California Building Code (CCR, Title 24, Part 2, Chapter 11B) requirements for accessibility to persons with disabilities. Should any conditions arise, or be discovered, that are not covered by the Contact Documents, and that would cause the finished work to fail to comply with those requirements, a Change Order will be executed and approved DSA-ACS before proceeding with the Work.
- D. The Project is designed to comply with Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 35 43, Special Environmental Requirements:
- E. LEED Objective. It is the intent of these Documents to provide the Owner with a Project that when complete will earn sufficient LEED Credit Points to qualify for LEED Certification. Failure of contractors, sub-contractors, and material suppliers, at any tier, and employees or agents of these to cooperate in the implementation of this Objective may jeopardize the Owner's ability to certify the Project. Work of this Section may affect the attainment of the following LEED Pre-requisites and anticipated Credit Points.

1.	SS1.0 Code Compliance	P
2.	SS1.1 Environmental Sensitive Land	1
3.	SS1.3 Central Location	1
4.	SS1.5 Joint-Use of Parks	1
5.	SS1.6 Reduced Footprint	1
6.	SS2.1 Public Transportation	1
7.	SS2.2 Bicycles	1
8.	SS2.3 Minimize Parking	1
9.	SS3.0 Construction Site Runoff Control	P

10.	SS3.2 Treat Stormwater Runoff	1
11.	Anticipated Point Total	##

F. Work to be included as part of this Contract:

1. [ ]
2. [ ]

G. Work to be performed by Owner and not included in Contract:

1. Abatement of Hazardous Materials including Asbestos, PBCs, Lead paint, mold, [ ]. Contractor is hereby notified that the District will abate the hazardous material(s) under separate contract during the course of construction of this Contract. Contractor shall notify the District immediately of any hazardous material(s) encountered and allow the District minimum of 2 weeks for the District to remove or abate the hazardous material(s). Include this additional time in the Contractor's Construction Schedule. Contractor shall cooperate with District's subcontractors during this separate work. Other Work not affected by Hazardous removal shall continue uninterrupted.
2. [ ]
3. [ ]

H. The following restrictions apply to access and to use of site **[and existing buildings:]**

1. **General:** During construction period, Contractor shall have full use of premises for construction operations, including use of site. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
2. **Use of Site:** Limit use of premises to Work in areas indicated. Confine operations to areas within Contract limits indicated. Do not disturb portions of site beyond areas in which Work is indicated. Allow for Owner occupancy and use by public.
3. **Use of Existing Building:** Maintain existing building in weather-tight conditions throughout construction period. Repair damage caused by construction operations. Take all precautions necessary to protect building and its occupants during construction period.
4. **Driveways and Entrances:** Keep driveways and entrances serving premises clear and accessible to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
5. **Partial Owner Occupancy:** Owner reserves right to occupy and to place and install equipment in completed areas of building before Certified Completion, provided such occupancy does not interfere with completion of Work. Such placing of equipment and partial occupancy shall not constitute acceptance of total Work.
6. **[Full Owner Occupancy:** Owner will occupy site and existing buildings during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform Work so as not to interfere with Owner's operations.]
7. **[Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 5 feet beyond primary roadway curbs, walkways, and main utility branch trenches; and 25 feet beyond pervious paving areas.]**

1.03 PERMISSIBLE WORKING DAYS AND HOURS

- A. Work may be conducted on regularly scheduled school attendance days between the hours of 7:00 A.M. and 4:00 P.M.
- B. Work may be conducted at any hour during Saturdays, Sundays and non-school session days, at no extra cost to the Owner, when written notification to Owner has been submitted and anticipated schedule of Work activities has been approved.
- C. Conform to Division 01, General Requirements for required payment for Inspector's services performed during overtime hours.

1.04 INTERRUPTION OF EXISTING UTILITY SERVICES

- A. When necessary to interrupt any existing utility service to make connections, minimum of 48 hours advance notice shall be given to Owner and Architect. Interruptions in utility services shall be of shortest possible duration for Work at hand and shall be approved by Architect.
- B. In event any utility service is interrupted without required 48 hours notice, Contractor shall be financially liable for all damages suffered by Owner due to unauthorized interruption.

1.05 VERIFICATION OF EXISTING CONDITIONS

- A. Contractor shall be responsible to examine site of Work and after investigation to decide for himself/herself character of materials, equipment and utilities to be encountered and all other existing conditions affecting Work. Contractor is also responsible to provide sufficient costs to cover provisions of all items of Work under existing conditions referred to herein.

1.06 PHASING

- A. Conduct work sequence in following phases:
- B. Phase 1: Work of this phase shall be substantially complete and ready for occupancy within [ ] days of Notice to Proceed.
  - a. Phase 1 - Text out summary of Work in Phase I. Start and Completion Dates: [ ]
  - b. Phase 2 - Text out summary of Work in Phase II. Start and Completion Dates: [ ].]PRODUCTS

1.07 NOT USED.

PART 2 - EXECUTION

2.01 NOT USED.

**END OF SECTION**

## SECTION 01 20 00

### PRICE AND PAYMENT PROCEDURES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Alternates.
- B. Unit Prices.
- C. Allowances.
- D. Changes in the Work.
- E. Schedule of Values.

##### 1.02 ALTERNATES

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
- B. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- C. Alternates quoted on the Bid Form will be reviewed and accepted or rejected at Owner's option. Accepted alternates will be identified in Owner-Contractor Agreement.
- D. **[Owner will determine the Lowest Responsible Bid per Section 20103.8(a) of California Public Contract Code.][Owner will determine the Lowest Responsible Bid per Section 20103.8(b) of California Public Contract Code.][Owner will determine the Lowest Responsible Bid per Section 20103.8(c) of California Public Contract Code.][Owner will determine the Lowest Responsible Bid per Section 20103.8(d) of California Public Contract Code.]**
- E. Execute accepted alternates under the same conditions as other work of the Contract.
- F. Schedule of Alternates:

1. Alternate No. 1: < Insert title of alternate>
  - a. Base Bid: <Insert brief description of base-bid requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]
  - b. Alternate: <Insert brief description of alternate requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]
2. Alternate No. 2: < Insert title of alternate>
  - a. Base Bid: <Insert brief description of base-bid requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]
  - b. Alternate: <Insert brief description of alternate requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]

1.03 UNIT PRICES

- A. Unit Price is an amount proposed and stated in Bid Form as price per unit of measurement for materials or services or both that will be added to or deducted from Contract Price by Change Order in event estimated quantities of Work required by Contract Documents are increased or decreased.
- B. Unit Prices include all necessary material, labor, overhead, profit and applicable taxes.
- C. Refer to individual Specification Section for construction activities requiring establishment of Unit Prices.
- D. Owner reserves right to reject Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by independent surveyor acceptable to Contractor at Owner's expense.
- E. Schedule of Unit Prices:

	Item	Unit of Measure	Specification Section
1.	[ ]	[ ]	[ ]
2.	[ ]	[ ]	[ ]
3.	[ ]	[ ]	[ ]
4.	[ ]	[ ]	[ ]
5.	[ ]	[ ]	[ ]
6.	[ ]	[ ]	[ ]

- F. Measurement and Payment
  1. Unit Quantities: Quantities and measurements indicated in Bid Form are for Contract purposes only. Quantities and measurements supplied or placed in Work shall determine payment.
  2. Payment Includes: Full compensation for required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of item of Work; overhead and profit.
  3. Defect Assessment: Replace Work, or portions of Work, not conforming to specified requirements. If, in opinion of Architect, it is not practical to remove and replace Work, Architect will direct appropriate remedy or adjust payment.

## 1.04 ALLOWANCES

### A. Cash Allowance

1. Reference the General Conditions and Supplementary Conditions in addition to these requirements.
2. Cash Allowance:
  - a. Description: Cash allowance for all costs associated with the installation of the Work of \_\_\_\_\_.
  - b. Amount as indicated in the Bid Form [**Bidding Requirements**]
  - c. Include all Allowances in the Contract Sum.
3. Architect Responsibilities:
  - a. Prepare and issue a Construction Change Directive or Request for Proposal/Work Change Proposal Request describing Work required.
  - b. Prepare Change Order reflecting adjustments to Contract amount relative to allowance.
4. Contractor Responsibilities:
  - a. Itemize all costs associated with cost request in accordance with the General Conditions and Supplementary Conditions and herein in order to justify all costs affecting the allowance.
  - b. Include cost for materials, delivery, un-packaging, unloading, storage if any, taxes and installation costs.

### B. Materials Allowance

1. Reference the General Conditions and Supplementary Conditions in addition to these requirements. Include all Allowances in Contract Sum.
2. Architect Responsibilities:
  - a. Consult with Contractor for consideration and selection of products, suppliers and installers.
  - b. Select products in consultation with Owner and transmit decision to Contractor.
  - c. Prepare Change Order.
3. Contractor Responsibilities:
  - a. Assist Architect in selection of products, suppliers and installers.
  - b. Obtain proposals from suppliers and installers and offer recommendations.
  - c. On notification of selection by Architect, Owner, execute purchase agreement with designated supplier and installer.
  - d. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  - e. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
  - f. Include cost for materials, delivery, un-packaging, unloading, storage if any, and installation costs.

## 1.05 CHANGES IN THE WORK

- A. Approval by Division of the State Architect (DSA) Required: Changes in the Work affecting Structural Safety, Access or Fire and Life Safety, will be submitted for DSA approval, using Form DSA-140 (Application for Approval of Construction Change Document – Category A) in accordance with CAC Section 4-338(c), prior to commencing the work described therein. Changes not affecting Structural Safety, Access or Fire and Life Safety (Form DSA-141 Application for Concurrence of Construction Change Document - Category B) will not be submitted for approval, only if required by DSA in writing.
- B. Minor Changes in the Work: Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 or Architect's form, accompanied by Form DSA-141 or approved Form DSA-140.
- C. Proposal Requests
  - 1. Owner-Initiated Proposal Requests - Work Change Proposal Request (WCPR): Architect will issue **[through Construction Manager]** a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time, on AIA Document G709 or Architect's form, referencing Form DSA-140 or DSA-141. If necessary, the description will include supplemental or revised Drawings and Specifications.
    - a. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
    - b. Within time specified in the General and Supplementary Conditions after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      - 1) Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      - 2) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      - 3) Include costs of labor and supervision directly attributable to the change.
      - 4) Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      - 5) Quotation Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."
        - a) The CSI Forms mentioned above are available for purchase at [www.cisresources.org](http://www.cisresources.org).
  - 2. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect **[through Construction Manager]**.

- a. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
- b. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
- c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
- d. Include costs of labor and supervision directly attributable to the change.
- e. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- f. Comply with requirements in Section 01 60 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
- g. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."
  - 1) The CSI Forms mentioned above are available for purchase at [www.cisresources.org](http://www.cisresources.org).

D. Construction Change Directive to the Contractor

1. Construction Change Directive: Architect will issue [**through Construction Manager**] a Construction Change Directive on AIA Document G714 or Architect's form, accompanied by DSA-approved Form DSA-140 or Form DSA-141 or both, and completed WCPR (Work Change Proposal Request). Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Copy will be issued to the Project Inspector.
  - a. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
2. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - a. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract, using CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."
    - 1) The CSI Forms mentioned above are available for purchase at [www.cisresources.org](http://www.cisresources.org).

E. Change Orders Procedures: On Owner's approval of a completed Construction Change Directive, Architect will prepare and issue [**through Construction Manager**] a Change Order for signatures of the Owner and Contractor on AIA Document G701 or Architect's form. Copies of signed Change Order will be distributed to Architect, IOR and Contractor, and submitted for Board Approval.

1. Stipulated Price Change Order: Based on Contractor's Change Order Request as approved by Architect.



2. Time and Material Change Orders: Submit itemized account and supporting data after completion of change within time limits indicated in Conditions of Contract. Architect will determine change allowable in Contract Price and Contract Time as provided in Contract Documents.
3. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in Work.
4. Refer to the General and Supplementary Conditions for additional requirements.
5. Execution of Change Orders: Architect will issue Change Orders for signature of parties as provided in Conditions of the Contract.
6. **[Unit Price Change Order: For pre-determined unit prices and quantities, Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of Work that are not pre-determined, execute Work under Construction Change Directive. Change in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.]**

#### 1.06 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Forms G702 and G703 - Application and Certificate for Payment and Continuation Sheet. Contractor's standard form or electronic media printout will be considered, submit sample forms to Architect for approval.
- B. Submit application for progress payment in accordance with the General and Supplementary Conditions.
- C. Submit Schedule of Values in duplicate within 15 calendar days after date of Owner-Contractor Agreement for Architect's approval.
- D. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of the major Specification Section. Identify site mobilization and bonds and insurance. On projects of more than one building, list buildings separately. List mechanical, electrical, plumbing and fire protection Work separately for each building and for site Work.
- E. Break down the plumbing and mechanical portions of the work at a minimum into a rough, finish, including air balance and electrical portion.
- F. Break out rough grading, fine grading, and underground utilities.
- G. Include separate line items, showing amount of General Contractor's overhead and profit, bonds and insurance, supervision, and then remainder of general items.
- H. Revise schedule to list approved Change Orders, with each Application for Payment.
- I. **[Include in each line item, amount of Allowances specified in this section. For Unit Cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for item.]**

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

## SECTION 01 26 10

### REQUESTS FOR INFORMATION (RFI)

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Administrative requirements for Requests for Information (RFI).

##### 1.02 DEFINITIONS

###### A. Request for Information:

1. Written request prepared by Contractor requesting additional information necessary to clarify an item which he believes is not clearly shown or called for in the drawings or specifications, or to address problems which have arisen under field conditions, hereinafter referred to as RFI.
2. Properly prepared request for information shall include detailed written statement that indicates specific Drawings or Specification in need of clarification and nature of clarification requested.
  - a. Drawings shall be identified by Drawing number and location on Drawing sheet.
  - b. Specifications shall be identified by Section number, page and paragraph.
3. Contractor's documents with similar titles, such as "Request for Interpretation" or "Request for Clarification" shall be considered RFIs.
4. RFIs and Architect's responses are not Changes in the Work; if a Change in the Work is required in response to an RFI, separate documents shall be issued in accordance with Section 01 20 00.

###### B. Improper RFIs:

1. RFIs that are not properly prepared or incomplete.
2. Improper RFIs will be processed by Architect at Architect's standard hourly rate and Architect will charge Owner, and such costs will be deducted from moneys still due the Contractor. Architect will notify Contractor before processing of improper RFIs.

###### C. Frivolous RFIs:

1. RFIs that request information that is clearly shown on Contract Documents.
2. Frivolous RFIs may be returned unanswered or may be processed by Architect at Architect's standard hourly rate and Architect will charge Owner, and such costs will be deducted from moneys still due Contractor. Architect will notify Contractor before processing of frivolous RFIs.

##### 1.03 CONTRACTOR'S REQUESTS FOR INFORMATION

- A. When the Contractor is unable to determine from Contract Documents, material, process or system to be installed, Architect will be requested to make clarification of indeterminate item.

1. Whenever possible, such clarification shall be requested at next appropriate project meeting, with response entered into meeting minutes. When clarification at meeting is not possible, because of urgency of need, or complexity of item, Contractor shall prepare and submit RFI to Architect.
- B. Contractor shall endeavor to keep number of RFIs to a minimum. In the event the process becomes unwieldy, in the opinion of Architect, because of number and frequency of RFIs submitted, the Architect may require the Contractor to abandon process and submit future requests as either submittals, substitutions or requests for change.
- C. RFIs shall be submitted on form acceptable to Architect. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or transmission by facsimile (fax) or eMail scan. Each page of attachments to RFIs shall bear RFI number in lower right corner.
- D. RFI's shall be originated by Contractor:
1. RFIs from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by Contractor before submittal to Architect.
  2. RFIs sent by subcontractor or suppliers directly to Architect or Architect's consultants shall not be accepted and will be returned unanswered.
- E. Contractor shall carefully study Contract Documents to ensure that requested information is not available therein. RFIs which request information available in Contract Documents will be deemed "improper" or "frivolous" as noted above.
- F. In cases where RFIs are issued to request clarification of coordination issues, for example pipe and duct routing, clearances, specific locations of Work shown diagrammatically, and similar items, Contractor shall fully lay out suggested solution using drawings or sketches drawn to scale, and submit same with RFI. RFIs which fail to include suggested solution will be returned unanswered with requirement that Contractor submit a complete request.
1. Contractors are encouraged to utilize photocopies of Contract Documents to completely illustrate their questions, and to provide sketches as required to communicate question, concepts and suggestions.
- G. Do not use RFIs for following purposes:
1. To request approval of submittals.
  2. To request approval of substitutions.
  3. To request changes which entail additional cost or credit.
  4. To request changes which entail change of time of completion.
  5. To request different methods of performing Work than those drawn and specified.
- H. In event Contractor believes that clarification by Architect results in additional cost or time, Contractor shall not proceed with Work indicated by RFI until Change Order or Construction Change Directive is prepared and approved in accordance with Section 01 20 00. RFIs shall not automatically justify cost increase in Work or change in project schedule.
1. Answered RFIs shall not be construed as approval to perform extra Work.
  2. Unanswered RFIs will be returned with stamp or notation: Not Reviewed.

- I. Contractor shall prepare and maintain log of RFIs, and at any time requested by Architect, Contractor shall furnish copies of log showing outstanding RFIs. Contractor shall note unanswered RFIs in log.
- J. Contractor shall allow up to 7 days review and response time for RFIs, however, Architect will endeavor to respond in timely fashion to RFIs.

1.04 ARCHITECT'S RESPONSE TO RFIs

- A. Architect will respond to RFIs on one of following forms:
  - 1. Properly prepared RFIs:
    - a. If no Change in the Work is required, Architect will respond in space provided on the RFI form.
    - b. If a Change in the Work is required, Architect will issue in accordance with Section 01 20 00.
  - 2. Improper or Frivolous RFIs:
    - a. Notification of Processing Fee(s).
    - b. Unanswered RFIs will be returned with stamp or notation: "Not Reviewed".
- B. Architect may opt to retain RFIs for discussion during regularly scheduled project meetings for inclusion of responses in meeting minutes in lieu of responding on written form.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

**END OF SECTION**

## SECTION 01 30 00

### ADMINISTRATIVE REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Project Management and Coordination: Project Coordination, Project Meetings.
- B. Construction Progress Documentation: Construction Progress Schedule, Two-week Look Ahead Schedule, Construction Photographs.
- C. Submittal Procedures: Shop Drawings, Product Data, Samples, Deferred Approval Items, Finishes Materials Schedule, Coordinated Drawings.

##### 1.02 PROJECT COORDINATION

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical Work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installation, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Certified Completion and for portions of Work designated for Owner's occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

##### 1.03 PRECONSTRUCTION MEETING

- A. Architect will schedule meeting after Notice of Award.
- B. Attendance Required: Architect, Prime Contractors, Major Subcontractors, Project Inspector and key Owner personnel.
- C. Agenda:

1. Contract Agreement:
  - a. Transmit 5 signed originals of the Agreement to the Owner.
  - b. Transmit Attachment Certifications to the Owner.
  - c. Transmit Performance and Payment Bonds to the Owner.
  - d. Contractor to transmit Certificates of Insurance to the Owner.
  - e. Owner to transmit copy of Certificates of Property Insurance to Contractor.
  - f. Review General and Supplementary Conditions.
2. Receive documentation from Contractor:
  - a. Construction Progress Schedule.
  - b. Schedule of Values.
  - c. List of Subcontractors with addresses and phone numbers.
  - d. List of Submittals and estimated date of submittal.
  - e. Documentation for LEED Requirements.
3. Project Administration:
  - a. Application for Payment, Stop-Notice Release, Record Drawings.
  - b. Change Order Requests, Change Orders, Request For Proposals, Construction Change Directive/Instruction Bulletins. Preparation of Change Orders by Architect according to 2016 California Administrative Code, Code of Regulations Title 24 Part 1, Section 4-233 .
  - c. Submittals
  - d. Deferred Approvals Submittals
  - e. Substitution procedures.
  - f. Site Meetings.
  - g. Testing Laboratory.
  - h. Verified Reports.
  - i. Phasing.
  - j. Critical work sequencing and long-lead items.
  - k. Designation of key personnel and their duties.
  - l. Lines of communications.
  - m. Procedures for RFIs.
  - n. Procedures for testing and inspecting.
  - o. Distribution of the Contract Documents.
  - p. Sustainable design requirements.
  - q. Preparation of record documents.
  - r. Work restrictions.
  - s. Working hours.
  - t. Procedures for moisture and mold control.
  - u. Procedures for disruptions and shutdowns.
  - v. Construction waste management and recycling.
  - w. Parking availability.
  - x. Storage areas.
  - y. Equipment deliveries and priorities.
  - z. Security.
  - aa. Progress cleaning.
4. Special Owner Conditions:
  - a. Temporary Facilities.
  - b. Owner Occupancy.
  - c. Work by Owner.
  - d. Access to Site - Owner Contact.
5. Construction Process:
  - a. Contractor shall discuss overview of construction.

- b. Contractor shall identify items to be selected by Architect/Owner and date selections must be made.
- c. Contractor shall review special requirements for equipment, safety, and noise.
- 6. Pre-Job Conference:
  - a. Prevailing Wage Requirements.
  - b. Checklist and signatures.
- D. Architect will record minutes and distribute copies within seven days after meeting to participants and those affected by decisions made.

#### 1.04 PROGRESS MEETINGS

- A. Architect will schedule and administer meetings throughout progress of Work as needed.
- B. Architect will make arrangement 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 Owner 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 that impede planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Maintenance of Construction Progress Schedule.
  - 7. Corrective measures to regain projected schedules.
  - 8. Maintenance of quality and work standards.
  - 9. Effect of proposed changes on progress schedule and coordination.
  - 10. Other business relating to Work.
  - 11. Deferred Approval submittals and timelines.
  - 12. Review of Mockup rooms and/or Assembly.
- E. Architect will record minutes and distribute copies within seven days after meeting to participants, and those affected by decisions made.

#### 1.05 PREINSTALLATION MEETING

- A. When required in individual Specification Sections, convene pre-installation meeting before starting Work of Section.
- B. Require attendance of parties directly affecting, or affected by, Work of 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 shall record minutes and distribute copies within three days after meeting to participants, Architect and those affected by decisions made.
- 1.06 SUBMITTAL PROCEDURES
- A. Transmit separate request for EACH Section submittal directly to Architect.
1. Bind submittals sturdily, neatly label covers.
  2. Include Architects job number as it appears on Contract Documents.
  3. Include Authority Having Jurisdiction application or approval number.
- B. Submittal number shall use a sequential number followed by a hyphen then the Specification Section followed by a hyphen and then the revision number (e.g., 0001-051200-0). Resubmittals shall have the original number and include the revision number as the suffix (e.g., 0001-051200-1).
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and Specification Section number, as appropriate.
1. Provide name telephone number of individual who may be contacted for further information.
- D. Apply Contractor's dated 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 according to requirements of Work and Contract Documents. Stamped signatures or initials are not acceptable.
- E. Schedule submittals to expedite Project. Coordinate submission of related items.
1. Make submittals according to Construction Schedule and adequate enough in advance of scheduled dates of installation to provide required time for reviews for securing necessary approvals for possible revision and re-submittal and for placing orders and securing delivery.
  2. Schedule submittals such that related materials and assemblies that support or are affected by the submitted materials are either submitted simultaneously or in order of installation sequence such that impacts and coordination can be evaluated as part of the review.
  3. Late submittals, not in accordance with the "Schedule for Submission of Shop Drawings, Product Data and Samples" and the Construction Schedule, will not be considered an acceptable reason for initiating a substitution requests caused by late ordering and procurement of materials.
- F. Identify variations from Contract Documents and Product or system limitations that is detrimental to performance of completed Work.
- G. Substitutions: Submit only as approved per Section 01 60 00, state effect of approved substitution on construction schedule, and changes required in other work or products.

- H. Owner-Directed Substitution Approval: Substitution submittals specifically directed by Owner to be approved by the Architect for this project shall pertain to a specific item only. The Architect's stamped approval of Owner-Directed Substitution does not constitute approval for any other item, other projects or parts of project. A Change Order shall be prepared to effect the Owner's authorization of Owner-Directed Substitution.
- I. Provide space for Contractor and Architect review stamps.
- J. Revise and resubmit submittals in their entirety, identify changes made since previous submittal.
- K. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- L. Determine and verify field dimensions and conditions, materials, catalog numbers and similar data.
- M. Coordinate as required with all trades and all public agencies involved.
- N. Unless otherwise specifically authorized by Architect, make submittals in groups containing associated items within the same Section. Architect may reject partial submittals as not complying with provisions of this Section.
- O. Where individual Sections require structural calculations, prepare submittal under direction of qualified California Licensed Structural Engineer and shall bear the Engineer's stamp and signature.
- P. Format of Submittals: Submit Electronic Submittals, including but not limited to Product Data, Shop Drawings, Schedules, Certifications, tests, logs, for ease of information distribution. At Contractor's option he may submit standard printed data on reproducible media and in number of copies required per this Section and other project Sections. Identify submitted items that are applicable to the project, including any deviations, with arrows, clouds, or other distinct graphic, or in highlighted writing that can be reproduced with black and white copiers easily discernible from background information.
- Q. Submittals for Deferred Approved Items, refer to listed items in this Section and the specific requirements therein in addition to requirements above.

#### 1.07 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit Construction Progress Schedule in duplicate within 15 calendar days after the date on the Notice to Proceed for Architect's review.
  - 1. Schedule shall reflect amount of time stipulated in Agreement.
  - 2. If the Contractor proposes an earlier completion dated than stipulated in the Agreement, Change Order will be issued reflecting revised completion date at no change in Contract Sum.
- B. Revise and resubmit as required.

- C. Scheduling may utilize programs including: Microsoft Project Schedule, Primavera Project Planner (P3), Primavera SureTrak Project Manager, Meridian Project Systems or similar programs addressing the requirements.
- D. Submit computer generated network analysis diagram in accordance with Section 01 32 16.13 using Critical Path Method, generally as outlined in Associated General Contractors of America (AGC) publication "Construction Planning and Scheduling", latest Edition.
- E. Prepare final Construction Progress Schedule. Provide separate time for each activity and vertical line to identify first workday of each week. Use same breakdown of Work indicated in Schedule of Values. As Work progresses, mark to indicate actual completion.
  - 1. Submit within 15 calendar after the date on the Notice to Proceed
  - 2. Prepare schedule on reproducible media, of width sufficient to show data for entire construction period.
  - 3. Coordinate each element with other activities. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
  - 4. Indicate fabrication, delivery and installation activities.
  - 5. Indicate Owner-Furnish, Owner-Installed or Owner-Furnish, Contractor-Installed items in Schedule.
  - 6. Schedule Distribution: Distribute copies to Owner, Architect, subcontractor and parties required to comply with dates.
  - 7. Updating: Revise schedule after each meeting or activity where revisions have been made.
  - 8. Indicate Completion Date and allow time for Architect's procedures necessary for certifying Completion.
- F. Indicate complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates and duration. Ownership of float time is shared commodity, not for exclusive use by either party. Use float time to make up Work behind schedule until float time is depleted. Submittals returned in less time than allowed by Contract, shall be used to reduce Contractor time extension requests.
- G. Indicate Milestones and target date and their activities including completion dates.
- H. No Time extensions will be granted nor delay damages paid until a delay occurs that impacts the schedule consumes all available float or contingency time available, and extends the work beyond the contract completion date.
- I. Indicate estimated percentage of completion for each item of Work at each submission.
- J. Schedule for Submission of Shop Drawings, Product Data and Samples: Incorporate "Schedule for Submission of Shop Drawings, Product Data and Samples" in Construction Progress Schedule. This schedule shall include submittal dates required for shop drawings, product data, samples and product delivery dates, including Deferred Approval Items, if any, and including those items furnished by Owner. Provide time in schedule for Architect's review of submittals according to Contract Time. Allow 21 calendar days for submittals requiring consultants' review.

- K. Submit revised schedules with each Application for Payment identifying changes since previous version.
- L. As a minimum allow 15 calendar days in schedule for final inspections before final acceptance. Include time to correct punch list items prior to final acceptance.
- M. Substantially Completed buildings, alterations, additions and relocatables: in projects consisting of different buildings, alterations, additions and relocatables, scheduled to be substantially completed and delivered to the Owner for beneficial occupancy prior to Final Completion of entire project, indicate in the Construction Schedule each building, alteration, addition and relocatable progress, completion date, Punch List items and time for completion of Punch list items.
  - 1. DSA 152-Project Inspection Cards: The Inspector shall post the forms in his/her job file and shall electronically post the forms. Inspection Cards required: DSA-issued 152-Project Inspection Cards for EACH building, alteration, addition, each relocatable, and one for the site work when site work is involved. The Project Inspector is responsible to sign off applicable blocks and sections on the form as the Work progresses as required in accordance with DSA Procedures. No one is allowed to modify the Project Inspection Cards except the Project Inspector.
  - 2. Relocatable Buildings: EACH relocatable building shall have its independent 152-Project Inspection Card. For new relocatable buildings constructed in the manufacturer's facility, an "in-plant" Inspection Card, an "on-site" Inspection Card and a site work Inspection Card are required.

#### 1.08 TWO-WEEK LOOK AHEAD SCHEDULE

- A. Submit a Two Week Look Ahead Schedule and shall contain the following:
  - 1. Prepare detailed two-week schedule projections for the Work to be performed during the following weeks beyond the week it is presented at the weekly construction meeting or at the request of the Architect during the construction period.
  - 2. Be plotted in bar chart or time scale logic format and be of such size that all activity numbers and descriptions are clearly legible.
  - 3. Be sorted by sub contractor responsibility, actual start, early start and total float.
  - 4. Include activity ID, description and float for each activity.
  - 5. Include all activities, completed, in progress and scheduled to start within the time frame of the date minus one week to the data date plus two weeks.
  - 6. Schedule shall be updated and provided at each regular progress meeting for review and comparison to approved project schedule status.

#### 1.09 CONSTRUCTION PHOTOGRAPHS

- A. Photographer : Engage qualified photographer to take construction photographs.
- B. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 14 megapixels, and at an image resolution of not less than 1600 by 1200.
  - 1. Provide 2 sets (CD's or flash drives) of copies to Owner.

- C. Date Stamp: Unless otherwise indicated, date and time stamp each photographs as it is being taken so stamp is integral to photograph.
  - 1. Identify each print with job name, location from which photograph was taken, photographer's name address and photograph number.
- D. Pre-Construction Photographs: Before starting construction, take 4 color photographs of Project site and surrounding properties from different vantage points, as directed by Architect. Show existing conditions adjacent to property.
- E. Periodic Construction Photographs: Take 4 color photographs monthly, coinciding with cutoff date associated with each Application of Payment. Photographer shall select vantage points to best show status of construction and progress since last photographs were taken. Take photographs same time of day.
  - 1. Field Office Prints: Retain 1 set of prints of periodic photographs in field office at Project site available at all times for reference. Identify photographs same as for those submitted to Architect.
  - 2. Final Completion Construction Photographs: Take 8 color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
  - 3. Submit Construction Photographs to Owner monthly, submit before Application for Payment.

#### 1.10 LEED SUBMITTALS

- A. Comply with requirements specified in Division 01, General Requirements.
  - 1. Number of Copies: Submit 3 copies of LEED submittals, unless otherwise indicated.
  - 2. See the following sections for additional submittal requirements necessary to demonstrate compliance with LEED version 2.2:
    - a. Section 01 35 43, Special Environmental Requirements.
    - b. Section 01 74 19, Construction Waste Management.
    - c. Section 01 81 19, Construction Indoor Air Quality.
  - 3. Building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the Owner's or Owner Representative's project requirements. Commissioning shall be performed in accordance with California Green Building Standards Code, Section 5.410.2 by trained personnel with experience on projects of comparable size and complexity. All occupancies shall comply with the California Energy Code as prescribed in California Energy Code Section 120.8.
    - a. Commissioning Submittal requirements shall include:
      - 1) Owner's or Owner Representative's project requirements.
      - 2) Basis of Design.
      - 3) Commissioning measures shown in the construction documents.
      - 4) Commissioning plan.
      - 5) Functional performance testing.
      - 6) Documentation and training.
      - 7) Commissioning report.

## 1.11 SHOP DRAWINGS

- A. Within 15 days from Notice to Proceed, submit to Architect for review and acceptance, "Schedule for Submission of Shop Drawings, Product Data and Samples" (Submission Schedule) listing required submittals and review dates. Schedule shall allow sufficient time for checking by Architect. Incorporate Submission Schedule in Construction Progress Schedule. Days: Calendar Days.
1. Additionally, submit all Shop Drawings, Product Data and Samples according to the following guidelines. Guidelines are provided to allow Architect and Engineers adequate time for review and is not intended to dictate contractor's means and methods:
    - a. Contract of 60 to 90 days: Submit within 15 days from acceptance of Submission Schedule. Allow Architect 15 days to respond (defined as reviewed and returned). Re-submittals: allow contractor 7 days, allow Architect 10 days to respond.
    - b. Contract of 90 to 180 days: Submit within 30 days from Notice to Proceed. Allow Architect 15 days to respond. Re-submittals: allow Contractor 10 days, and Architect 15 days to respond.
    - c. Contract of 180 to 270 days: Submit within 45 days from Notice to Proceed. Allow Architect 21 days to respond. Re-submittals: allow Contractor 10 days, and Architect 15 days to respond.
    - d. Contract of 270 to 360 days: Submit within 60 days from Notice to Proceed. Allow Architect 21 days to respond. Re-submittals: allow Contractor 10 days, and Architect 15 days to respond.
    - e. Contract of 360 to 450 days: Submit within 60 days from Notice to Proceed. Allow Architect 21 days to respond. Re-submittals: allow Contractor 15 days and Architect 21 days to respond.
    - f. Contract of 450 days and longer: Contractor to schedule submittals. Allow Architect 30 days to respond. Re-submittals: allow Contractor 15 days and Architect 21 days to respond.
- B. Submit newly prepared information, drawn to accurate scale. Highlight, encircle or otherwise indicate deviations from Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to 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 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. Contractor shall review, stamp with his approval as herein required, and submit with reasonable promptness and in orderly sequence, according to Submittal Schedule, all shop drawings required by Contract Documents or subsequently by Architect as covered by modifications. Shop drawings shall be properly identified. At time of submission Contractor shall inform Architect in writing and with highlighted annotation on shop drawings of any deviation in shop drawings from requirements of Contract Documents.
- E. Stamp: Each page of shop drawings shall bear Contractor's stamp, which shall signify 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 information contained in shop drawings. Each stamp shall be accompanied by wet signature or initial of employee of Contractor who may be contacted for information. Stamped signatures or initials are not acceptable.
- F. Method of Review: Submit Electronic Shop Drawing Submittals. Submit standard .pdf document shop drawings. Identify submitted items that are applicable to the project, including any deviations, with arrows, clouds, or other distinct graphic, or in highlighted writing that can be reproduced with black and white copiers easily discernible from background information.
1. Comments or corrections will be noted on submittals and returned to Contractor, who shall identify all changes made since previous submittal and resubmit in same manner. When reviewed, submittals will be stamped and returned to Contractor who shall make distribution of electronic copies as required.
- G. Processing Time
1. Allow enough time for submittal review, including time for re-submittals, as follows:
    - a. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.
    - b. In accordance with the Schedule for Submission of Shop Drawings, Product Data and Samples. Review of each submittal for conformance with design concept of Project and with information given in Contract Documents. Architect's review of a separate item shall not indicate acceptance of assembly in which that item functions. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
    - c. Submittals requiring Consultants' Review: Where review of submittals by Architect's consultants is required, allow minimum 21 calendar days for review of each submittal.
  2. Re-submittal Review: In accordance with the Schedule for Submission of Shop Drawings, Product Data and Samples for each re-submittal.
- H. Submittal of shop drawings to Architect, shall be made by Contractor with dated transmittal form or letter, and not by subcontractors or suppliers.

- I. Architect's review of shop drawings shall not relieve Contractor of responsibility for any deviation from requirements of Contract Documents unless Contractor has informed Architect in writing of such deviation at time of submission and Architect has given written acceptance to specific deviation, nor shall Architect's review relieve Contractor from responsibility for errors or omissions in shop drawings.
- J. No portion of Work requiring shop drawings shall be commenced until shop drawings have been returned with review by Architect.
- K. At Contractor's option, he may request and if Architect approves use Architect's computer-generated drawings in electronic format. Contractor's request must be in writing with list of drawings requested and CAD format required. Contractor assumes all liability for accuracy of shop drawings if he opts to use Architect's drawings. Software for CAD formats requested by Contractor not currently available to Architect will be provided by Contractor at his own expense. Complete CAD Drawing Request Form at the end of this Section for request.
  - 1. Engineers' Drawings, CAD engineers' drawings are available only at discretion of the Engineer.

#### 1.12 PRODUCT DATA

- A. Submit within time required by Shop Drawings.
- B. Submit electronic copies only.
- C. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- D. After review, distribute and provide copies for Record Documents.

#### 1.13 SAMPLES

- A. Submit within time required by Shop Drawings.
- B. Submit samples to illustrate functional and aesthetic characteristics of product with integral parts and attachment devices. Coordinate sample submittals for interfacing Work.
- C. Submit samples of finishes from the full range of manufacturers' standard colors, textures and patterns for Architect selections, or in custom colors selected.
- D. Include identification on each sample with full Project information.
- E. Submit minimum of three (3) samples or as specified in individual Sections of Specifications, two (2) of which will be retained by Architect.
- F. Reviewed samples which may be used in the Work are indicated Sections of the Specifications, two (2) of which will be retained by the Architect.
- G. Selection or rejection of samples will be determined by Architect in writing.



- H. Colors: Materials that are visually related to other finishes require that subcontractors submit their samples before normally scheduled in order that color selection can be made for other items that are scheduled to be ordered earlier in construction schedule. Complete submittal of color charts and color samples shall be made before related colors will be selected Architect. Contractor shall be responsible to coordinate submittal schedules so as not to delay Work.
- 1.14 FINISHES MATERIALS SCHEDULE
- A. Submit in accordance with Submittal Procedures.
  - B. Submit Schedule verifying lead times of materials.
- 1.15 MANUFACTURER'S INSTRUCTIONS
- A. When specified in individual Specification Sections, submit manufacturer's printed instruction for delivery, storage, assembly, installation, start-up, adjusting and finishing in quantities specified for product data.
  - B. Identify conflicts between manufacturer's instructions and contract documents.
- 1.16 MANUFACTURER'S CERTIFICATIONS
- A. When specified in individual Specification Sections, submit manufacturers' certificate to Architect for review in quantities specified for product data.
  - B. Indicate that 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.
- 1.17 SPECIAL PROCEDURES – ACCELERATION OF THE WORK
- A. If, in judgment of Architect or Owner, it becomes necessary at any time to accelerate Work or portion thereof, Contractor, when ordered or directed by Architect or Owner, shall deploy workers in such portions of Project where directed to enable others to properly engage and carry on their work.
    - 1. If circumstances require that entire Work or portion thereof be completed at date earlier than Contract Completion Date as adjusted by change orders, Contractor, when ordered or directed by Owner or Architect, shall increase his forces, equipment, hours of work, and/or number of shifts and shall expedite delivery of materials to meet the altered completion date or dates ordered or directed. Any increase in cost to Contractor in compliance with such orders or directives will be adjusted in accordance with Contact Documents.
  - B. If, in judgment of Architect or Owner, Work is behind schedule and rate of placement of work is inadequate to regain scheduled progress so as to ensure timely completion of Work or separable portion thereof, Contractor, when so informed by Architect or Owner, shall immediately take action to increase rate of Work placement.

1. This shall be accomplished by any one or combination of following or other suitable measures:
  - a. An increase in working forces,
  - b. An increase in equipment or tools,
  - c. An increase in hours of work or number of shifts,
  - d. Expediting delivery of materials.
2. Contractor shall, within ten (10) calendar days after being so informed, notify Architect of specific measures taken and/or planned to increase rate of progress together with estimate of when scheduled progress will be regained. Should plan of action be deemed inadequate by Architect or Owner, Contractor will take additional steps or make adjustments as necessary to his plan of action until it meets with Architect's or Owner's approval.
3. Acceleration of Work will continue until scheduled progress is regained. Scheduled progress shall be established from latest revised approved progress schedule for Project.
4. Timely completion will be understood as Contract Completion Date as revised by all time extensions granted at time acceleration is undertaken.
5. Contractor shall not be entitled to additional compensation for additional effort he applies to Work under terms of this sub-paragraph.

- C. Any directive or order to accelerate Work will be in writing. Any directive or order terminating accelerated Work will be in writing.

#### 1.18 DEFERRED APPROVAL ITEMS

- A. In accordance with 2016 California Code of Regulations Title 24, Part 1, California Administrative Code, Section 4-229 where certain items, equipment or portions of their installation cannot be fully detailed or structurally calculated before selection of specific manufacturer, items or portions thereof may be indicated in Documents or herein as "Deferred Approval Items.
1. Elevator guide rails and support brackets.
  2. Fire pumps and water tanks.
  3. Gymnasium bleachers
  4. Exterior pre-engineered fixed bleachers
  5. Storefronts
  6. Curtain Wall Systems more
  7. Exterior wall systems - precast concrete, glass fiber reinforced concrete (GFRC).
- B. Items noted or listed in Contract Documents as "Deferred Approval" shall not be fabricated or installed until they have been approved by Division of the State Architect (DSA).
- C. Submittals for approval shall be submitted within 30 days after Notice to Proceed to Architect for his review and signature before submitting to DSA.
- D. For Deferred Approval Items provided by the Contractor, Contractor shall be responsible for providing details, structural calculations, stamps and signatures by Structural Engineer licensed in California, and other necessary data or material as required in the affected section and herein, and complete installation of items and equipment without extra cost to Owner. Provide to A/E of Record for approval.

1. **Storefront or Curtain Wall Submittals: Architect will submit Deferred-Approval items as follows in accordance with DSA procedures:**
  - a. **Architect will identify the number of types of Storefront and Curtain Wall panels assemblies and the number of types of connections applicable to the project. Will submit only the particular details or elevations that reflect the various types of assemblies and connections used in the project and their associated calculations. 10 feet high and over, DSA deferred approval required.**
  - b. **Architect will stamp and sign the appropriate details for submittal to DSA. If not stamped and signed, include statement (when they utilize plans prepared by other licensed professionals) acceptable to DSA. A table of contents of plans submitted will follow the above statement. In the latter case, the plans and details shall be stamped by the design professional for the deferred approval items.**
  - c. **Submit plans numbered in sequence. Two sets of plans and one set of calculations will be submitted to DSA for review.**

E. Detailed performance specifications and/or loading criteria for the deferred approval components must be included on the drawings or in the specifications. The drawings must include a list of the deferred approval components on the title sheet and clearly state that no work may proceed on the components until DSA stamped approved drawings are provided to the contractor and inspector for the components.

F. A/E of Record shall accept responsibility for verifying that all components (including those granted deferred approval) of the project are properly designed by appropriately licensed design professionals. The A/E of Record is also responsible for coordination of all components of the project. The A/E of Record is responsible for designing connections to the structure for all deferred approval components and verifying that all interactions (deflection compatibility, drift compatibility, vertical and lateral loads, etc.) are adequately addressed and in conformance with good engineering practices and the California Building Standards Code.

G. It should be noted no fixed time frame can be established for agency's approval. However, Contractor shall be responsible for time delays caused by his own late scheduling or incomplete drawings for deferred items.

#### 1.19 PRECEDENCE

A. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

1. The Agreement.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.

5. Drawings and Technical Specifications.
6. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.
7. Any work called for in the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.
8. Contractor shall secure written permission from, Architect before proceeding with work affected by omission or discrepancies in the Contract.

- C. Separate sections of this Specification are arranged only for convenience of Contractor, and nothing stated herein should be misconstrued as suggesting jurisdiction over items of work by any different building trades.

## PART 2 - PRODUCTS

### 2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. Refer to Section 01 70 00 Execution Requirements.
- B. New Materials: As specified in product sections; match existing products and Work for patching and extending Work.
- C. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing Work as standard.

## PART 3 - EXECUTION

### 3.01 NOT USED.

**END SECTION**

SECTION 01 30 00.A

CAD DRAWING REQUEST FORM

Date: \_\_\_\_\_

Job Number: \_\_\_\_\_

Project: \_\_\_\_\_

Project Architect: \_\_\_\_\_

We \_\_\_\_\_

*Contractor*

Request the following listed CAD file Sheet Numbers for use in the execution of our Work under the Contract Documents of the subject project, and hereby assume all and sole responsibility of field verification and coordination with the Work of associated trades.

The Contractor further agrees, to the fullest extent permitted by law, to indemnify and hold harmless the Architect, its officers, directors, employees and subconsultants (collectively, Architect) against any damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from or allegedly arising from or in any way connected with the unauthorized reuse or modification of the electronic files by the Contractor or any person or entity that acquires or obtains the electronic files from or through the Contractor without the written authorization of the Architect.

Sheet No.	Dated	Sheet Title
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Requested File Format  
DWG (AutoCAD, 2012, 2015)

Requested File Deliverable  
CD Rom  
E-MAIL (Zipped Files)

\_\_\_\_\_  
*Contractor's E-mail address*

Contractors are not required to pay for the first 5 drawings (maximum). Additional drawings available at a rate of \$50.00 per drawing.

Total payment enclosed \$ \_\_\_\_\_, (checks made payable to HMC Architects).

Signed: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Contact: *HMC Architects, Project Manager*

END OF SECTION

## SECTION 01 32 16.13

### NETWORK ANALYSIS SCHEDULES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. References
- B. Quality Assurance.
- C. Format
- D. Schedule
- E. Submittals
- F. Review and Evaluation.
- G. Updating Schedule.
- H. Distribution

##### 1.02 REFERENCES

- A. "Construction Planning and Scheduling", The Associated General Contractors of America (AGC), Washington, D.C., Latest Edition.

##### 1.03 QUALITY ASSURANCE

- A. Scheduler: Contractor's Personnel specializing in CPM scheduling with one year minimum experience in scheduling construction Work of complexity comparable to this Project, and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: One year minimum experience in using and monitoring CPM schedule on comparable projects.

##### 1.04 FORMAT

- A. Scheduling may utilize programs (Latest Editions) including Microsoft Project, Primavera Project Planner for Windows (P3), Primavera SureTrack Project Manager, Meridian Project Systems or similar programs addressing the requirements.
- B. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with applicable Specification section number.
- C. Diagram Sheet Size: 30 inches high by width required.
- D. Scale and Spacing: To allow for notations and revisions.

## 1.05 SCHEDULE

- A. Prepare Network Analysis Schedule and supporting mathematical analyses using Critical Path Method, under concepts and methods outlines in AGC's "Construction Planning and Scheduling".
- B. Diagrams to illustrate order and interdependence of activities and sequence of Work, how start of given activity depends on completion of preceding activities, and how completion of activity may restrain start of subsequent activities.
- C. Illustrate complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates and duration. Provide dates for procurement and delivery of critical products and dates for installation and provision for testing. Provide legend for symbols and abbreviations used. Indicate fabrication, delivery and installation activities.
- D. Incorporate Schedule for Submission of Shop Drawings and Samples. Submittal dates required for shop drawings, product data, samples and product delivery dates, including those furnished by Owner. Provide time in schedule for review of submittals.
- E. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates and identifying for each activity:
  - 1. Preceding and following event number.
  - 2. Activity description.
  - 3. Estimated duration of activity, in maximum 15 day intervals.
  - 4. Earliest start date.
  - 5. Earliest finish date.
  - 6. Actual start date.
  - 7. Actual finish date.
  - 8. Latest start date.
  - 9. Latest finish date.
  - 10. Lag time, total and free float for each activity and critical path.
  - 11. Monetary value of activity, keyed to Schedule of Values.
  - 12. Manpower and cost loading of scheduled activities.
  - 13. Percentage of activity completed.
  - 14. Responsibility
- F. Analysis Program: Capable of compiling monetary value of completed and partially completed activities of accepting revised completion dates and re-computation of all dates and float.
- G. Required Sorts: List activities in sorts or groups:
  - 1. By preceding Work item or event number from lowest to highest.
  - 2. By amount of float, then in order of early start.
  - 3. By responsibility in order of earliest possible start date.
  - 4. In order of latest allowable start dates.
  - 5. In order of latest allowable finish dates.
  - 6. Contractor's periodic payment request sorted by Schedule of Values.
  - 7. Listing of basic input data that generates report.

8. Listing of activities on critical path.

H. Coordinate contents with Schedule of Values.

I. Contractor shall not sequester float through strategies including extending activity duration estimates to consume available float, using preferential logic, using extensive or insufficient crew or resource loading, use of float suppression techniques, special lead or lag logic restraints or imposed dates.

#### 1.06 SUBMITTALS

A. PRELIMINARY Network Analysis Schedule: Within 15 days after date established in the Notice to Proceed, submit proposed PRELIMINARY Network Analysis Schedule defining planned operations for first 30 days of Work, with general outline for remainder of Work.

B. COMPLETE Network Analysis Schedule: Within 15 days after Notice to Proceed, submit Draft of proposed COMPLETE Network Analysis Schedule for review. Include written certification that major mechanical and electrical Subcontractors have reviewed and accepted proposed schedule. Make submittals in sufficient time for Architect's review.

C. PRELIMINARY Network Analysis Schedule: Within 20 days after joint review of proposed PRELIMINARY Network Analysis Schedule, submit proposed COMPLETE Network Analysis Schedule for review consisting of network diagrams and mathematical analysis. Include written certification that major, mechanical, and electrical subcontractors have reviewed and accepted proposed schedule.

D. COMPLETE Network Analysis Schedule: Within 10 days after joint review of Draft of proposed COMPLETE Network Analysis Schedule, submit COMPLETE Network Analysis Schedule consisting of network diagrams and mathematical analysis. Include written certification that major, mechanical and electrical subcontractors have reviewed and accepted proposed schedule.

E. Participate in review of Preliminary and Complete Network Analysis Schedule jointly with Architect.

F. Number of opaque reproductions Contractor requires, plus three copies which will be retained by Architect.

G. One reproducible transparency and one opaque reproduction.

H. All schedule submittals, including progress updates for duration of Work, shall include electronic submittal in original file format, by e-mail or delivered on storage media agreed to.

I. Updated network schedule with each Application for Payment.



1.07 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of network diagrams and analysis with Architect at each submittal.
- B. Evaluate project status to determine Work behind schedule and Work ahead of schedule.
- C. After review, revise as necessary as result of review and resubmit within 10 days.

1.08 UPDATING SCHEDULE

- A. Maintain schedule to record actual start and finish dates of completed activities.
  - 1. Submit updated schedule at each scheduled project meeting or monthly, whichever is more frequent.
- B. Indicate progress of each activity to date of revision with project completion date of each activity. Update diagrams to graphically depict current status of Work.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Indicate changes required to maintain Date of Certified Completion.
- E. Submit sorts required to support recommended changes.
- F. Provide narrative report to define problem areas, anticipated delays and impact on Schedule. Report corrective action taken, or proposed and its effect including effect of change on schedule of separate contractors.

1.09 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedule to Contractor's project site file, to Subcontractors, Suppliers, Architect, Owner and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedule.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

## SECTION 01 35 16

### ALTERATION PROJECT PROCEDURES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Products and installation for patching and extending Work.
- B. Transition and adjustments.
- C. Repair of damaged surfaces, finishes and cleaning.

#### PART 2 - PRODUCTS

##### 2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New Materials: As specified in products Sections, match existing products and work for patching and extending Work. Maintain fire-rated construction.
- B. Type and Quality of Existing Products: Determine by inspection and testing of products where necessary, referring to existing Work as standard.

#### PART 3 - EXECUTION

##### 3.01 EXAMINATION

- A. Verify that demolition is complete and areas are ready for installation of new Work.
- B. Beginning of restoration 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, such as rotted wood, corroded metals and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- C. Remove debris and abandoned items from work area and from concealed spaces.
- D. Prepare surface 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. Insulate ductwork and piping to prevent condensation in exposed areas.

### 3.03 INSTALLATION

- A. Coordinate Work of alterations and renovations to expedite completion sequentially and to accommodate Owner occupancy.
- B. Remove, cut and patch Work in manner to minimize damage and to provide means of restoring products and finishes to original or specified condition.
- C. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified conditions for each material with neat transition to adjacent finishes.
- D. Restore existing systems including fire alarm systems to their full operating condition(s) at no additional cost that were damaged and/or removed during the scope of this contractor's work. Advise Architect of any deficiencies and/or pre-existing deficient conditions prior to starting work.
- E. Install products as specified in individual Sections and Drawings.

### 3.04 TRANSITIONS

- A. Where new Work abuts or aligns with existing, perform smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- B. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and make recommendation to Architect.

### 3.05 ADJUSTMENTS

- A. Where change of plane of 1/4 inch or more occurs, request instructions from Architect.
- B. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- C. Work at penetrations in fire-rated assemblies to maintain required fire rating assembly.

### 3.06 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces that are damaged, lifted, discolored or showing other imperfections. Maintain fire-rated construction.
- B. Repair substrate prior to patching finish.

### 3.07 FINISHES

- A. Finish surfaces to match existing.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest Intersections.

3.08 CLEANING

- A. Conform to Division 01, General Requirements and Section 01 70 00, Execution Requirements.

**END OF SECTION**

## SECTION 01 35 42

### CALGREEN REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. This Section includes general requirements and procedures for compliance with 2016 CALGreen nonresidential mandatory requirements.
- B. Related Sections:
  - 1. Divisions 01 through 48 Sections, as applicable, for CALGreen requirements specific to the work of each of those Sections.

##### 1.02 SUBMITTALS

- A. CALGreen submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated CALGreen requirements.
- B. Contractor shall develop a spreadsheet or use one furnished by the Architect [Owner] building department to track submittals required by CALGreen.
- C. CALGreen Submittals:
  - 1. Furnish documentation showing verification of CALGreen compliance as required by enforcing agency.
  - 2. Section 5.106.1 – Storm Water Loss Prevention Plan: Newly constructed projects and additions which disturb less than one acre of land shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:
    - a. Local ordinance, 5.106.1.2.
    - b. Best management practices (BMP) complying with Section 5.106.1.2.
  - 3. Section 5.106.10 – Grading and Paving: Furnish drawing showing grading and paving designed to keep surface water from entering buildings.
  - 4. Section 5.408.2 – Construction Waste Management Plan: Furnish a construction waste management plan complying with specified requirements.
  - 5. Section 5.504.4.5 – Composite Wood Products: Furnish documentation showing compliance with Section 5.504.4.5.
  - 6. Section 5.504.5.6 – Resilient Flooring: Furnish documentation showing resilient flooring materials meet the pollutant emission limits.

#### PART 2 - PRODUCTS

2.01 NOT USED.

#### PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

## SECTION 01 35 43

### SPECIAL ENVIRONMENTAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Special environmental, sustainable, and "green" building practices related to energy conservation and efficiency, indoor air quality, and resource efficiency.
- B. Owner Requirements: The Owner is committed to sustainable design as defined by the US Green Building Council's LEED Rating System and seeks to achieve the following:
  - 1. Maximize recycled content in materials, products, and systems.
  - 2. Maximize use of materials that are harvested, extracted, salvaged, and/or manufactured locally.
  - 3. Maximize use of wood that is certified sustainably harvested by the Forest Stewardship Council (FSC).
  - 4. Require practices and materials that ensure healthy indoor air quality in final Project.
- C. Compliance: Fulfillment of LEED prerequisite and credit requirements identified in this section is a requirement of the Project. Other LEED prerequisites and credits needed to obtain LEED certification are dependent on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification are dependent on the Architect's design, and other aspects of the Project that are not part of the Work of the Contract. Construction team is required to comply with sustainable building practices described in this Section and subsequent sections, during construction and when considering materials for substitutions. Insure that all sub-contractors are familiar with all of the project's special environmental goals. The General Contractor is responsible for gathering documentation required for the points identified in this section and for submitted templates and supporting documentation on the LEED online account for the project; individual subcontractors are responsible for documenting products and processes as identified in this section and relevant specific sections. Contractor shall follow LEED requirements in conjunction with requirements specified in all other Sections and refer any discrepancies to the Architect for clarification. Contractor will obtain access to LEED Online through Architect and complete templates assigned to them for credit verification and signature. Access for sub-contractor for LEED online is not required but may be obtained on a case by case basis.
- D. Related Sections
  - 1. Section 01 30 00, Administrative Requirements
  - 2. Section 01 74 19, Construction Waste Management
  - 3. Section 01 81 19, Construction Indoor Air Quality
  - 4. Section 01 91 00, General Commissioning Requirements
  - 5. Section 01 91 14, O&M Training Review
  - 6. Section 01 91 15, Electrical Commissioning Requirements

7. Section 01 91 17, Mechanical Commissioning Requirements
8. Section 02 41 16 Building Demolition
9. Section 02 41 19, Selective Demolition

E. LEED Objective. This Project is registered under LEED 2009 or Version 4 for New Construction and Major Renovation. It is the intent of these Documents to provide the Owner with a Project that when complete will qualify for LEED NC 2009 of version 4 with a target Gold rating (60-79 points). Failure of contractors, sub-contractors, and material suppliers, at any tier, and employees or agents of these to cooperate in the implementation of this Objective may jeopardize the Owner's ability to certify the Project.

#### 1.02 REFERENCE STANDARDS

- A. ANSI/BIFMA M7.1-2007 and ANSI/BIFMA X7.1-2007 testing protocol
- B. California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Carpet and Rug Institute Green Label Plus program
- D. FloorScore standard
- E. Greenguard Indoor Air Quality certification
- F. Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997
- G. Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993
- H. Green Seal Standard GS-36, Commercial Adhesives, October 19, 2000
- I. South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004
- J. South Coast Air Quality Management District (SCAQMD) Rule 1168, Adhesive and Sealant Application, effective July 1, 2005 and rule amendment January 7, 2005
- K. SMACNA IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapter 3.

#### 1.03 DEFINITIONS

- A. Agrifiber Product: Products consisting of fibrous material derived from the agricultural industry and typically characterized by rapidly renewable characteristics. Such products may consist of wheat straw, sugar cane, and other agricultural crops.
- B. Certified Wood: wood-based building products that are certified as "sustainably harvested" under the Forest Stewardship Council's (FSC) Principles and Criteria.
- C. The following Specification sections contain Certified Wood submittal requirements:

- D. Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
- E. Construction Waste Diversion: Waste generated during the construction and demolition process that is diverted from a landfill. 50% is required per CALGreen Code, 75% and 95% are targeted in the LEED rating system.
- F. LEED: Leadership in Energy & Environmental Design.
- G. Low-Emitting Materials: building materials that comply with specified Indoor Air Quality requirements.
  - 1. 03 30 00 Cast-In-Place Concrete
  - 2. 05 12 00 Structural Steel
  - 3. 05 31 00 Steel Decking
  - 4. 06 20 10 Finish Carpentry
  - 5. 06 41 16 Plam Cabinets
  - 6. 06 61 16 Solid Polymer Fabrications
  - 7. 07 13 26 Self-Adhering Sheet Waterproofing
  - 8. 07 21 00 Insulation
  - 9. 07 54 23 Membrane Roofing – Thermoplastic
  - 10. 07 81 16 Cementitious Fireproofing
  - 11. 07 84 00 Firestopping
  - 12. 07 92 00 Joint Sealants
  - 13. 08 14 16 Flush Wood Doors
  - 14. 08 84 10 Acoustical Ceiling Treatment
  - 15. 09 51 00 Acoustical Ceilings - Lay-In
  - 16. 09 29 00 Gypsum Board
  - 17. 09 30 13 Ceramic Tiling
  - 18. 09 53 23 Acoustical Suspension Systems
  - 19. 09 65 13 Resilient Base
  - 20. 09 66 16 Precast Terrazzo
  - 21. 09 90 00 Painting
  - 22. 09 96 46 Intumescent Painting
  - 23. 09 65 15 Cove Caps, Reducers and Transitional Mouldings
  - 24. 09 65 19 Resilient Tile Flooring
  - 25. 09 68 13 Carpet Tile
  - 26. 09 81 16 Sound Control Insulation
  - 27. 10 22 19 Demountable Partitions
  - 28. 10 22 26 Operable Partitions - Folding Panels
  - 29. 10 26 17 Wall Protection
  - 30. 22 07 00 Plumbing Insulation
  - 31. 22 11 16 Domestic Water Piping
  - 32. 22 13 16 Sanitary Waste and Vent Piping
  - 33. 22 14 13 Facility Storm Drainage Piping
    - a. Refer to Appendix A - Special Environmental Requirements Product Submittal Form
- H. Recycled Content: feedstock materials that have been recovered from consumer or industrial waste streams. Recycled content is classified into two types:



1. Pre-Consumer (also known as Post-Industrial): material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.
2. Post-Consumer: waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.
3. The following Specification Sections contain Recycled Content submittal requirements:
  - a. 03 10 00 Concrete Formwork
  - b. 03 30 00 Cast-In-Place Concrete
  - c. 03 49 13 Glass Fiber Reinforced Concrete Column Covers
  - d. 03 53 20 Designer Concrete Topping
  - e. 04 22 00 Concrete Unit Masonry
  - f. 05 12 00 Structural Steel
  - g. 05 31 00 Steel Decking
  - h. 05 40 00 Cold-Formed Metal Framing
  - i. 05 50 10 Metal Pipe Bollards
  - j. 05 51 00 Metal Stairs
  - k. 05 51 33 Metal Ladders
  - l. 05 52 00 Handrails and Railings
  - m. 06 61 16 Solid Polymer Fabrications
  - n. 07 13 26 Self-Adhering Sheet Waterproofing
  - o. 07 21 00 Insulation
  - p. 07 25 00 Weather Barriers
  - q. 07 42 13 Metal Wall Panels
  - r. 07 46 21 Equipment Screens
  - s. 07 54 23 Membrane Roofing - Thermoplastic
  - t. 07 62 00 Sheet Metal Flashing and Trim
  - u. 07 72 00 Roof Accessories
  - v. 07 81 16 Cementitious Fireproofing
  - w. 08 12 14 Hollow Metal Frames - Knock Down
  - x. 08 13 13 Hollow Metal Doors
  - y. 08 33 23 Overhead Coiling Doors
  - z. 08 33 26 Overhead Coiling Grilles
  - aa. 08 41 13 Aluminum Entrances and Storefronts
  - bb. 08 42 32 Automatic Door Entrances
  - cc. 08 44 14 Glazed Aluminum Curtain Wall
  - dd. 08 71 00 Door Hardware
  - ee. 08 80 00 Glazing
  - ff. 09 21 16 Shaft Walls
  - gg. 09 22 16 Non-Structural Metal Framing
  - hh. 09 24 00 Portland Cement Plastering
  - ii. 09 29 00 Gypsum Board
  - jj. 09 30 13 Ceramic Tiling
  - kk. 09 51 00 Acoustical Ceilings - Lay-In
  - ll. 09 53 23 Acoustical Suspension Systems
  - mm. 09 65 13 Resilient Base
  - nn. 09 65 15 Cove Caps, Reducers and Transitional Mouldings
  - oo. 09 65 19 Resilient Tile Flooring
  - pp. 09 66 16 Precast Terrazzo

- qq. 09 68 13 Carpet Tile
- rr. 09 81 16 Sound Control Insulation
- ss. 10 11 23 Tackboards
- tt. 10 14 00 Interior Signage
- uu. 10 14 00 Exterior Signage
- vv. 10 21 00 Toilet Compartments
- ww. 10 22 19 Demountable Partitions
- xx. 10 22 26 Operable Partitions - Folding Panels
- yy. 10 26 17 Wall Protection
- zz. 10 28 00 Toilet and Bath Accessories
- aaa. 12 93 00 Site Furnishings
- bbb. 32 13 13 Sitework Concrete
- ccc. 32 31 13 Fences And Gates
- ddd. 32 31 22 Screen Panels
- eee. 32 93 00 Landscape Planting

4. Refer to Appendix A - Special Environmental Requirements Product Submittal Form

I. Regional Materials: Building materials that are both manufactured and extracted, harvested, or recovered within a 500 mile radius of the job site. Manufacturing refers to the final assembly of components into a product that is furnished and installed by tradesmen.

1. The following Specification sections contain Regional Materials submittal requirements:

- a. 03 10 00 Concrete Formwork
- b. 03 30 00 Cast-In-Place Concrete
- c. 03 49 13 Glass Fiber Reinforced Concrete Column Covers
- d. 03 53 20 Designer Concrete Topping
- e. 04 22 00 Concrete Unit Masonry
- f. 05 12 00 Structural Steel
- g. 05 31 00 Steel Decking
- h. 05 40 00 Cold-Formed Metal Framing
- i. 05 50 10 Metal Pipe Bollards
- j. 05 51 00 Metal Stairs
- k. 05 51 33 Metal Ladders
- l. 05 52 00 Handrails and Railings
- m. 06 61 16 Solid Polymer Fabrications
- n. 07 13 26 Self-Adhering Sheet Waterproofing
- o. 07 21 00 Insulation
- p. 07 25 00 Weather Barriers
- q. 07 46 21 Equipment Screens
- r. 07 54 23 Membrane Roofing - Thermoplastic
- s. 07 62 00 Sheet Metal Flashing and Trim
- t. 07 72 00 Roof Accessories
- u. 07 81 16 Cementitious Fireproofing
- v. 08 12 14 Hollow Metal Frames - Knock Down
- w. 08 13 13 Hollow Metal Doors
- x. 08 33 23 Overhead Coiling Doors
- y. 08 33 26 Overhead Coiling Grilles
- z. 08 41 13 Aluminum Entrances and Storefronts

- aa. 08 42 32 Automatic Door Entrances
- bb. 08 44 14 Glazed Aluminum Curtain Wall
- cc. 08 71 00 Door Hardware
- dd. 08 80 00 Glazing
- ee. 08 84 00.10 Plastic Glazing
- ff. 09 21 16 Shaft Walls
- gg. 09 22 16 Non-Structural Metal Framing
- hh. 09 24 00 Portland Cement Plastering
- ii. 09 29 00 Gypsum Board
- jj. 09 30 13 Ceramic Tiling
- kk. 09 51 00 Acoustical Ceilings - Lay-In
- ll. 09 53 23 Acoustical Suspension Systems
- mm. 09 65 13 Resilient Base
- nn. 09 65 15 Cove Caps, Reducers and Transitional Mouldings
- oo. 09 65 19 Resilient Tile Flooring
- pp. 09 68 13 Carpet Tile
- qq. 10 11 23 Tackboards
- rr. 10 14 00 Interior Signage
- ss. 10 14 00 Exterior Signage
- tt. 10 21 00 Toilet Compartments
- uu. 10 21 23 Cubicle Curtains and Track Assembly
- vv. 10 22 19 Demountable Partitions
- ww. 10 22 26 Operable Partitions - Folding Panels
- xx. 10 26 17 Wall Protection
- yy. 10 28 00 Toilet and Bath Accessories
- zz. 12 93 00 Site Furnishings
- aaa. 32 13 13 Sitework Concrete
- bbb. 32 31 13 Fences And Gates
- ccc. 32 93 00 Landscape Planting

2. Refer to Appendix A - Special Environmental Requirements Product Submittal Form

J. SRI: Solar Reflectance Index. A measure of a materials ability to reject solar hear, as shown by a small temperature rise. Materials with the highest SRI values are the coolest choices for roofing.

K. Systems Furniture: Includes panel-based workstations comprising modular interconnecting panels, hang-on components, and drawer and filing components or a free-standing grouping of furniture items designed to work in concert. Lobby and conference room furnishings are excluded from this category.

L. Volatile Organic Compounds (VOC's): Carbon compounds emitted by materials that participate in atmospheric photochemical reactions. VOC's are common in building products and are emitted over time through offgassing. Sources of VOC's may include solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywoods; and foam insulation.

#### 1.04 SUBMITTALS

A. General Requirements

1. Contractor shall designate a LEED Representative. LEED Representative shall be an individual responsible for implementation, coordination, and documentation of LEED Credit Requirements specified herein. LEED Representative shall be present at all LEED related meetings.
  2. The Contractor shall keep at least one copy of the LEED NC 2009 Reference at the project site at all times. Copy can be obtained through [www.usgbc.org](http://www.usgbc.org) website.
  3. All LEED submittal information shall be in electronic format only unless requested otherwise, including digital photographs.
- B. Submit the following information, including manufacturer's certifications and/or verifying information where Specifications sections require submittals relating to environmental issues. All of the following products are identified in their respective specification sections. Use the LEED Materials and Resources Reporting form and LEED VOC Reporting form attached in Appendix A of this Section, for all submittals below. Provide the submittal form, along with all supporting documentation.
1. Recycled Content: Submit information regarding product pre-consumer and post-consumer recycled content.
    - a. Identify the percentage by weight of virgin content, post-industrial recycled content, and post-consumer recycled content. Attach either a third-party certification or a letter signed by a corporate officer of the product manufacturer attesting to the recycled content.
    - b. For recycled content values of assemblies (a product formulated from multiple materials or a product made up of subcomponents) submit percentage of postconsumer and pre-consumer recycled content, vales and weights for each of the component parts.
    - c. Contractor is to submit recycled content and cost of cementious materials separate from the cost and recycled content of other concrete materials. Fly ash, slag, silica fume, rice hull ash and other SCMs (supplementary cementious materials) recycled from other operations are pre-consumer recycled-content cementious materials.
    - d. Demonstrate that post-industrial and post-consumer recycled content of materials installed meet or exceeds that required by product specifications.
    - e. For steel products, where specific recycled content information is not available, simply indicate percentages of the steel produced using Basic Oxygen Furnace and Electric Arc Furnace methods. Recycled content will be determined by industry averages for the corresponding production method.
  2. Regional Materials: Submit information regarding the site of manufacturing and extraction, harvesting, or recovering of materials.
    - a. Indicate distances in miles from the job site to both the harvest location and the manufacturing location. Submit location names for both harvesting and manufacturing of materials.
    - b. For assemblies or products manufactured within the 500-mile radius that contain some components extracted farther away, use multiple lines when listing purchases. Provide separate weight, cost, and distance between job site and point of extraction for each component part.
  3. Certified Wood: For all products designated in their respective sections as containing "FSC certified" wood content, quantify and provide evidence of compliance with FSC standards as follows.
    - a. Identify the percentage by weight of FSC certified wood content.

- b. Demonstrate that products are FSC certified by providing an FSC chain-of-custody number. This number is typically contained on vendor's invoices. A "vendor" is defined as the company that furnishes wood products to project contractors and/or sub-contractors for on-site installation.
  - c. Non-FSC certifications (such as Sustainable Forestry Initiative [SFI]) will not be accepted.
4. Indoor Air Quality (IAQ): Submit verification that the following products comply with respective IAQ requirements.
- a. Adhesives and Sealants used on the interior of the building (inside the weather proofing system and applied on site):
    - 1) All adhesives, sealants and sealant primers must conform to maximum VOC content limits set by South Coast Air Quality Management District (SCAQMD) Rule #1168. and conform to Bay Area Air Quality Management District Regulation 8, Rule 51.
    - 2) Aerosol Adhesives must comply with Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.
    - 3) Attach MSDS sheet or attestation letter from the manufacturer for all adhesives and sealants used.
  - b. Paints and Coatings used on the interior of the building (inside the weatherproofing system and applied on site):
    - 1) Architectural paints and coatings applied to interior walls and ceilings must not exceed the volatile organic compound (VOC) content limits set by Green Seal Standard GS-11, Paints, 1<sup>st</sup> Edition, May 20, 1993.
    - 2) Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit of 250 g/L (2 lb/gal) established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
    - 3) Clear wood finishes, floor coatings, stains, primers, sealers, and shellacs applied to interior elements must not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
    - 4) Attach a copy of Green Seal certification, MSDS sheet, or attestation letter from the manufacturer for all opaque topcoat interior paints and coatings used.
  - c. Flooring Systems: All flooring elements installed in the building interior must meet one of the two compliance options below. Contractor must attach a copy of certification or compliance data from the manufacturer for all flooring adhesives and sealants and flooring materials and finishes used. Contractor must identify the referenced standard of compliance used on the LEED VOC Reporting form.
    - 1) Option 1 – Carpet and Rug Institute, South Coast Air Quality Management District, and FloorScore referenced standards:
      - a) Carpet: Meet the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.
      - b) Carpet cushion: Meet the requirements of the Carpet and Rug Institute Green Label program.
      - c) Carpet adhesives: Meet VOC limit of 50 g/L.

- d) Hard surface flooring (except tile, masonry, terrazzo, cut stone, and solid-wood flooring without coatings or sealants): Meet the testing and product requirements of FloorScore certification.
  - e) Floor finishes: Meet the requirements of South Coast Air Quality Management District (SCAWMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
  - f) Tile setting adhesives and grout: Meet the South Coast Air Quality Management District (SCAQMD) Rule 1186. VOC limits correspond to an effective date of July 1, 2005 and a rule amendment date of January 7, 2005.
- 2) Option 2 – California Department of Health Services standard:
- a) Meet the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- d. Composite Wood and Agrifiber Products: Composite products and laminating adhesives must be free of added urea-formaldehyde resins. Attach MSDS sheet or attestation letter from the manufacturer for all composite wood and agrifiber products used.

**PART 2 - PRODUCTS**

2.01 NOT USED.

**PART 3 - EXECUTION**

3.01 NOT USED.

**END OF SECTION**

The General Contractor must return this form, along with required attachments, completed for each special environmental product as required by specific specification sections. Attach additional sheets if necessary. Check specific product requirements below as required by specification sections.

**SHEET 1: LEED MATERIALS AND RESOURCES REPORTING**

(provide cut sheets for the data below)

PROJECT NAME: \_\_\_\_\_ CONTRACTOR \_\_\_\_\_ SPEC SECTION \_\_\_\_\_  
 CONTACT NAME: \_\_\_\_\_ TEL. NO: \_\_\_\_\_ SUBMITTAL \_\_\_\_\_

Product Name	Vendor or Manufacturer	Required for all products identified in Specs: CSI Divisions 3-10, 31.60 Foundations, 32.10 Paving, 32.30 Site Improvements, and 32.90 Planting. (MEP excluded)	(MRc4) Recycled Content <sup>1</sup> (% by weight)		(MRc5) Local distances from manufacturing to project AND raw material harvesting to project site
			% pre-consumer	% post-consumer	
		Total Material Cost (exclude labor & equipment)			

					Harvest location & di Manufacture location
					Harvest location & di Manufacture location
					Harvest location & di Manufacture location
					Harvest location & di Manufacture location

1. (MRc4) Recycled Content: All percentages by weight. Attach attestation letter signed by a corporate officer of the product manufacturer or third party certification documentation.
2. (MRc5) Regional Materials: Attach an area map showing distance from site of extraction, harvesting or salvaging to job site. Provide invoices and any additional supporting documentation.

CONTRACTOR CERTIFICATION: I, \_\_\_\_\_ a duly authorized representative of \_\_\_\_\_ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualifications during the purchasing period will require prior written approval from the Construction Manager, Architect and Owner.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: \_\_\_\_\_  
DATE: \_\_\_\_\_

The General Contractor must return this form, along with required attachments, completed for each special environmental product as required by specific specification sections. Attach additional sheets if necessary. Check specific product requirements below as required by specification sections.

## SHEET 2: LEED VOC REPORTING

PROJECT NAME: \_\_\_\_\_ CONTRACTOR \_\_\_\_\_ SPEC SECTION \_\_\_\_\_  
 CONTACT NAME: \_\_\_\_\_ TEL. NO: \_\_\_\_\_ SUBMITTAL \_\_\_\_\_

Product name and type	Vendor or Manufacturer	Type of Backup Documentation provided (e.g. MSDS, Product Data Sheet)	(IEQc4.1, 4.2, 4.3) Indoor field-applied adhesives, sealants, paints & coatings (including MEP work): <sup>a, b, c</sup>		C St G
			Actual VOC content (g/L)	Corresponding LEED VOC limit (g/L)	
1.					
2.					
3.					
4.					
5.					
6.					

Submit documentation (i.e. MSDS; Product Data Sheet, or attest letter from manufacturer) indicating VOC content in grams per liter, or other compliance methods as required for flooring systems, composite wood products and systems furniture and seating:

PART 4 - (IEQc4.1) Low Emitting Adhesives and Sealants: conform to maximum VOC limits set by South Coast Air Quality Management District Rule #1168. Aerosol adhesives must comply with Green Seal Standard for Commercial Adhesives GS-36 (effective 10/19/2000).

PART 5 - (IEQc4.2) Low Emitting Paints and Coatings: Architectural paints and coatings must conform to VOC limits set by Green Seal Standard GS-11. Anti-corrosive and anti-rust paints applied to ferrous metal substrates must not exceed VOC limit of 250 g/L. Clear wood finishes, floor coatings, stains, primers, sealers, and shellacs must not exceed VOC limits in SCAQMD Rule 111.

PART 6 - (IEQc4.3) Low Emitting Flooring Systems: Carpet systems (carpet, cushion) must conform to VOC limits set by the Carpet and Rug Institute Green Label Testing Program. Carpet adhesive VOC content must not exceed 50 g/L. Floor finishes must comply with SCAQMD Rule 113. Tile setting adhesives and grouts must comply with SCAQMD Rule 1168. Or comply with California Dept. of Health Services standard for any flooring type.

PART 7 - (IEQc4.4) Low Emitting Composite Wood and Agrifiber Products: products must be free of added urea-formaldehyde resins. Attach MSDS sheet or attestation letter from the manufacturer for all composite wood and agrifiber products used.

CONTRACTOR CERTIFICATION: I, \_\_\_\_\_ a duly authorized representative of \_\_\_\_\_ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualifications during the purchasing period will require prior written approval from the Construction Manager, Architect and Owner.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: \_\_\_\_\_  
 DATE: \_\_\_\_\_



**SECTION 01 40 00**  
**QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Reference Standards.
- B. Quality Assurance and Control of Installation.
- C. Field Samples.
- D. Mock-up
- E. Project Inspector and Inspections.
- F. Permits and Fees.
- G. Verified Reports.
- H. Manufacturers' Field Services and Reports.
- I. Laboratory Testing Services.

**1.02 REFERENCE STANDARDS**

- A. Conform to reference standards by date of issue current on date of Contract Documents.
- B. For products or workmanship specified by Association, Trade or Federal Standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy of standards at jobsite during submittals, planning and progress of the specified Work until Certified Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, products, services, site conditions and workmanship to produce Work of specified quality.

- B. Comply fully with manufacturers' instructions including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Perform Work by persons qualified to produce workmanship of specified quality.
- E. Where experience minimums for workmen, applicators, companies or manufacturers are required in individual Sections, written certification and documentation substantiating such minimums shall be submitted and approved by the Architect, when requested.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- G. Field Samples
  - 1. Obtain field samples for review by Architect.
- H. Mock-Up
  - 1. Test will be performed under provisions identified in this Section.
  - 2. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals and finishes.
  - 3. Where mock-ups are specified in individual Sections, shall be removed after approval per this Section unless are to remain as part of the Work.

#### 1.04 PROJECT INSPECTOR

- A. An Inspector, herein referred to as the "Project Inspector", "Job Inspector", or "Inspector of Record" (IOR) will be employed by the Owner approved by the Architect, Structural Engineer, and the Division of State Architect (DSA) in accordance with 2016 California Code of Regulations, Title 24, Part 1, California Administrative Code, Section 4-333(b). The Inspector of Record's duties are described in CAC Section .
- B. Class of Inspector required for this project in accordance with Title 24, Part I, Section 4-333.1:
  - 1. Class 1 Inspector - all projects.
  - 2. Class 2 Inspector - any project, except a project containing one or more new structures or additions with a primary lateral force resisting system of steel, masonry, or concrete.
  - 3. Class 3 Inspector - projects containing alterations to approved buildings, site place of relocatable buildings and construction of minor structures.
  - 4. Class 4 Inspector - projects containing site placement of relocatable buildings and associated site work.
- C. The Work of construction in all stages of progress shall be subject to the personal continuous observation of the Project Inspector. He shall have free access to any or all part 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.

## 1.05 PERMITS AND FEES

- A. Where required by the provisions of individual sections of the Specifications, and where required to carry out construction operations, Contractor shall obtain and pay for permits and fees, including, but not limited to, Demolition, Grading, Disposals, requirements of Water, Gas, Sewer, Flood and Sanitary Districts, Municipal and County Building Departments having jurisdiction.
  - 1. Fees for final utility connections shall be paid by the Contractor and reimbursed to the Contractor by the Owner at direct cost.
  - 2. Building Permits or approvals issued by DSA requiring fees will be obtained and paid by the Owner.

## 1.06 VERIFIED REPORTS

- A. Contractor shall comply with CAC Sections 4-336 and 4-343 and issue verified reports through the Architect as required.

## 1.07 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable and to initiate instructions when necessary.
- B. Manufacturers' representatives shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report of observation to Architect for review.

## 1.08 CODES AND REGULATIONS

- A. All work pertaining to and all materials supplied for executing and completing this Contract shall comply with provisions specified in the Contract Documents and with all applicable laws, regulations and ordinances governing Work including, but not necessarily limited to, those of:
  - 1. California Code of Regulations (CCR), Title 24, California Building Standards Code
    - a. CAC - 2016 California Administrative Code, 24 CCR Part 1
    - b. CBC - 2016 California Building Code, 24 CCR Part 2, Volumes 1 and 2 ('15 IBC w/CA Amendments)
    - c. CEC - 2016 California Electrical Code, 24 CCR Part 3 ('11 NEC w/CA Amendments)
    - d. CMC - 2016 California Mechanical Code, 24 CCR Part 4 ('12 UMC w/CA Amendments)
    - e. CPC - 2016 California Plumbing Code, 24 CCR Part 5 ('12 UPC w/CA Amendments)
    - f. 2016 California Energy Code, 24 CCR Part 6
    - g. CFC - 2016 California Fire Code, 24 CCR Part 9 ('12 IFC w/CA Amendments)

- h. CALGreen - 2016 California Green Building Standards Code, 24 CCR Part 11
    - i. CRSC - 2016 California Reference Standards Code, 24 CCR Part 12
  - 2. California Code of Regulations (CCR), Title 19, Public Safety, Division 1, State Fire Marshal.
  - 3. Addenda Compliance per CBC Section 4-338(b), Part 1.
- B. Administrative Regulations, CCR Title 24, Part 1, California Administrative Code, Chapters 1, 4, 5 :
  - 1. DSA not subject to Arbitration.
  - 2. Copy of Part 1 and Part 2, Volume 1 and 2 (CBC), and Parts 3 through 5 of Title 24 CCR, shall be kept and made available at the construction site office during construction.
- C. ADA – Americans with Disabilities Act of 1990, as amended
  - 1. Standards – ADA Title III Regulations and the 2010 ADA Standards for Accessible Design.
- D. Enforcement includes all other codes, regulations, or standards referenced in the above listed codes.
- E. The preceding listed codes, regulations and ordinances of the regulatory agencies are hereby made a part of this Contract. Nothing in the Contract shall be construed as allowing any violation of any provision of any of above listed documents. Maintain copies of Codes listed above at the construction site.
- F. Threaded Steel Anchor Bolts and Anchor Rods requirements: DSA Interpretation of Regulation IR 17-11 requirements for identification, sampling and testing of threaded steel anchor bolts and anchor rods used for anchor structural elements to foundations.
  - 1. Anchor bolt and anchor rod materials identifications, sampling and testing shall be performed in accordance with IR 17-11 and the applicable standards. Anchor bolts and anchor rods not readily identifiable by physical markings, nor traceable by documentation accompanying the material's shipment, shall be treated according:
    - a. Sampled and tested to established conformity to the project documents.
    - b. Remove from the jobsite and replaced with identifiable material.
  - 2. Copy of IR 17-11 may be obtained at: [www.dgs.ca.gov/dsa/Resources/IRManual.aspx](http://www.dgs.ca.gov/dsa/Resources/IRManual.aspx)
- G. The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the contract documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required work shall be submitted to and approved by DSA before proceeding with the work.

- H. Should any existing conditions such as deterioration or noncomplying construction be discovered which is not covered by the DSA approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work.

#### 1.09 VARIATIONS WITH LAWS

- A. If Contractor, his subcontractors or suppliers, or any of their employees ascertain at any time that requirements of this Contract conflict with or are in violation of applicable laws, codes, regulations and ordinances he shall not proceed with Work in question, except at his own risk. Contractor shall be required to remove that Work from site and replace such Work with all complying Work at no additional cost to Owner.

#### 1.10 SELECTION AND PAYMENT - TESTING LABORATORY AND SPECIAL INSPECTORS

- A. Owner will employ and pay for services of independent Testing Laboratory and Special Inspectors approved by Architect and DSA to perform inspection and testing in accordance with Part 1, Title 24, Section 7-144 and 7-149, California Code of Regulations and this Section.
- B. Offsite fabrication requiring Inspection and Testing: submit the qualifications of Inspectors and laboratory, including proposals for services, to the Owner and Architect for approval of qualifications and costs. Inspectors and laboratories shall conform to the requirements of Part 1 Title 24 Section 7-149.
- C. Inspector of Record (IOR) / Testing Laboratory Travel Expenses
  1. Initial Testing. For initial testing required by this Manual, Owner shall pay IOR, Testing Laboratory or both, for travel expenses, including mileage, room and board, when travel for inspection and testing of products purchased by the Contractor exceeds 50 miles or 2 hours from the project site.
  2. Additional Testing. When initial testing fails, IOR and Testing Laboratory travel expenses, as described above, attributable to required retesting shall be borne by the Contractor and will be deducted by Change Order from funds due and payable, or that become due and payable to Contractor.
  3. IOR, Testing Laboratory or both, as applicable, shall forward billings and records of such expenses to the Owner.
- D. When tests and inspections are required on an overtime basis, initial payment will be made by Owner. At termination of Work or completion of Project, all costs for overtime testing and inspections will be deducted from Contractor's final payment (or any funds due and payable) by Change Order.
- E. Before the Testing Laboratory files testing and inspection billings with Owner, they shall be billed indicating segregated straight time from overtime costs. All overtime costs shall be substantiated with detailed explanation for necessity of such work costs.

- F. When materials tested fail to meet requirements herein specified, they shall be promptly corrected or removed and replaced, re-inspected and retested in a manner required by the Architect. Costs involved in re-inspection and retesting will be paid by the Owner and deducted from Contractor's final payment (or any funds due and payable) by Change Order.
- G. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

#### 1.11 LABORATORY RESPONSIBILITIES

- A. Laboratory shall be licensed to conduct testing and inspection operations in California and shall be approved by DSA. It shall be supervised by a State Licensed Civil Engineer who shall certify and sign all reports.
- B. Provide qualified personnel at site. Cooperate with Architect, Project Inspector and Contractor in performance of services.
- C. Perform specified inspection, sampling and testing of products in accordance with standards specified herein.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Architect, Project Inspector and Contractor by letter of observed irregularities or non-conformance of Work or products.
- F. Perform additional inspections and test required by Architect or governing agencies.
- G. Immediately upon Testing Laboratory determination of a test failure, the laboratory shall telephone the results of test to Architect. On the same day, laboratory shall send written test results to those named on the distribution list below.

#### 1.12 LABORATORY REPORTS

- A. After each inspection and test, promptly submit one copy of laboratory report to the following:
  - 1. Owner
  - 2. Contractor
  - 3. Inspector of Record (IOR)
  - 4. Special Inspectors: Special Inspector's Verified Reports as required by Section 4-336 and shall be submitted in a timely manner.
  - 5. Architect
  - 6. Structural Engineer
  - 7. Mechanical and Electrical Engineers (Related Tests and Inspections).
  - 8. Division of the State Architect (DSA)
- B. Include:
  - 1. Date issued.
  - 2. Project title, Architect's number, DSA Application and File number.
  - 3. Name of inspector.

4. Date and time of sampling and Specifications Section.
5. Identification of product and Specifications Section.
6. Location in the Project.
7. Type of inspection or tests.
8. Date of test and ambient conditions at time of test.
9. Results of tests.
10. Conformance with Contract Documents.
11. Signature by Registered Professional Engineer licensed in California.
12. Statement that tests were conducted in accordance with Parts 1 and 2, Title 24, California Code of Regulations.

C. Test reports shall include tests made, whether such tests indicate that the material performed satisfactorily or not. Samples taken but not tested shall be reported. Reports shall show that the materials were sampled and tested in accordance with the requirements of the approved Specifications. Reports shall show the specified design strength and shall state whether or not the materials tested comply with requirements. Report special sampling operations where required.

D. Submit a report verifying that tests and inspections herein specified and otherwise required have been completed and material and workmanship complies with the Contract Documents. Such verification reports shall be submitted at the completion of the Project and at any time the Project is suspended. Parties to receive such reports are the same as listed above.

E. When requested by Architect, provide interpretation of test results.

#### 1.13 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of Contractor.

D. Laboratory has no authority to stop the Work.

E. Laboratory shall not interpret code in relation to the design of the building.

#### 1.14 CONTRACTOR RESPONSIBILITIES

A. Administration of construction by Contractor per CAC Sections 4-330 and 4-343.

B. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing. Selection of materials required to be tested shall be by the Lab or Owner's Representative and not by the Contractor.

C. Cooperate with laboratory personnel, Owner's Representative, Project Inspector and the Architect, and provide access to the Work including weekends and after work hours and to manufacturer's facilities.

- D. Provide incidental labor materials and facilities to provide at all times, safe access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- E. Notify Architect, Project Inspector and laboratory 24 hours prior to expected time for operations requiring inspection and testing services. Contractor shall pay for costs incurred if testing or inspections are cancelled and are required to be rescheduled due to the Contractor's failure to notify the Project Inspector in advance as required. Also, notify Owner in advance of manufacturer of materials to allow testing at source of supply.
- F. In accordance with CBC-17A, Section 1706A, Contractor shall execute and submit a Statement of Responsibility regarding special inspections and testing required for principal wind- and seismic-load bearing systems to the Inspector of Record and the Owner.
- G. The Owner, Project Inspector, or the Architect shall have the right to reject materials and workmanship that are defective or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without cost to the Owner. If the Contractor fails to correct such rejected Work within a reasonable time, fixed by written notice, the Owner will correct same and charge the expense to the Contractor by Change Order.
- H. Should it be considered necessary or advisable by the Owner at any time before date of completion 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, all extra expenses shall be charged to the Contractor by Change Order. If however such Work is found to meet the requirements of the Contract Documents, the additional cost of labor and materials involved in the examination and for replacement costs shall be allowed to the Contractor by Change Order.
- I. When changes of construction schedule are necessary during construction, coordinate such changes with the Testing Laboratory as required.
- J. When the Testing Laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, extra charges for testing attributable to the delay shall be charged to the Contractor by Change Order.
- K. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
- L. Selection of materials to be tested shall be made by the Testing Laboratory or the Project Inspector and not by the Contractor.
- M. Any material shipped by the contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated in the Work.



#### 1.15 SCHEDULE OF STRUCTURAL TESTS AND INSPECTIONS

- A. Refer to Form DSA-103, Statement of Structural Tests and Inspections, attached hereto.

#### 1.16 MOISTURE AND ALKALINITY, AND RELATIVE HUMIDITY TESTING

- A. Field Testing of concrete slabs, moisture testing per ASTM F1869 -2009. The test area should be at the same temperature and humidity expected during normal use, minimum testing conditions shall be  $75 \pm 10$  degrees F. and  $50 \pm 10\%$  relative humidity. Maintain these conditions 48 hours prior to, and during testing.
- B. Field Testing of concrete slabs, relative humidity per ASTM F2170.
- C. Field Testing of concrete slabs, resilient flooring per ASTM F710.
- D. Alkalinity testing: per ASTM F710, ranges shall not exceed those recommended by the flooring manufacturer.

#### 1.17 EXPANSION BOLTS OR EPOXY-TYPE ANCHORS - APPROVED ANCHORS

- A. Basis of Design Capacities: Design capacities for expansion type and epoxy (adhesive) type anchors should reflect the tested capacity of the anchors including the degree of scatter in the recorded peak loads and the load-displacement response, the type and mechanical properties of the concrete or masonry in which the anchor is installed, anchor edge distance and spacing, and whether the anchors are installed through metal decking into concrete fill. In addition, the potential for concrete cracking in the vicinity of the anchor during its service life and the effect of such cracking on the capacity of the anchor to resist loads shall be considered. The effects of temperature variations on epoxy (adhesive) type anchors shall also be taken into account where applicable. The age, composition and mechanical properties of the materials in which the anchor will be installed shall be evaluated.
- B. The relevant mechanical properties include unit weight, compressive strength, and aggregate size and type. Evaluation of compressive strength on the basis of cores taken at or near the anchor locations shall be permitted. The compressive strength of the material in which the anchor will be installed shall meet or exceed the compressive strength of the material in which the anchor was tested.
- C. Expansion-type anchors: Concrete
  1. Kwik Bolt TZ (KB-TZ) Concrete Anchor, 3/8 to 3/4 inch diameter, ICC ESR-1917, by Hilti Inc., Tulsa, OK.
  2. Simpson Strong-Bolt 2 concrete anchor, 1/2, 5/8, 3/4 and 1 inch diameter, ICC ESR-3037, by Simpson Strong-Tie, Pleasanton, CA ,
  3. Or equal with ICC Report Number.
- D. Expansion-type anchors: Concrete filled CMU Masonry
  1. Kwik Bolt 3 (KB3) Masonry Anchors, 1/4 to 3/4 inch diameter, ICC ESR-1385, by Hilti.
  2. Wedge-All grout-filled CMU anchor, 3/8, 1/2, 5/8, and 3/4 inch diameter, ICC ESR-1396, by Simpson Strong-Tie.

3. Or equal with ICC Report Number.
- E. Epoxy-Type Adhesive Anchors:
1. For fully grouted CMU, lightweight concrete construction
    - a. HIT HY-70 by Hilti, ICC ER-2682.
    - b. Or equal with ICC Report Number.
  2. For Normal Weight concrete with min. compressive of 2500 psi or 4000 psi.
    - a. HIT RE 500-SD Adhesive Anchor System by Hilti, ICC ESR-2322.
    - b. SET-XP adhesive by Simpson Strong-Tie, ICC ESR-2508
    - c. Or equal with ICC Report Number.
- F. Expansion-type anchors. Expansive type anchors may be used, provided the allowable shear and tension loads are determined in accordance with following:
1. CBC 1913A.7.2.
  2. The allowable values listed in an ICC-ES Evaluation Service Report, with special inspection, may be used for allowable stress design, provided the report states that the anchors were tested in accordance with AC 01, latest revision, including the seismic qualification tests of AC 01 Section 5.6. Strength design values may be used provided the anchors have been tested in accordance with AC193, latest revision, including the seismic qualification tests of ACI 355.2 Sections 9.6 and 9.7 and Annex 1 of AC-193.
  3. For anchors installed in the underside of a beam/slab, the allowable tension load design values should be based on the tabulated value of the anchors installed without special inspection (special inspection is still required), unless allowable load values for anchors installed in cracked concrete are provided in the ICC-ES Report, or the anchors have been tested in accordance with ACI 355.2, latest revision, Table 5.2 and Annex 1 of AC-193, or ACI-318-11 Appendix D. Shear values are based on the tabulated values in the ICC-ES Report. Once an ICC-ES Report complying with AC-193 has been issued, it shall take precedence over any previous report.
  4. If anchors have not been tested in accordance with the requirements for seismic qualification tests of AC 01, Section 5.6, the allowable load values listed in the ICC-ES Report may be used with the following modifications:
    - a. Allowable shear and tension loads shall be limited to 80% of the tabulated allowable values for anchors installed with special inspection.
    - b. For anchors installed in the underside of a beam/slab, the allowable tension load should be based on 80% of the tabulated allowable value for anchors installed without special inspection (special inspection is still required). Allowable shear values should be based on "a." above.
  5. Underside of Beam/Slab Installations: except as noted in Section, all expansion type anchors installed in the underside of a beam/slab should use the reduced allowable design load values determined in F.1 and F3.b above.
    - a. The allowable design loads in F.1, F3.a above may be used for expansion-type anchors installed in the underside of a beam/slab, provided the installation meets one of the following criteria:
    - b. The design engineer provides information that indicates the anchor installation will occur in the negative moment (-M) region of the beam/slab, considering unbalanced loading, or
    - c. Data is submitted to indicate that specific anchor is suitable for use in cracked concrete (testing per ACI 355.2, Table 5.2, including Annex 1 of ACI 193), or

- d. The anchor is installed in the high flute (rib) of the metal deck in a concrete on metal deck assembly, or
  - e. The anchor is installed with sufficient embedment that the load transfer zone is above the neutral axis of the beam/slab.
  - f. When installing expansion-type anchors through the low flutes of metal deck into concrete, the anchors should be placed as close to the center of the flute width as practicable. The deck shall be 20-gage minimum thickness per CBC Section 2210A.1.1.2 and the flute width shall meet or exceed the value set forth in the ICC-ES Report for the anchor. The minimum effective depth of embedment shall be as noted in the ICC-ES Report for the anchor.
- G. Epoxy-type anchors. Epoxy-type (adhesive) anchors include anchors that rely on organic and inorganic compounds (including) epoxies, polyurethanes, methacrylates and vinyl esters) to develop the bond to the concrete.
- 1. The use of shallow epoxy-type (adhesive) anchors to resist direct tension loads where concrete cracking may occur is not permitted. Shallow epoxy-type (adhesive) anchors are those with an embedment to diameter ratio less than 8.
  - 2. Epoxy-type (adhesive) anchors should only be installed in conditioned, interior spaces. Where epoxy type anchors are used as shear dowels at the perimeter of an existing opening (slab or wall) to be filled with concrete, or are being used to connect new concrete elements to existing concrete elements (e.g. gunite), they may be installed in exterior locations with prior approval by DSA.
  - 3. If epoxy-type (adhesive) anchors are exposed to fire, all anchors in the affected area shall be inspected and evaluated by a qualified person to ensure their load carrying capability has not been compromised.
  - 4. The design shear and tension capacities of epoxy-type anchors must be determined in accordance with the following:
    - a. The allowable loads may be based on the values listed in an ICC ES Report that complies with requirements of AC 58 for a specific anchor in the same configuration as tested. Supporting data shall include the Seismic Qualification test performed in accordance with procedures of Section 5.3.7 of AC 58.
    - b. Where epoxy-type (adhesive) anchors are used for structural applications, such as dowels between new and existing concrete the anchors shall be installed in a manner such as that the ultimate tensile capacity is controlled by the ultimate strength of the steel element.
- H. When epoxy-type (adhesive) anchors are used to resist tensile forces in structural applications, the minimum depth of embedment shall be greater than or equal to the development length,  $l_d$ , determined in ACI 318-11 for a cast-in-place reinforcing bar of the same diameter and grade when considering a tensile splitting failure mode. Where tensile splitting need not be considered, the depth of embedment, may be determined in accordance with Appendix D of ACI 318-11 as amended by Section 3.3 of AC 308.
- I. Embedment, Spacing, and Edge Distance: All anchors shall meet the minimum embedment, spacing, edge distance, and slab thickness criteria established by the relevant ICC-ES Report.

1. Unless otherwise noted in the Report, the edge distance should be a minimum of ten (10) bolt diameters from the free edge of the slab and center-to-center spacing should be a minimum of twelve (12) bolt diameters. If the edge distance is less than ten (10) diameters, and the load is directed toward the free edge.

J. Holes shall be clean and free from dust immediately prior to installation of the anchor.

K. Installation of expansion anchors in Metal Deck:

1. When expansion anchors are installed into concrete supported by metal deck, the anchors shall be centered on the "low" flute of the decking where practicable. The deck should have a minimum thickness of 20 gauge, CBC Section 2210A.1.1.2 and the flute width shall meet or exceed the value set forth in the ICC-ES Report for the anchor.
2. When installed from the bottom, embedment shall be 1-1/2" above the top of the decking flute (except 1/4" diameter and 5/16" diameter anchors for ceilings). The effective depth of embedment should be considered to be 1/3 of the metal deck height plus the 1-1/2" noted above. There shall be a one inch minimum clearance distance from the top of concrete to end of bolt.
3. When installed from the top of the concrete, the depth of embedment shall be the depth of concrete above the top of the flute plus one third the flute height. A minimum one inch clear distance from the steel deck to the bottom of the anchor must be maintained.

#### 1.18 TESTING AND INSPECTION REQUIREMENTS FOR EXPANSION AND EPOXY ANCHORS

- A. Post-installed anchors shall be tested in accordance with the provisions of CBC Section 1913A.7 by an accepted testing facility or Special Inspector. If any anchor fails testing, test all anchors of the same type, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency. If the anchors are used for the support and bracing of non-structural components (pipe, duct or conduit), the twenty (20) shall be only those anchors installed by the same trade. Refer to 1.19G.8 on the Test Values Table (this Section) for acceptance/failure criteria.
- B. Structural Applications: Tension test all expansion-type anchors. Expansion-type anchors shall not be used as hold-down bolts. When used for sill plate bolting application 10% of the anchors shall be tension tested.
- C. Non-Structural Applications: Tension test 50% or alternate bolts including at least one-half the anchors in each group, shall be tension tested. in a group. Nonstructural may include such applications as equipment anchorage.
- D. Tension testing shall be done in the presence of the project inspector and a report of the test results shall be submitted to Architect. If any anchors fail the tension-testing requirements, the additional testing requirements shall be acceptable to Architect. The requirements shall also apply to bolts or anchors set in concrete with chemical (adhesives) if the long-term curability and stability of the chemical material and its resistance to loss of strength and chemical change at elevated temperatures are established to the satisfaction of the DSA.
- E. Expansion Type Anchors Setting Verification:

1. Torque-Controlled Anchors: Following attainment of 10% of the required torque, torque-controlled anchors shall not require more than six (6) additional complete turns of the nut during installation to achieve the manufacturer's specified installation torque. The extent of bolt projection after installation shall be measured to confirm that this requirement has been met.
2. Displacement-Controlled Anchors: The position of the plug in the anchor shell shall be checked with the manufacturer-supplied installation tool or other appropriate device. The position of the plug shall conform to the manufacturer's specifications.

F. Testing for Expansion-Type Anchors: The test load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring loaded devices, or a calibrated torque wrench. Displacement-Controlled anchors such as drop-in shall not be tested using a torque wrench. Required test loads may be determined by either of the following methods:

1. Twice the allowance tension load as determined in Article 1.18., or;
2. Tension or torque test values from the table and procedures below.
3. Anchors tested with a hydraulic jack should exhibit no discernable movement during the tension test, e.g., as evidenced by loosening of the washer under the nut. Anchors tested with a calibrated torque wrench must attain the specified torque within 1/2 turn of the nut.

G. Test Values: Conform to the following table for either Hardrock or Lightweight Concrete and Masonry:

1. All anchor bolts of the expansion type installed in concrete shall be one of the following or equal:
  - a. ITW Red Head-Wedge Anchor-ICC/ES ESR-2427
  - b. Hilti, Inc. - Qwik Bolt TZ - Wedge Anchor-ICC/ES ESR-1917
  - c. Simpson - Strong Bolt - Wedge Bolt - Wedge Anchor-ICC/ES ESR-3037

Minimum Test Values - Normal Weight or Lightweight Concrete

Dia(in)	ANCHOR		WEDGE	
	Tension Load(lbs)	Torque(ft-lbs)	Torque(ft-lbs)	Embedment(in)
-	-	-	-	-
3/8	1105	25	25	2
1/2	2420	40	40	3-1/4
5/8	4015	60	60	4
3/4	4690	110	110	4-3/4

2. All anchor bolts of expansion type installed in grout filled masonry shall be one of the following or equal:
  - a. Hilti, Inc - Kwik Bolt III-Wedge Anchor-ICC/ES NO.1385
  - b. Simpson-Wedge All-Wedge Anchor-ICC/ES NO. 1396

Minimum Test Values - Grout Filled Concrete Masonry

Dia(in)	ANCHOR		WEDGE	
	Tension Load(lbs)	Torque(ft-lbs)	Torque(ft-lbs)	Embedment(in)
1/4	432	4	4	2
3/8	626	15	15	2-1/2
1/2	724	25	25	3-1/2

5/8	1035	65	4
3/4	1368	120	4-3/8

3. Anchor diameter refers to the thread size for the WEDGE ANCHORS.
4. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).
5. Test equipment (including torque wrenches) shall be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
6. The following criteria apply for the acceptance of installed anchors:
  - a. Hydraulic Ram Method: The anchor shall have no observable movement at the applicable test load. For wedge and sleeve anchors, a practical way to determine observable movement is that the washer under the nut becomes loose
  - b. Torque Wrench Method: The applicable test torque must be reached within the following limit for wedge type:
    - 1) Wedge or Sleeve type: One-half (1/2) turn of the nut.
    - 2) One-quarter (1/4) turn of the nut for the 3/8 inch sleeve anchor only.
7. Testing shall occur within 24 hours after installation.
8. If the manufacturer's recommendation installation torque is less than the test torque listed in the table above, the manufacturer's installation torque shall be used in lieu of the tabulated values.

#### 1.19 EPOXY-TYPE (ADHESIVE) ANCHORS AND SCREW-TYPE ANCHORS

- A. Epoxy-type (adhesive) anchors shall be tension tested per Section 1913A.7 . The tension test load shall equal twice the allowable load for the specific location of the anchor to be tested (i.e., accounting for edge distance) or 80% of the yield strength of the bolt (0.8AbFy), whichever is less. The test procedures for expansion-type anchors in the attached table shall also be used for epoxy-type (adhesive) anchors. Torque testing of epoxy-type (adhesive) anchors is not permitted.
- B. Where epoxy-type (adhesive) anchors are used as shear dowels across cold joints in slabs on grade and the slab is not part of the structural system, testing of those dowels is not required.
- C. Anchors shall exhibit no discernible movement during the tension test.
- D. Screw Anchors: The fastener is produced from hardened steel with threads, similar in appearance to a lag bolt. Screw anchors may be used, provided the allowable shear and tension loads are determined in accordance with ACI 318 Appendix D.
  1. Welding to these anchors is not permitted.
  2. Screw anchors may be used to attach components, such as equipment, mechanical vibration isolators or snubbers, to structural (reinforced) concrete, or for sill bolting applications. All screw anchors installed through a wood sill plate requires a plate washer in conformance with Section 2308.6.
  3. The use of screw anchors is not permitted in overhead applications or for discrete hold down forces, such as shear walls.
  4. Masonry Anchors: 1/4" diameter, Tapcon with Advance Threadform Technology, heat-treated steel, by Illinois Tool Works/Buildex, ICC-ESR-1671. Slotted Hex Washer Head.

- E. Screw-type anchors shall be torque tested in accordance with the testing procedures in Test Values Table and procedures herein.
- F. Screw-type anchors: Simpson Strong-Tie Titen-HD concrete anchor, 3/8, 1/2 and 3/4 inch diameter, ICC ESR-2713, by Simpson Strong-Tie, Pleasanton, CA or equal with ICC report number.
- G. Screw-type anchors: Simpson Strong-Tie Titen-HD grout-filled CMU anchor, 3/8, 1/2, 5/8, and 3/4 inch diameter, ICC ESR-1056, by Simpson Strong-Tie, Pleasanton, CA or equal with ICC report number.

#### 1.20 POWDER ACTUATED FASTENERS

- A. Powder-Actuated Fasteners: Powder-actuated fasteners (shot pins) are not addressed by Chapter 1908A1.1 of CBC. Powder-actuated fasteners may be used for limited application provided the allowable shear and tension loads are determined in accordance with the following:
  - 1. The allowable values listed in an ICC ES Evaluation Services Report, with special inspection, may be used for allowable stress design, provided the report states that the anchors were tested in accordance with AC 70, latest revision. Powder-actuated fasteners may be used for hanging metal suspension systems for lay-in panel ceilings and for the attachment of metal track in conjunction with non-bearing partitions. The use of powder-actuated fasteners for other applications shall be subject to review and approval of DSA.
- B. Powder actuated fasteners (Shot Pins): Installer shall utilize tools recommended by the manufacture in compliance with the ICC code reports. Pins shall have a minimum diameter of 0.145 inch and be installed to conform to the load requirements of this Section and:
  - 1. Tables 1 (driven into steel), 2 (driven into concrete), and 4 (driven into Structural lightweight concrete) of ICC ESR-1663, Hilti or
  - 2. Table 1 or 3 (driven into concrete), 2 (driven into steel), 5 (driven into structural lightweight concrete), and 6 (driven in hollow concrete masonry units) of ICC ESR-2138, Simpson Strong-Tie powder-actuated fasteners or
  - 3. Table 1 and 2 (driven into concrete), 3 (driven into structural lightweight concrete), 4 (driven into hollow concrete masonry units), 5 (driven into steel) of ICC ESR-2811, Simpson Strong-Tie gas-actuated fasteners or equal with ICC report.
- C. Allowable Loads: Limited to 90 lbs. maximum or 80% of ICC approved values whichever is less. Testing required.
- D. Use of Powder actuated fasteners for tension loads is limited to support of minor loads such as suspended acoustical ceilings, ductwork and conduit. Permissible Loads for Ceiling Clip Assembly:
  - 1. Normal-Weight Concrete: Ceiling Clip Assembly Hilti X-CW, minimum 0.138" diameter, minimum penetration 1-1/8". Allowable Loads: 210 lbs. tension listed in ICC Report: ICC ESR 2184: 4000 psi Concrete Compressive Strength.
    - a. Type X-CW X-C 32 KWIK, by Hilti, Inc., Tulsa, OK, or equal.

2. Lightweight Concrete: Ceiling Clip Assembly, minimum 0.138" diameter, minimum penetration 1-1/8". Required Allowable Loads: 150 lbs tension values listed in ICC ESR 2184: 3000 psi Concrete Compressive Strength.
    - a. Type X-CW C-C 32, by Hilti, Inc., Tulsa, OK, or equal.
  3. Use manufacture's drill bits and recommended tools.
- E. Permissible Loads for Sills. Light gage steel and Interior Wood Plate Anchorages:
1. Low Velocity Power-Driven Fasteners: normal-weight concrete: Hilti DS and X-CR (stainless steel for exterior applications), 0.177", 0.145 for X-CR, shank diameter with washers, ICC-ESR Report ER-1663, Table 2. Exterior or Perimeter Sill and Interior Plate Anchorages.
  2. Low Velocity Power-Driven Fasteners: normal-weight concrete: Simpson PDPWL-300, 3 inches long, 0.300 inch head diameter and 0.145 inch shank diameter with washer, ICC ESR-2138, Table 1 or 4. Exterior or Perimeter Sill and Interior Plate Anchorages.

#### 1.21 REQUIRED TESTING FOR POWDER ACTUATED FASTENERS

- A. Testing: Operator, tool and fastener shall be pre-qualified by the Project Inspector.
1. Tools shall conform to ANSI A10.3 safety requirements for Powder Actuated Fastening Systems and to all OSHA requirements.
  2. Manufacturer's representative shall provide safety training for all installation personnel and provide powder actuated tool operator certification in accordance with OSHA requirements.
- B. The Project Inspector shall observe the testing of the first 10 fastener installations.
- C. A test pullout load of not less than twice the design load or 200 lbs., whichever is greater, shall be applied to the fastener in such a manner as not to resist the spalling tendency of concrete in which the fastener is imbedded. Thereafter, random tests under the Project Inspector's supervision shall be made of approximately 1 in 10 fasteners.
- D. Should failure occur on any fastener tested, all installations shall be tested until twenty consecutive fasteners pass, then resume the initial testing frequency.

#### 1.22 INSTALLATION

- A. When installing drilled-in anchors or powder driven pins in reinforced concrete, use care and caution to avoid cutting or damaging reinforcing bars. When required by the Architect, locate the reinforcing by using a non-destructive method prior to installation. Exercise extreme care and caution to avoid cutting or damaging reinforcing during installation. Maintain a minimum clearance of one inch between the reinforcing and the anchor and/or pin.



PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 ATTACHMENTS

- A. Form DSA-103, Statement of Structural Tests and Inspections.

**END OF SECTION**



DSA-103 rev 12/20/13

**Statement of Structural Tests & Special Inspections - 2013 CBC**

INCREMENT #

DSA File No.:

Application No.:


Date Submitted:

Revised:

Revised:



School Name		District	
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**IMPORTANT:** This form is only a summary list of structural tests and special inspections required for the project. The actual tests and inspections must be performed as detailed on the DSA approved documents. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A.  
**NOTE:** This form is also available for projects submitted for review under the 2007 and 2010 CBC.

**INSTRUCTIONS:** Click a plus sign (+) before any category or subcategory to reveal additional tests and special inspections. An "X" before a listed test or inspection indicates it is a mandatory requirement. A shaded box indicates a test or special inspection that may be required, depending on the scope of the construction and other issues. A shaded box can be clicked indicating your selection of that test. **Note:** A minus (-) on a category or subcategory heading indicates that it can be collapsed. However, any selections you may have made will be cleared. Click on the "COMPILE" button to show only the tests finally selected. **For more information on use of this form, see DSA-103.INSTR.**

Note: References are to the 2013 edition of the California Building Code (CBC) unless otherwise noted.

	TEST OR SPECIAL INSPECTION	TYPE <sup>1</sup>	PERFORMED BY <sup>2</sup>	CODE REFERENCE AND NOTES
-	<b>SOILS</b>			Table 1705A.6
	<b>1. GENERAL:</b>			Table 1705A.6
X	a. Verify that: • site has been prepared properly prior to placement of controlled fill and/or excavations for foundations, • foundation excavations are extended to proper depth and have reached proper material, and • materials below footings are adequate to achieve the design bearing capacity.	Periodic	GE*	* By geotechnical engineer or his or her qualified representative.
+	<b>2. COMPACTED FILLS:</b>			Table 1705A.6
+	<b>3. DRIVEN DEEP FOUNDATIONS (PILES):</b>			Table 1705A.7
+	<b>4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):</b>			Table 1705A.7
+	<b>5. RETAINING WALLS:</b>			
+	<b>6. OTHER SOILS:</b>			
-	<b>CONCRETE</b>			Table 1705A.3
+	<b>7. CAST IN PLACE CONCRETE</b>			
+	<b>8. PRESTRESSED CONCRETE (in addition to Cast in Place Concrete tests and inspections):</b>			
+	<b>9. PRECAST CONCRETE (in addition to Cast in Place Concrete tests and inspections):</b>			
+	<b>10. SHOTCRETE (in addition to Cast in Place Concrete tests and inspections):</b>			
+	<b>11. POST-INSTALLED ANCHORS:</b>			
+	<b>12. OTHER CONCRETE:</b>			
-	<b>MASONRY</b>			TMS 402-11/ACI 530-11/ASCE 5-11 Table 1.19.3
+	<b>13. STRUCTURAL MASONRY:</b>	Enter f <sub>m</sub>		
+	<b>14. VENEER OR GLASS BLOCK PARTITIONS:</b>			Table 1705A.4.1
+	<b>15. POST-INSTALLED ANCHORS IN MASONRY:</b>			
+	<b>16. OTHER MASONRY:</b>			
-	<b>STEEL</b>			Table 1705A.2.1
+	<b>17. STRUCTURAL STEEL AND COLD-FORMED STEEL USED FOR STRUCTURAL PURPOSES</b>			
+	<b>18. HIGH STRENGTH BOLTS:</b>			
+	<b>19. WELDING:</b>			DSA IR 17-3, AWS D1.1 and AWS D1.8 (AWS D1.3 for cold formed steel).
+	<b>20. NONDESTRUCTIVE TESTING:</b>			
+	<b>21. STEEL JOISTS AND TRUSSES:</b>			
+	<b>22. SPRAY APPLIED FIRE-PROOFING:</b>			
+	<b>23. OTHER STEEL:</b>			
-	<b>WOOD</b>			
+	<b>24. PREFABRICATED WOOD STRUCTURAL ELEMENTS:</b>			Section 1705A.5
+	<b>25. OTHER WOOD:</b>			
-	<b>OTHER</b>			
	<b>26. SKYLIGHT LOAD TEST</b>	Test	Lab	1709A.2 and 1709A.3. Testing is not required for: 1) a skylight with a valid evaluation service report per DSA IR A-5, or 2) a skylight that can be justified by structural calculation.
	<b>27</b>			



DSA-103 rev 12/20/13

**Statement of Structural Tests & Special Inspections - 2013 CBC**

INCREMENT #

DSA File No.:

Application No.:

Date Submitted:

Revised:

Revised:

28			
29			

**KEY to Columns**

1 Type -	2 Performed By -
<b>Continuous</b> – Indicates that a continuous special inspection is required	<b>GE</b> – Indicates that the special inspection is to be performed by a registered geotechnical engineer or his or her authorized representative
<b>Periodic</b> – Indicates that a periodic special inspection is required	<b>Lab</b> – Indicates that the test or inspection is to be performed by a testing laboratory accepted in the DSA laboratory Evaluation and Acceptance (LEA) Program. See section 4-335, 2013 CCR Title 24, Part 1.
<b>Test</b> – Indicates that a test is required	<b>PI</b> – Indicates that the special inspection is to be performed by the project inspector
	<b>SI</b> – Indicates that the special inspection is to be performed by a special inspector

**COMPILE**

**PRINT**

Name of Architect or Engineer in general responsible charge

Name of Structural Engineer (When structural design has been delegated)

Signature of Architect or Structural Engineer date

**IDENTIFICATION STAMP**  
 DIV OF THE STATE ARCHITECT  
 APP. # \_\_\_\_\_

AC N/A F/LS N/A SS \_\_\_\_\_

DATE \_\_\_\_\_

## SECTION 01 43 40

### OFF SITE MOCK-UP ASSEMBLY

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Section includes requirements for full-size, physical assemblies that are constructed off-site.
1. Full scale performance mock-up.
  2. Full scale visual mock-ups.
  3. The actual finish and color of products and systems are to be representative of the complete exterior façade.
  4. Construct a full scale mock-up for the purpose of testing for structural performance, water penetration and air infiltration as hereinafter specified. Visual approval will be based on finish match and uniformity, flatness, construction, joints and seals.
  5. Actual products installed by the Contract subcontractors of the Work. Each trade shall have required trade person(s) on project to complete mock-up.
  6. Testing of mock-up construction. Full-size, physical assemblies that are constructed at off-site Test Laboratory facility to verify performance characteristics. Minimum 2 stories high, 3 modular bays across.

##### 1.02 DESCRIPTION

- A. Definition: Mock-up: Physical assemblies that are constructed off-site Test Laboratory Mock-up is used to verify selections made under sample submittals, to demonstrate aesthetic effects, performance, and where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.
1. Mock-up assembly will become the footprint from which to construct actual and exact replica of exterior facade complete with glazed aluminum window system(s), glass and glazing, composite metal panel, and related exterior finishes.
- B. Related Sections: Constructed at a testing facility used for preconstruction testing to verify performance characteristics, the following construction mock-up shall include:
1. Section 07 21 00, Insulation
  2. Section 07 42 43, Composite Metal Panels
  3. Section 07 54 19, PVC Membrane Roofing System
  4. Section 07 62 00, Sheet Metal Flashing and Trim
  5. Section 07 92 00, Joint Sealants
  6. Section 08 44 14, Glazed Aluminum Curtain Wall
  7. Section 08 80 00, Glazing
  8. Section 09 24 00, Portland Cement Plaster
  9. Section 09 29 00, Gypsum Board
  10. Section 09 90 00, Painting

### 1.03 SUBMITTAL

- A. Product Data: Include construction details, material descriptions, profiles of components to be incorporated in the exterior envelope assembly.
- B. Shop Drawings
  - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. List of Materials Used in Constructing Mock-ups: List generic product names together with manufacturers, manufacturers' product names, model numbers, source of supply, and other information as required to identify materials used.
  - 1. Submittal is for information only. Neither receipt of list nor approval of mock-up constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

### 1.04 QUALITY ASSURANCE

- A. Build mock-up assembly using required materials, and components, necessary for complete operational system in the actual exterior façade finishes.
  - 1. Build mock-up in location and of size indicated or as designated by Architect.
  - 2. Notify Architect seven days in advance of dates and times when mock-up will be constructed.
  - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 4. Obtain Architect's approval of mock-up before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of revisions and changes to the mock-up.
    - b. Architect's review of partial mock-ups, if requested by the Contractor or Owner, shall not be considered approval for any incomplete or not installed work. Review shall be considered applicable only for completed work as requested for review and not for adjacent work not included in Contractor's request.
  - 5. Maintain field mock-ups during construction in an undisturbed condition as standard for judging the completed Work.
- B. Curtain Wall Mock-Up: Erect a segment of the proposed curtain wall on the site for the Architect's review and for testing.
  - 1. Locate Mock-up as directed.
  - 2. Mock-up shall be a full size curtain wall assembly at least 2 mullion spacings wide, and 1-1/2 stories high with one composite metal panel course and wall cap. Use materials identical to those proposed. The Mock-up shall be complete with spandrel and vision glass units, floor anchor system, and vertical control joint. Erect this mock-up in conjunction with construction of the masonry mock-up specified in Section 04 20 00; the two construction shall meet to form a vertical joint at least 8-feet high typical of the condition at Grid intersection.
  - 3. Do not fabricate the mock-up until mock-up Shop Drawings are reviewed and accepted.

4. Obtain materials and installation services for coordinate work specified in other Sections, including at least the following.
  - a. Sealants, Section 07 92 00.
  - b. Firestopping, Section 07 84 00.
  - c. Glass and Glazing, Section 08 80 00.
5. Test the curtain wall mock-up for the specified Performance Requirements.
6. Test the perimeter sealant for compatibility and adhesion.
  - a. Conduct peel-out tests on sealants.
7. Correct areas, modify construction details, or adjust components as directed by Architect or the testing laboratory to meet the specified requirements.
8. Document methods and materials used to obtain approvals; maintain at least one copy of this documentation in a readily accessible location at the Site while this work is in progress.
9. Protect the accepted Mock-up from damage and maintain access to the Mock-up while the related work is in progress.
10. Remove Mock-up as soon as the progress of the work permits, obtain the Architect's approval.
11. Finish or restore grounds, occupied by the Mock-up, to the indicated condition.]

## PART 2 - PRODUCTS

### 2.01 CONSOLIDATED VISUAL FIELD OFF-SITE TEST LABORATORY MOCK-UPS

- A. The consolidated field Test Laboratory mock-up consist of the entire exterior wall and window assembly including all, flashing, reveals and joint sealants. Area of exterior wall to be constructed is indicated on the exterior mock-up drawing and related details, but shall not be incorporated into the work.
- B. Before installing portions of the Work requiring a mock-up, build the consolidated field Test Laboratory mock-up with each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  1. Build consolidated mock-up in field off-site location where visual review is possible and required testing can be conducted.
  2. Notify Architect, Owner and Project Manager seven (7) days in advance of dates and times when mock-ups will be constructed.
  3. Field Mock-up are to be freestanding and self-supporting.
  4. After visual mock-ups have been approved at the off-site location:
    - a.
    - b. Take photographs in presence of the Owner's Inspector, Owner's Representative, and Architect from different angles, take close-up shots of details as directed by Architect to use as standard for judging of completed Work. Submit photographs to Architect.

## PART 3 - EXECUTION

### 3.01 LABORATORY TESTING

- A. Curtain Wall Mock-Up Testing
  1. Testing Laboratory: an Independent Testing Laboratory certified by Architectural Aluminum Manufacturers Association, selected by the manufacturer/fabricator and acceptable to the Owner.

2. Conduct tests according to AAMA 501, except as specified herein.
3. Sequence of Testing
  - a. Conduct ASTM E283 air infiltration test at 6.24 PSF. Verify air leakage at each glazed panel of the assembly.
  - b. Conduct ASTM E331 static pressure water penetration test with pressure at the design value.
  - c. Conduct ASTM E330 structural performance tests, each for a period of 10 seconds, with static air pressure difference as follows.
    - 1) +50% of Design Load (Inward) to remove slack.
    - 2) +50% of Design Load (Inward).
    - 3) -50% of Design Load (Outward).
    - 4) -50% of Design Load to remove slack (Outward).
4. Witnessing the Testing. Provide notice and coordinate schedules to permit representatives from the Architect and Owner to be present during mock-up testing.
5. Test Reports. Submit certified copies of test results indicating procedures, results and any modifications needed to meet the specified criteria. Report shall comply with AAMA requirements.
6. Deficiencies: Correct deficiencies in mock-up observed during testing or indicated through test result analysis. Repeat tests as necessary to show compliance with the specified structural, differential movement, thermal, air infiltration and water penetration resistance Performance Requirements. Repair or replace mock-up members damaged during testing.
  - a. Correct areas, modify method of installation, or adjust system as directed by Architect or testing laboratory to comply with requirements specified herein.
  - b. Incorporate modifications and findings into Shop Drawings.
  - c. Incorporate corrective measures necessary into final wall assembly to achieve specified performance.
7. Acceptance. Do not proceed with production of curtain wall materials until receipt of the final Laboratory Testing Report.

### 3.02 FIELD OFF-SITE TESTING

- A. Complete assembly testing: Maximum allowable air infiltration and water penetration requirements shall apply to the complete mock-up assembly including the joining and connection interfaces of all materials and systems
- B. Testing Agency: The Contractor shall engage and pay for a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- C. Field Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements.
  1. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.
    - a. Destructive test method, Method A, Hand Pull Tab (Destructive) in ASTM C 1401, Appendix X2 shall be used.
      - 1) Structural-Sealant Glazing Inspection: After installation of glass wall systems are complete, structural-sealant glazing shall be inspected and evaluated according to ASTM C 1401 recommendations.

2. Air Infiltration: Areas shall be tested for air leakage of 0.09 cfm/sq. ft., of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft..
3. Water Penetration: Areas shall be tested according to ASTM E 1105 at minimum uniform static-air-pressure difference of 6.24 lbf/sq. ft.] and shall not evidence water penetration.

D. Water Spray Test shall be tested according to AAMA 501.2 and shall not evidence water penetration.

### 3.03 RETESTING

A. When retesting is required, additional inspections and testing shall be performed promptly by Contractor as directed by Architect, at no change in Contract Time and Contract Sum. Reasonable expenses incurred by Owner, including costs of Inspector of Record (IOR) and Testing Laboratory, as result of repeating tests, will be deducted by Owner from monies due Contractor, in accordance with provisions of the General Conditions of the Contract.

1. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

**END OF SECTION**



## SECTION 01 45 23

### TESTING AND INSPECTION

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. This Section includes CONTRACTOR's responsibilities with regard to mandatory testing and inspection services:
  - 1. Testing and inspection services to meet requirements of the California Code of Regulations (CCR), Title 24, California Building Code (CBC).
  - 2. Tests of materials required by the DISTRICT's DSA certified testing agency as set forth in Section 4-335 of the California Building Standards Administrative Code.
  - 3. Inspection by DSA certified inspectors, employed by the DISTRICT in accordance with the requirements of California Building Standards Administrative Code, assigned to the Work with duties specifically defined in Section 4-333(b).

##### 1.02 TESTING AGENCY

- A. DISTRICT will select an independent testing agency approved by the California Division of the State Architect to conduct tests, sampling, and testing of materials.
- B. Selection of material to be tested shall be by the agency or the INSPECTOR OF RECORD (IOR) and not by CONTRACTOR.
- C. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from IOR that such testing and inspection is not required shall not be incorporated into the Work.
- D. DISTRICT will select and directly reimburse testing agency the costs for all DSA and/or DSA required tests and inspections, but may be reimbursed by CONTRACTOR for such costs as noted in related portions of the Contract Documents.
- E. The independent testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work. The testing agency shall not perform any duties of CONTRACTOR. The agency does not have authority to stop the Work.

##### 1.03 TEST REPORTING

- A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. Reports shall indicate the material or materials were sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2. Test reports shall indicate specified design strength. They shall also definitely state whether or not material or materials tested comply with the specified requirements. When requested by DISTRICT or Architect, provide interpretation of test results.

- B. After each inspection and test, testing agency will promptly submit one (1) copy of laboratory report to the following distribution list:
1. Division of State Architect
  2. District.
  3. Project Inspector.
  4. Architect.
  5. Structural Engineer.
  6. Mechanical and Electrical Engineers (Related Tests and Inspections).
  7. Contractor
- C. Each test report will include:
1. Date issued.
  2. Project title, Architect's number, DSA application and file number.
  3. Name of agency's inspector.
  4. Date and time of sampling or inspection.
  5. Identification of product and Specifications Section.
  6. Location in the Project.
  7. Type of inspection or test.
  8. Date of test and ambient conditions at time of test.
  9. Results of tests.
  10. Statement of Conformance with Contract Documents.
  11. Signature by Registered Professional Engineer licensed in California.
  12. Statement that tests were conducted in accordance with Parts 1 and 2, Title 24, California Code of Regulations.
- D. Immediately upon testing agency determination of a test failure, the agency will telephone the results of the test to the ARCHITECT. On the same day, the agency will send written test results to those on the distribution list.

#### 1.04 TEST AND INSPECTION VERIFICATION REPORT

- A. Testing agency shall submit to the Division of the State Architect a verified report in duplicate, with copy to the DISTRICT, covering each test which is required to be performed by that agency during progress of the Work. Such report shall be furnished each time construction on the Work is suspended, covering tests up to that time, and also prior to Final Completion of the Work, covering all tests.

#### 1.05 INSPECTION BY DISTRICT

- A. DISTRICT and its representatives shall at all times have access, for purpose of inspection, to all parts of the Work and to shops wherein the Work is in preparation, and CONTRACTOR shall at all times maintain proper facilities and provide safe access for such inspection.

- B. DISTRICT shall have the right to reject materials and/or workmanship deemed defective Work, and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of, all without charge to DISTRICT. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, DISTRICT may correct such defective Work and proceed to recover costs in accordance with related Articles of the Contract Documents.

#### 1.06 INSPECTOR OF RECORD

- A. INSPECTOR OF RECORD (IOR) is employed by DISTRICT in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein.
- B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all of the terms and conditions of the Contract Documents.
- C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

#### 1.07 CONTRACTOR RESPONSIBILITIES

- A. Deliver to testing agency, at designated location, adequate samples of materials proposed to be used which require testing.
- B. Cooperate with testing agency personnel, DISTRICT's Representative, INSPECTOR OF RECORD (IOR), CONSTRUCTION MANAGER and the ARCHITECT, to provide access to the Work including weekends and after work hours and to manufacturer's facilities.
- C. Provide incidental labor, materials and facilities to provide, at all times, safe access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- D. Notify CONSTRUCTION MANAGER, IOR and testing agency 24 hours in advance of required inspections or sampling, and 48 hours in advance of special testing or inspections. Notify DISTRICT in advance of the manufacturer or fabrication of materials in time to plan and schedule required testing at the source of supply. Extra expenses resulting from a failure to notify the agency shall be borne by the CONTRACTOR. Whenever extra expenses are indicated to be borne by the CONTRACTOR, they will be charged to the CONTRACTOR by Change Order.
- E. The DISTRICT, IOR, CONSTRUCTION MANAGER or the ARCHITECT 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 cost to the DISTRICT. Extra expenses for retesting and re-inspection shall be borne by the CONTRACTOR. If the CONTRACTOR fails to correct such rejected work within a reasonable time, fixed by written notice, the DISTRICT will correct same and charge the expense to the CONTRACTOR by Change Order.

- F. Should it be considered necessary or advisable by the DISTRICT at any time before date of substantial completion 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, all extra expenses shall be borne by the CONTRACTOR. 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 costs shall be allowed the CONTRACTOR by Change Order.
- G. When changes of construction progress schedule are necessary during construction, coordinate such changes with the testing agency as required.
- H. When the testing agency is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, extra charges for testing attributable to the delay shall be borne by the CONTRACTOR.
- I. CONTRACTOR shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.
- J. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements, regardless of the provisions of this Section.
- K. Inspecting and testing performed exclusively for the CONTRACTOR's convenience shall be the sole responsibility and expense of the CONTRACTOR.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.01 TESTS AND INSPECTIONS

- A. Refer to Form DSA-103 "Statement of Structural Test & Special Inspections - 2016 CBC requirement attached at the end of this Section.

### 3.02 EARTHWORK

- A. The DISTRICT's testing agency, under the direction of the Geotechnical Engineer of Record, will provide continuous inspection of fill and will field test fill and earth backfill as placed and compacted, and inspect excavations and subgrade before concrete is placed and provide periodic inspection of open excavations, embankments, and other cuts or vertical surfaces of earth. Geotechnical Engineer will sign all reports of observation and testing.
- B. Unsatisfactory materials shall be removed from the site. Materials installed improperly shall be removed, replaced, moisture adjusted, re-compacted and otherwise re-worked to achieve a satisfactory installation.

- C. Imported fill materials from offsite or onsite shall be inspected and tested at the source before importing and placing, and a report issue attesting to the satisfactory nature of the material.
- D. The agency will perform all sampling and testing of materials and testing of work in place as required by the DSA Testing and Inspection Listing, or otherwise required. Testing will be performed in accordance with ASTM or California-required test methods.

### 3.03 CONCRETE

- A. The DISTRICT's testing agency will conduct one-time sampling of aggregate and preparation and testing of concrete mix design for each strength and/or aggregate size specified. Testing costs for additional mix designs shall be borne by the CONTRACTOR.
- B. Continuous plant inspection and other concrete installation tests will be conducted by the DISTRICT's testing agency. However, costs for retesting of materials that do not meet specification requirements shall be borne by the CONTRACTOR.

### 3.04 ROOFING

- A. Testing agency will conduct inspection and testing of built-up bituminous roofing in accordance with manufacturer's instructions, including:
  - 1. Attend pre-roofing conference.
  - 2. Check deck surfaces prior to roofing application to verify that substrate is in satisfactory condition to receive roofing.
  - 3. Check kettle temperature control system and monitor kettle control temperatures.
  - 4. Inspect and test materials including softening point of asphalt to ensure conformance with specifications.
  - 5. Check for excessive moisture.
  - 6. Observe roofing application to ensure conformance with specifications.
  - 7. Supervise cutting and repair of cut-out tests and test and inspect cut-out samples for conformance with specifications.

**END OF SECTION**

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures, fencing, protection of Work and security.
- C. Construction Facilities: Access roads, parking, progress cleaning, and field office trailer.
- D. Special Controls: Waste disposal facilities, Water Control, Dust Control, Erosion and Sediment Control, Noise Control, Pollution Control.
- E. Comply with Title 24, Part 9, California Fire Code, Chapter 33 Fire Safety During Construction and Demolition, during all Phases of project.

##### 1.02 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Phasing Plan: Submit Phasing Plan to confirm understanding of phasing work required and in coordination with Architect's Phasing Plan indicating horizontal routing of pedestrian traffic, entryways, barrier plans and signage plan. Include schedule or time of day when Owner's use of facilities will be affected by construction Work.

##### 1.03 TEMPORARY ELECTRICITY

- A. Provide temporary electrical service suitable to conduct construction operations.
- B. Connect to existing power service. Power consumption shall not disrupt Owner's need for continuous service.
- C. Contractor shall pay cost of energy used. Exercise measures to conserve energy.
- D. Provide power outlets for construction operations with branch wiring and distribution boxes located where needed. Provide flexible power cords as required.
- E. Provide feeder switch at source distribution equipment.
- F. Permanent existing convenience receptacles may [not] be utilized during construction.

##### 1.04 TEMPORARY LIGHTING

- A. Provide and maintain adequate lighting for construction operations.

- B. Maintain lighting and provide routine repairs.
- C. Permanent building lighting may be utilized during construction.

1.05 TEMPORARY HEAT

- A. Provide heating devices and heat as required to maintain specified conditions for construction operations.
- B. Utilize Owner's existing heat plant, extend and supplement with temporary heating devices as required to maintain specified conditions for construction operations.
- C. Contractor shall pay cost of energy used. Exercise measures to conserve energy.

1.06 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials to dissipate humidity and noxious fumes and to prevent accumulation of dust, fumes, vapors or gases.

1.07 TELEPHONE SERVICE

- A. Provide, maintain and pay for two separate telephone service lines and telephone service to field office and Project Inspector's field office at time of project mobilization. Project Inspector's telephone shall be equipped with exterior, clearly audible bell.
- B. Provide and pay for cellular telephone service for Project Inspector's use at time of project mobilization.
- C. Provide, maintain, and pay for copy machine with 11 by 17 inch capability.

1.08 TEMPORARY WATER SERVICE

- A. Provide for suitable quality water service.
- B. Contractor shall pay cost of water used. Exercise measures to conserve water.
- C. Extend branch piping with outlets located so water is available by hose with threaded connections.

1.09 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facilities shall not be used.

1.10 TEMPORARY FIRE PROTECTION

- A. Provide fire protection during construction according to CFC Chapter 33, including but not limited to fire extinguisher requirements and exit access requirements.
- B. Conform to Title 24, Part 9, California Fire Code, Chapter 33, , Fire Safety During Construction/Demolition.

### 1.11 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades required by governing authority for public rights-of-way and for public access to existing facilities.
- C. Provide protection for plant life designated to remain. Replace damaged plant life.
- D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
- E. Provide steel trench plates, orange mesh fencing, construction site marker and other protective means to keep site and users, Owner's personnel, visitors and students safe, protected, and separated from ongoing construction operations. Provide temporary access at all paths of travel. Yellow warning tape is not acceptable means of separation and protection. At all open trenching operations, enclose entire trenching operation area including stockpiled backfill within orange mesh construction fencing. Provide steel trench plate "bridges" at all walkways.
  - 1. Notify Fire Marshall at least 48-hours prior to beginning utility work in the existing Fire Lane.
  - 2. Allow Fire Marshall access at reasonable times during progress of the work for inspections.

### 1.12 FENCING FOR CONSTRUCTION OPERATIONS

- A. Construction: Commercial grade chain link fence, 1-3/4 inch mesh, 11 gauge, top and bottom knuckled selvage (closed end).
  - 1. Provide screen full height of fence, 1-3/4 inch mesh, 11 gauge, woven open mesh 100% polypropylene with 78 percent wind break, reinforced tape at grommets at 18 inches centers at perimeter, attach screen to chain link fence with 11 gauge hog rings by Roxford Fordell, Los Angeles, CA.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.
- C. Submit detailed fencing and construction traffic plan for review and approval by Architect.
- D. At completion of project repair concrete or A.C. substrate.

### 1.13 STAGING AREAS

- A. Coordinate with Owner for location, extent and type of construction staging area.



#### 1.14 EXTERIOR ENCLOSURES

- A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with hardware and locks.

#### 1.15 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as required to separate Work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas and to prevent damage to existing materials and equipment.
- B. Construction: Wood framing, plywood or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces, translucent or opaque as directed by Owner.
- C. Fire-Retardant flexible Barriers: "ASFR6 Cover" anti-static Fire Retardant, 6 mil film . Passes NFPA 701-99 Test 1 or UL214, printed on sheet. Providing fire-retardant protection. By Americover Inc. San Diego, CA., [www.americover.com](http://www.americover.com) or equal
- D. Accessories Sets as required: ZipWall SLP: Springloaded Poles, Foam Rails, Side Clams, GripDisks, "Zip-Up" Self Adhesive Zippers. By Americover Inc. San Diego, CA. [www.americover.com](http://www.americover.com). or equal.
- E. Paint surfaces exposed to view from Owner-occupied areas where required for rigid wall construction.

#### 1.16 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual Specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills and openings. Provide protective and removal coverings for metal finishes intended to be exposed.
- D. Protect finished floors and other surfaces from traffic, dirt, wear, damage or movement of heavy objects by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces.
- F. Prohibit traffic from landscaped areas.
- G. Provide sticky track mats at transition areas to minimize footprints and distribution of dirt from construction areas through occupied corridors, classrooms, and adjacent workspaces. At carpet floors provide "Velcro Brand Carpet" protection in lieu of sticky mats.

### 1.17 SECURITY

- A. Provide security and facilities to protect Work, existing facilities and Owner's operations from unauthorized entry, vandalism or theft.
- B. Coordinate with Owner's security program.
- C. Within 48 hour period, replace or repair, to Architect's satisfaction, all surfaces or items damaged by graffiti during course of construction.
- D. Where security or fire detection systems are disabled for any reason, including where Owner has given approval for such system shutdown, provide fire watch or security guard service as directed by Owner at no additional cost to Owner.

### 1.18 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions. Where required by local fire authority, provide and maintain a 26 foot wide fire apparatus access road.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.
- F. Where construction traffic occurs when students and staff are on campus, provide "spotter" responsible for leading construction traffic through site areas.
- G. Route construction equipment, trucks, and similar vehicles via existing public streets to and from site as approved by governing authorities.

### 1.19 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel.
- B. When site space is not adequate, provide additional off-site parking.

### 1.20 PROGRESS CLEANING

- A. Refer to Section 01 70 00 Execution Requirements and the requirements of this Section.
- B. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- C. Remove debris and rubbish from closed or remote spaces, prior to enclosing space.

- D. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust. Clean substrate; remove dirt, oil, grease, construction markings, and foreign matter that could adversely affect surface finish appearance or performance.
- E. Remove waste materials, debris and rubbish from site weekly and dispose off-site.
- F. Maintain public streets free of mud, dust and debris and as required by jurisdictional authority.

#### 1.21 FIELD OFFICE TRAILER(S)

- A. Owner will provide space for office and project meetings.
- B. Field Office Trailer: Provide field office trailer, weather tight with lighting, electrical outlets, communications capabilities, heating, cooling and ventilating equipment and equipped to adequately conduct meetings for construction operations, minimum size; 480 sq. ft. Provide restroom: facilities within trailer.
  1. In SAME Field Office trailer provide separate private office similarly equipped and furnished with desk, 2 drawer file cabinet, a table and two chairs for use by Project Inspector, Owner and Architect including plan rack suitable for 30 by 42 inch drawings, minimum size 120 square feet. Inspector's office must be lockable and have direct access to outside, provide private telephone line and access to the Internet to inspector's office.
  2. Provide a SECOND separate Field Office Trailer similarly equipped as Contractor's office trailer and furnished desk, 2 drawer file cabinet, table, chairs and lockable for use by Project Inspector, Architect and Owner, provide private telephone line and access to the Internet to inspector's office, minimum size 480 sq. ft. (For Project Inspector's office trailer only, size 240 sq. ft.)
- C. Cost of use permits, occupancy permits and related fees, if any required by Governing Authorities for temporary construction facilities, shall be paid by Contractor.
- D. Provide 4 by 8 feet conference table, 6 conference chairs and 3 by 6 feet white markerboard at conference room.
- E. Install no closer than 45 feet from project buildings in accordance with NFPA 241.
- F. Maintain facility until Substantial Completion of entire project. Remove within 1 week of Substantial Completion.
- G. Provide property insurance and protection.

#### 1.22 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials prior to Certified Completion inspection.
- B. Remove temporary underground or overhead installations.
- C. Clean and repair damage caused by installation or use of temporary Work.

- D. Restore permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

#### 1.23 RELOCATION OF UTILITIES

- A. Contractor shall not have responsibility of timely removal, relocation or protection of public utility facilities that are not identified by Owner in Drawings and Specifications, in accordance with California Government Code 4215. Owner shall compensate Contractor for costs of locating and repairing damage not due to failure of Contractor to exercise reasonable care in removing and relocating such public utility facilities. If Contractor, while performing Contract, discovers public utility facilities not identified by Owner in Contract Drawings or Specifications, he shall immediately notify Owner and utility in writing. Contractor shall not be assessed liquidated damages for delay when delay was caused by failure of Owner to provide for relocation for utility facilities.

#### 1.24 WATER CONTROL

- A. Do not permit surface, rainwater or subsurface water or other liquids to accumulate in or about premises and vicinity thereof. Should such conditions be encountered or develop, control water or other liquid shall be suitably disposed of by means of temporary pumps, piping, drainage lines, troughs, ditches, dams or other methods as reviewed by Architect and approved by authority having jurisdiction.
- B. Reference Section 01 57 23 for Storm Water Pollution Prevention Plan Requirements.
- C. Dewatering Facilities and drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations and construction free of water.
  - 1. Refer to Section 31 23 19, Dewatering for additional water control requirements.
- D. Dispose of rainwater in lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- E. Pools: Provide all necessary measures to remove all ground water and rain water from pool excavation.

#### 1.25 DUST CONTROL

- A. Conduct earthwork operations in a manner to prevent windblown dust and dirt from interfering with progress of Work, Owner's activities and existing occupied structures in areas immediately adjacent as well as adjacent properties.
- B. Periodically water construction areas as required minimizing accumulation of dust and dirt.
- C. Water spray or cover with tarpaulins truck loads of soil to additionally minimize generation of dust and dirt from construction operations.
- D. Prevent dust and dirt from accumulating on walks, roadways, parking areas and from washing into sewer and storm drain lines.

#### 1.26 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes and drains to prevent water flow over adjacent properties or City rights-of-way.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Reference Section 01 57 23 for Storm Water Pollution Prevention Plan Requirements.

#### 1.27 NOISE CONTROL

- A. Avoid excessive noise where adjacent Owner's functions may be detrimentally affected.
- B. Refer to requirements in Section 01 57 20, Control of Construction Noise.Noise Control Plan: Submit Noise Control Plan after the Contract is awarded, prior to the commencement of the work, Contractor shall meet with the Owner to discuss the proposed Noise Control Plan and to develop mutual understanding relative to details of the Plan.
  - 1. The Noise Control Plan shall comply with the constraints set forth by the Owner, and be in compliance with the noise control laws of the City of \_\_\_\_\_.
  - 2. Submit a description of the instruments to be used in monitoring noise.
  - 3. Show the areas and boundaries where noisy work will occur.
  - 4. Approval of the Contractor's Noise Control Plan will not relieve the Contractor of responsibility for proper and continuing control of noise throughout the project site.

#### 1.28 POLLUTION CONTROL

- A. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Burning of refuse, debris or other materials will not be permitted on Site.
- C. Comply with regulatory requirements and anti-pollution ordinances during course of construction and disposal operations.

## 1.29 WASTE DISPOSAL FACILITIES

- A. Comply with requirements of Authorities Having Jurisdiction. Remove loose refuse and dispose off site legally.
- B. Provide waste-collection containers in sizes adequate to handle waste from construction operations.
- C. Provide and maintain trash bins on the Project site. Trash bins shall be serviced on an as needed basis.
- D. Free Fall Maximum: 8 ft. Provide enclosed waste CHUTES for higher fall.
  - 1. Provide disposals sufficiently sized to prevent debris from scattering around areas.
  - 2. Use support systems, intake hoppers, protective liners and durable non-breakable chutes. Max-Access Inc., Houston, TX, Chutes International, White Plains, MD or equal.
  - 3. When using demolition chutes, chute opening must be sealed when not in use. Chute and dumpster shall be sprayed with water to maintain dust control.
  - 4. Do not use Owner's disposal system.

## 1.30 PROTECTION OF EXISTING FACILITIES AND SITEWORK

- A. Provide site plan of proposed route of construction equipment for approval by Owner.
- B. Use caution to minimize disturbance and damage to existing landscaped areas and sitework.
- C. Protect sidewalks, curbs, entry areas and utilities.
- D. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) and irrigation on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- E. Protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. Repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work.

- F. Repair landscaped areas, irrigation and sidewalks and any other damaged facilities where trucks, erection equipment or other construction equipment was used in removal and replacement of the HVAC units during construction. Repair damaged areas to match existing construction to satisfaction of the Owner, and at no additional cost to the Owner.

#### 1.31 CONTRACTOR CONDUCT AND DRESS CODE

- A. Contractor's and subcontractors' personnel shall observe and abide by Owner requirements concerning appropriate conduct, loud noise (unrelated to construction activities) and dress requirements for a safe and un-disturbing work place. Conduct work activities in a professional manner at all times.
- B. Dress Code requirements: contractor's personnel shall wear traditional work attire or uniforms without logos, graphics or wording detrimental to work or school environment; unless logos, graphics or wording are for business identification purposes.
- C. Contractors and subcontractors shall wear orange safety vests along with other required safety attire including hard hats and safety glasses.
- D. Identification badges issued by the Owner shall be worn at all times, worn on the left side shirt-pocket area, displayed in full view and not concealed.
- E. No radios or music permitted on the job site.
- F. Owner reserves the right to remove any person(s) not observing conduct and dress requirements specified herein.
- G. Animals: Contractors' and worker's pets or animals of any kind are not permitted on the Campus, including being retained in a vehicle.

#### 1.32 MOBILIZATION AND DEMOBILIZATION

- A. The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract. Mobilization will not be considered as work in fulfilling the contract requirements for commencement of work.
- B. Mobilization: Equipment and Material: Mobilization shall include all activities and associated costs for transportation of contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the contractor's operations at the site; premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable.
- C. Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site; including the disassembly, removal, and site cleanup of offices, buildings, and other facilities assembled on the site specifically for this contract.

- D. This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.
- E. Payment: Payment will be made as the work proceeds, after presentation of paid invoices or documentation of direct costs by the contractor showing specific mobilization and demobilization costs and supporting evidence of the charges of suppliers, subcontractors, and others. When the total of such payments is less than the lump sum contract price, the balance remaining will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for completion of the work.
- F. Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

### 1.33 INTERIM LIFE SAFETY MEASURES (ILSM)

- A. The Interim Life Safety Measures (ILSM) itemized below are a series of administrative actions that must be taken to compensate for the hazards posed by NFPA 101 - 2003 Life Safety Code (LSC) deficiencies temporarily caused by construction activities. In addition, the ILSM shall include all applicable sections of NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations, a copy of which shall be maintained at the site by the Contractor for reference.
- B. ILSM must be implemented in, or adjacent to, all construction areas within the scope of work of this contract. ILSM apply to all construction personnel, including personnel of the General Contractor, Sub-contractors, Vendors, Suppliers, and any other personnel under the supervision and coordination of the General Contractor. ILSM shall be continuously enforced by the Contractor throughout the duration of the Contract.
- C. The Contractor shall ensure that exits provide free and un-obstructive egress.
  1. Unless provided elsewhere, the Contractor shall provide a Construction Egress Plan, showing temporary barricades, egress paths, and exits from, around, and (if necessary through) the construction area. Temporary exits shown on the Plan must be identified with exit signs approved by the local authority having jurisdiction.
  2. The Contractor shall present the Plan to and obtain approval from the Owner and the local authority having jurisdiction prior to implementation.
  3. The Contractor, in conjunction with the Owner, shall conduct an ILSM meeting prior to the commencement of the work. The purpose of the meeting will be to present the Construction Egress Plan and to review the ILSM. The meeting shall be attended by the Owner's and the Contractor's designated personnel. The Contractor is responsible to present the ILSM to all personnel under his supervision and coordination, whether or not they attend the ILSM meeting.
  4. The Contractor shall update and revise as required by construction progress and phasing.



5. The paths of egress and exits shown on the Plan must be inspected daily and maintained at all times.
  6. Where temporary alternate exits cannot be provided, the Contractor shall provide a continuous, 24 hour per day Fire Watch, consisting of one designated person per floor assigned solely to observing and reporting fire and life safety conditions and hazards to the General Contractor and the Owner, as well as initiating any required code red alarms.
- D. The Contractor shall ensure free and unobstructed access to emergency departments and services for emergency forces.
- E. The Contractor shall ensure that fire alarm, detection, and suppression systems, as well as structural and compartmentation features of fire safety outside the construction area are not impaired or compromised.
1. When the existing fire systems or fire safety features outside the construction area must be impaired or compromised a temporary but equivalent system or feature shall be provided. All temporary systems must be tested and inspected monthly.
  2. In lieu of temporary systems or features, the Contractor may provide a Fire Watch as described in Item C.6 above and other measures as required by the authority having jurisdiction.
- F. The Contractor shall ensure that temporary construction barricades and barricade doors are smoke tight and made of non-combustible or limited combustible materials that will not contribute to the development of smoke or fire.
- G. The Contractor shall provide additional fire-fighting equipment and user-training for his personnel.
- H. The Contractor shall ensure the prohibition of smoking by his personnel in accordance with MA.1.3.15 of the "Management and Administrative Service" manual, Volume 1, a copy of which shall be provided to the Contractor by the Owner.
- I. The Contractor shall develop and enforce storage and debris-removal practices that reduce the flammable and combustible fire load of the construction area to the lowest level necessary for daily operations.
- J. The Contractor shall conduct a minimum of one fire drill every month throughout the duration of the project.
- K. The Contractor shall provide daily hazard surveillance of the construction area with special attention to excavations, construction storage, and field offices.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Materials for temporary work may be new or used.
1. Use materials that are adequate in capacity for the required use and loads.
  2. Do not use materials that would create unsafe conditions.
  3. Do not violate requirements of authorities having jurisdiction.

4. Sticky Track Mats: Trim-Tack Adhesive mats by Markell Industries, Manchester, CT or equal. At carpet floors provide Velcro Brand Carpet protection in lieu of sticky mats.

B. Electrical Materials

1. Power Receptacles: 15 ampere, 120 volt, duplex grounding type with ground fault circuit interrupters. Furnish in suitable boxes with hinged cover plates.
2. Light Fixtures and Lamps: Medium-base, rubber pigtail, type lamp sockets or porcelain lampholders furnish with boxes, and lamps.
3. Conductors: insulated copper or aluminum, with phase conductor insulation rated for the circuit voltage, and insulation or jacketing suitable for the conditions, and branch circuit conductors - No. 12 AWG minimum size, except No. 10 AWG where length of branch circuit exceeds 100 feet.

C. Mechanical Materials

1. Portable Equipment may be new or used, temporary units that will not damage construction materials or processes, that will not create unhealthy conditions for workers, and that can be operated with approval from the authorities having jurisdiction.
2. Fixed Equipment may be new or used, temporary or permanent, devices including any heat generating or cooling equipment that can be operated in a safe manner and with approval from the authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.01 REMOVAL

- A. Remove all temporary control measures in accordance with regulatory requirements at completion of construction.

**END OF SECTION**

## SECTION 01 55 00

### VEHICULAR ACCESS AND PARKING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Signs, Signals and devices.
- B. Construction Parking Control.
- C. Flagmen
- D. Flares and Lights.
- E. Haul Routes.
- F. Traffic Signs and Signals.
- G. Removal

##### 1.02 SIGNS, SIGNALS AND DEVICES

- A. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs as required to maintain adequate standards of safety and control of vehicular movement on and off construction site.
- B. Traffic Control Signals: As approved by local jurisdictions.
- C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- D. Flagmen Equipment: As approved by local jurisdictions.

##### 1.03 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and Owner's operations.
- B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

##### 1.04 FLAGMEN

- A. Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

1.05 FLARES AND LIGHTS

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

1.06 HAUL ROUTES

- A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- D. Consult with Owner to establish construction traffic haul route.

1.07 TRAFFIC SIGNS AND SIGNALS

- A. At approaches to site and on site, install at crossroads, detours, parking areas and elsewhere as needed to direct construction and affected public traffic.
- B. Install and operate traffic control devices as are necessary to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
- C. Relocate as Work progresses to maintain effective traffic control.

1.08 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to full depth.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

## SECTION 01 56 39

### TEMPORARY TREE AND PLANT PROTECTION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Sections:
  - 1. Division 1 Section "Temporary Facilities and Controls" for temporary site fencing.
  - 2. Division 2 Section "Site Clearing" for removing existing trees and shrubs.

##### 1.03 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches above the ground for trees up to, and including, 4-inch size; and 12 inches above the ground for trees larger than 4-inch size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings (defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated).
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

##### 1.04 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.

- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

## PART 2 - PRODUCTS

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Field verification: Where in the opinion of the Contractor and Inspector of Record, the excavation and/or adjacent site preparation work necessary to provide for the Contract Scope will cause damage to the tree or plant (roots), stop work in the area and contact the Arborist immediately for consultation and determination of procedure. In the event that the tree or plant is deemed necessary to be removed, the Owner shall issue a change order as required.
- C. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

### 3.02 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
  - 1. Apply 4-inch average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

### 3.03 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
  - 1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.

2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
  3. Access Gates: Install as required; adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, but no less than one sign facing a different direction.
  - C. Maintain protection zones free of weeds and trash.
  - D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
  - E. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
    1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
    2. Temporary access is permitted subject to pre-approval in writing by Arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

### 3.04 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 2 Section "Earthwork."
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

### 3.05 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Review pruning procedure and requirements with Arborist prior to the commencement of the work. Prune roots as follows:
  - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
  - 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches in diameter with emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
  - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 4. Cover exposed roots with burlap and water regularly.
  - 5. Backfill as soon as possible according to requirements in Division 2 Section "Earthwork."
- B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

### 3.06 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
  - 1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by Arborist.
  - 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1)[and the following:
    - a. Type of Pruning: Cleaning, Thinning, Raising, Reduction per Arborist's recommendation(s).
    - b. Specialty Pruning: Restoration, Vista, Palm, Utility per Arborist's recommendation(s).
  - 3. Cut branches with sharp pruning instruments; do not break or chop.
  - 4. Do not apply pruning paint to wounds.
- B. Chip removed branches and incorporate into the on-site planting improvements as approved by Architect.

### 3.07 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.



- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
  - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

### 3.08 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

### 3.09 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
  - 1. Submit details of proposed root cutting and tree and shrub repairs.
  - 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
  - 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
  - 4. Perform repairs within 24 hours.
  - 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition or are damaged during construction operations that Arborist determines are incapable of restoring to normal growth pattern.
  - 1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
  - 2. Provide one new tree of 6-inch caliper size for each tree being replaced that measure more than 6 inches in caliper size.
    - a. Species: Optional species as selected by Architect.
  - 3. Plant and maintain new trees as specified in Division 2 Section "Exterior Plants."
- C. Soil Aeration: Where directed by Arborist, aerate surface soil compacted during construction. Aerate 5 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 1-inch-diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

**END OF SECTION**

**SECTION 01 57 20**

**CONTROL OF CONSTRUCTION NOISE**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to work of this section.

**1.02 DESCRIPTION**

- A. This section specifies the control of noise arising from construction operations and associated activities. Noise control measures specified are an obligation of the Contractor with the costs included within the various contract items of work.

**1.03 QUALITY ASSURANCE**

- A. Establish and maintain quality assurance program for the control of noise.

**1.04 SUBMITTALS**

- A. Noise Control Plan: After the contract is awarded, prior to the commencement of the Work, the Contractor shall meet with the Owner to discuss the proposed Noise Control Plan and to develop mutual understanding relative to details of the Plan.
  1. The Noise Control shall comply with the constraints set forth by the Owner, and be in compliance with the noise control regulations of the Owner and the City of Fallbrook.
  2. Submit a description of the instruments to be used in monitoring noise.
  3. Show the areas and boundaries where noisy work will occur.
  4. Approval of the Contractor's Noise Control Plan will not relieve the Contractor of responsibility for proper and continuing control of noise throughout the project site.

**1.05 NOISE CONTROL**

- A. General: Take every practicable precaution and action to eliminate or minimize noise emanating from the construction operations.
- B. Timing: Perform noise-producing work in less-sensitive hours of the day or week as directed by the Owner.
- C. Constraints: Control and abate noise produced by the Work at or below the decibel levels and within the time periods specified.
  1. Repetitive, high level impact noise will be permitted only between 7:00 a.m. and 4:00 p.m. unless otherwise permitted by the Owner. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise

Sound Level in dB

More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary to comply with the requirements specified, and comply with the following:
  - a. Maximum permissible construction equipment noise levels within 50 feet of any building on the premises shall be 75 decibels.
  - b. Provide shields or other physical barriers to restrict the transmission of noise.
  - c. Provide soundproof housings or enclosures for noise-producing machinery.
  - d. Use intake and exhaust mufflers on internal combustion engines that are maintained to have equipment perform below noise levels specified.
  - e. Line hoppers and bins with sound deadening material.
  - f. Conduct truck loading, unloading and hauling operations so that noise is kept to a minimum.
  
3. At least once every five successive working days while work is being performed, above 55 dBA noise level, measure sound level for noise exposure due to the construction. Measure noise exposure at the property line or 50 feet from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, measurements may be taken three to six feet in front of any building face. Submit the recorded information to the Architect noting any problems and the alternatives for mitigating actions.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

**SECTION 01 57 23**

**TEMPORARY STORM WATER POLLUTION CONTROL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes development and implementation of Storm Water Pollution Prevention Plan (SWPPP) written specifically for this Project
  
- B. Related Sections
  - 1. Section 31 10 00 - Site Clearing
  - 2. Section 31 22 00 - Grading
  - 3. Section 31 23 16 - Excavation
  - 4. Section 31 23 16.13 - Trenching
  - 5. Section 31 23 23.13 - Backfill
  - 6. Section 32 12 16 - Asphalt Paving
  - 7. Section 32 13 13 - Concrete Paving

**1.02 ADMINISTRATIVE REQUIREMENTS**

- A. SWPPP Compliance. Each contractor, sub-contractor, and material supplier, at any tier, and their employees or agents must follow the procedures in the SWPPP.
  - 1. Personnel or agents that handle or use materials or equipment, that in such handling or use could cause storm-water pollution or soil contamination, shall take precautions to prevent that contamination.
  - 2. Personnel or agents that conduct any activity that may disturb or damage barriers of any nature that are in place to protect stormwater drainage systems from pollution shall protect such barriers during and repair any damage to such barriers promptly upon completion of the activity.
  - 3. Complete SWPPP Compliance Activity Log upon completion of each activity.
  
- B. Sustainability Objective. The intent of these Documents is to provide the Owner with a Project that when complete will earn sufficient Credit Points to qualify for CHPS funding. Failure of contractors, sub-contractors, and material suppliers, at any tier, and employees or agents of these to cooperate in the implementation of this objective may jeopardize the Owner's ability to the Project.

Credit	LEED
1. _____.	#

- C. Construction Waste Management. Each contractor, sub-contractor and material supplier, at any tier, shall participate in Project's Construction Waste Management Plan to foster material recovery and re-use and to minimize disposal in landfills.
  - 1. Each contractor, sub-contractor and material supplier shall take measures to minimize the production of construction debris on Site, by minimizing packaging, and production of surplus and waste materials.
  - 2. Personnel that handle, unpack or use materials shall collect and separate waste materials for distribution to recycling, reuse and disposal facilities.

3. Waste Management objective for this Project is to divert at least 50-percent of non-hazardous construction debris from landfill disposal to recycling, reuse and salvage facilities.
4. Complete a Waste Management Report (Section 01 74 19, Attachment B) upon completion of each activity.

#### 1.03 SUBMITTALS

##### A. Action Submittals

1. Notice of Intent

##### B. Information Submittal

1. Certification of timely Notification of Authorities Having Jurisdiction
2. Copy of Storm-Water Pollution Prevention Plan, accompanied, upon request of Owner, with contractor's certification of compliance with the relevant rules, regulations, and laws
3. SWPPP Compliance Activity Logs
4. Waste Management Logs

##### C. Closeout Submittals

1. Certificates of Compliance with the SWPPP
2. Certified Copy of notification of Agencies of completion of operations

#### 1.04 QUALITY ASSURANCE

##### A. SWPPP shall satisfy the mandates of Federal Clean Water Act as enforced by State of California Water Resources Control Board and its Regional Water Quality Boards.

1. The plan shall identify potential sources of pollutants which may enter the storm water system, and describe steps that will be taken during construction to minimize the risk of storm water contamination.
2. The plan shall address management procedures that will be used during construction to prevent pollution discharges such as spills, leaking, and dumping.
3. Additional information regarding SWPPP requirements can be obtained from State Water Resources Control Board

##### B. If Owner is cited for violation of Clean Water Act due to failure of SWPPP to address requirement, Contractor shall be liable for any fines or penalties that might be imposed by regulatory agency, he shall be obligated to perform mandated corrective measures at his own expense.

1. If Owner, Architect, or Owner's Inspector becomes aware of violations of SWPPP, they will immediately inform Contractor in writing. Contractor shall immediately cease violation and shall restore site, at his own expense, to same conditions it was in before violation, to approval of Owner.
2. Should Contractor continue to violate requirements of SWPPP, or refuse to comply, or refuse to repair results of violation to Owner's approval, for purposes of this Contract it shall be considered as any other violation of Contract. Owner will take necessary measures as set forth in General Conditions.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Provide temporary and permanent storm water pollution prevention equipment, material, and facilities as required by or as necessary to comply with SWPPP.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify Site conditions are ready for the work of this Section.
- B. Do not begin until unsatisfactory conditions are corrected. Beginning SWPPP installations means acceptance of existing conditions including preparatory work of others, if any.

### 3.02 IMPLEMENTATION

- A. Execute measures required by SWPPP as directed by SWPPP itself.
- B. Prepare and submit Notice of Intent in accordance with terms of the General Permit prior to commencement of construction activity. Copies of General Permit and Notice of Intent form may be obtained from California Regional Water Control Board.
  - 1. Send Notice of Intent accompanied by fee to  
State Water Resources Control Board (SWRCB)  
Division of Water Quality  
Attention: Storm Water Section, Permit Unit  
P.O. Box 1977  
Sacramento, CA 95812-1977
- C. During construction, make changes as necessary for proper functioning of SWPPP measures.
- D. At completion of work, Contractor shall remove temporary SWPPP measures and dispose of any pollutants in legal manner offsite, or as otherwise required by SWPPP.

**END OF SECTION**

**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Products
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions

**1.02 PRODUCTS**

- A. Product: means new material, machinery, components, equipment, fixtures and systems forming Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Provide interchangeable components from the same manufacturer.

**1.03 TRANSPORTATION AND HANDLING**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

**1.04 STORAGE AND PROTECTION**

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground and protect as necessary to prevent deterioration or damage to the product.



- C. When approved by the Owner, provide off-site storage and protection in a bonded warehouse approved by Owner when site does not permit on-site storage or protection at no cost to Owner.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to ensure products are undamaged and are maintained under specified conditions.

#### 1.05 PRODUCT OPTIONS

- A. Where products are specified by reference standards or by description only, provide products meeting those standards or that description, made by a manufacturer acceptable to Architect.
- B. Where products are specified by naming one or more manufacturers, provide products of one of the named manufacturers that meets or exceeds specifications.
- C. Where any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction is indicated or specified by name, make, trade name, or catalog number, whether with or without the phrase "or equal," such specification shall be deemed to establish the minimum qualities of function, dimension, appearance, and performance (collectively the Basis of Design) for that material, process, or article. Such specification shall be deemed to be followed by the phrase "or equal."
- D. If a named product, or named manufacturer's equivalent product does not fully meet the specification, that manufacturer shall provide a custom or modified product to meet the specification.
- E. Where expressly noted "no substitutions" in individual Sections, no product options are permitted.
- F. When the phrase "or equal" is used or implied, it shall mean "an equivalent product, approved by the Architect in accordance with the requirements of this Section."
- G. Products, proposed as substitutions, shall conform to requirements listed in the respective Section of this Manual and have at least 10 successful installations in commercial projects similar in scale and complexity to those required for this Project that have been in service for minimum of 5 years and remain in satisfactory condition.

## 1.06 SUBSTITUTIONS

- A. Manufacturers and products listed in Specifications form basis for design and quality intended. Bidders may propose substitutions of equal design and quality and must be accompanied by completed Request Form included at end of this Section, other forms not permitted. Submit separate form for each proposed substitution.
1. Substitution requests, if any, shall be submitted to Architect 10 calendar days prior to Bid Opening Date. Architect will issue Addenda if accepted.
- B. Substitutions must clearly be in Owner's best interest because of quality, cost, performance, conformity to code requirements or availability. Architect will make decision as to acceptance of proposed substitution.
1. Submittal of proposed substitutions shall be made only by Prime Contractor(s). Architect will not review direct submittal by manufacturers, suppliers or subcontractors.
  2. Burden of proof as to equality of any material, process or article shall rest with Contractor. Provision authorizing submissions of "or equal" justification data shall not in any way authorize an extension of time for performance of this Contract.
  3. Substitutions shall, without exception, be manufactured of same basic materials and comply with or exceed all Specification requirements of dimension, function, structure and appearance, without deviation. Provide itemized comparison of quality and performance.
  4. Use of approved substitutions shall in no way relieve Contractor from responsibility for compliance with Contract Documents after installation. Contractor shall assume all extra costs caused by use of approved substitute materials.
  5. Statement indicating why specified material or product cannot be provided.
  6. Coordination information, including list of changes or modifications needed to other parts of Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
  7. Detailed side by side comparison of significant qualities of proposed substitution with those of the Work specified. Mark clearly affected specification Section for any differences from item specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect and specific features and requirements indicated.
  8. Product Data Samples, including drawings and descriptions of products and fabrication and installation procedures.
  9. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners.
  10. Material test reports from qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  11. Cost information, including a proposal of change, if any, in the Contract Sum.
  12. Substitutions for specified product, brand or manufacture that have been submitted and disapproved by Architect shall not be resubmitted in any modified form.
  13. In case materials are substituted and installed without proper authorization, Contractor shall remove such materials and install those specified at his own expense.
  14. Contractor shall determine effect approved substitutions will have on other portions of Work and so inform his subcontractors and employees of these effects.

15. Acceptance of proposed substitution shall be determined solely by specifying Architect. The final decision shall be the Architect's in accordance with the General Conditions.
- C. Substitutions may be considered when product becomes unavailable through no fault of Contractor. Provide letter from manufacturer, on manufacturer's letterhead, stating lack of availability.
  - D. Unacceptable Substitutions: substitution requests initiated by late submittals that have caused materials to become unavailable due to delay in ordering and procurement will not be acceptable reason for substitutions.
  - E. Provide same warranty for substitution as for specified product.
  - F. Contractor shall pay costs for time required by Architect for review and for any redesign services associated with substitutions and for costs of re-approval by Regulatory Agencies.
  - G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request.
  - H. Each subcontractor is responsible for providing products and construction methods compatible with products and construction methods of other subcontractors. If dispute arises between subcontractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
  - I. Substitution Submittal Procedure: In accordance with Division 01, General Requirements for Administrative Requirements and this Section.
  - J. All Substitutions for any material, system or product that would otherwise be regulated by DSA shall be included in an Addendum or Form DSA-140, and shall be approved by DSA prior to fabrication or use. (CAC Section 4-338(c) and IR A-6)
- 1.07 OWNER-FURNISHED, OWNER-INSTALLED WORK (OFOI)
- A. Indicate in construction progress schedule owner-furnish owner-installed items and schedule time for installation.
  - B. Items indicated on Drawings as OFOI will be furnished by Owner and installed by Owner. Work indicated as OFOI will be performed under separate contract employees by Owner at its discretion. Where work of this Contract adjoins or conflicts with OFOI, work, Contractor shall cooperate with Owner and its employees in manner that will provide for reasonable and accurate completion of this Contract and work under separate contact.
  - C. Coordinate with OFOI work affecting this contract. Including verification and interfacing of this contract with OFOI work.

1.08 OWNER-FURNISHED, CONTRACTOR-INSTALLED WORK (OFCI)

- A. Indicate in the construction progress Schedule Owner-Furnish Contractor-Installed items and schedule time for their installation.
- B. Contractor shall verify exact sizes and services required for each item of equipment indicated on Drawings or in Project Manual as OFCI and shall obtain from Owner rough-in drawings, diagrams, setting templates and other necessary information to ensure proper mating of assemblies.
- C. Contractor shall receive at project site each item of equipment from Owner and from that time on shall assume full responsibility for items and equipment until one year from date of Certified Completion.
- D. Contractor shall give Owner 15 days prior notice of requirements for delivery to site of all OFCI equipment.
- E. Contractor shall be responsible for receiving OFCI items and equipment and shall uncrate, inspect and notify Owner in writing within 7 days of receiving said items or equipment of acceptance or rejection of items or equipment. Owner, after receiving notice, will take appropriate action to have items or equipment made acceptable for Contractor's use. Rejected items shall be carefully stored and protected from damage by Contractor until Owner takes appropriate action.
- F. Contractor shall be responsible for final placing, installation, connection, start-up, checking, testing and demonstrated satisfactory operation. Owner will provide names of manufacturer's representatives, who shall assist the Contractor in checking, testing and demonstrating equipment.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

**END OF SECTION**

**SECTION 01 70 00**  
**EXECUTION REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Field engineering and surveying.
- B. Requirements and limitations for cutting and patching of Work.
- C. Cleaning throughout construction period.
- D. Project Record Documents.
- E. Closeout procedures.
- F. Adjusting
- G. Operation and maintenance data.
- H. Warranty and Guarantee.
- I. Spare parts and maintenance materials.
- J. Instruction to Owner's personnel.

**1.02 FIELD ENGINEERING QUALITY CONTROL**

- A. Employ Land Surveyor registered in the State of California and acceptable to Architect.
- B. Submit name, address and telephone number of Surveyor before starting survey work.
- C. Maintain complete and accurate log of control and survey Work as it progresses.
- D. On completion of foundation walls, floor slabs and major site improvements, prepare a certified survey illustrating dimensions, locations, angles and elevations of construction.

**1.03 SURVEY REFERENCE POINTS**

- A. Contractor to locate and protect survey control and reference points.
- B. Control datum for survey is that established by Owner provided survey.
- C. Protect survey control points prior to starting site Work; preserve permanent reference points during construction.
- D. Promptly report to the Architect loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the Architect.

#### 1.04 SURVEY REQUIREMENTS

- A. Provide field engineering services. Use recognized engineering survey practices.
- B. Establish a minimum of two permanent 3-inch diameter brass plate benchmarks on site, referenced to established control points. Record locations, with horizontal and vertical data on Project Record Documents. Establish additional temporary bench marks at all floor levels.
- C. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means, make use of laser instrumentation. Contractor shall arrange and pay for Field Engineering and Staking.
  1. Site improvements including pavements; stakes for grading, fill placement; utility locations, slopes, invert elevations and batter boards.
  2. Grid or axis for structures.
  3. Building foundation, column locations, ground floor elevations.
  4. Floor elevations of existing structures that relate to project.
  5. Partition layouts on rough floor as a guide to all trades.
- D. Periodically verify layouts by same means.

#### 1.05 layout markings

- A. Layout markings shall not be made with xylene-based inks, paint, or dyes, or with other solvent-based products that may bleed through finishes.

#### 1.06 EXISTING CONDITIONS

- A. Before beginning Work, investigate and verify existence and location of mechanical, drainage, and electrical systems and other construction affecting Work, including underground utilities.
  1. Before construction, survey and record points of connection of utility services.
  2. Locate invert elevation at points of connection to existing sanitary and storm drain, water-service piping, and underground electrical services.
  3. Employ a utility service locator company to locate underground utilities.
  4. Verify Owner's Record Drawings.
  5. Furnish survey of existing utilities.

#### 1.07 CUTTING AND PATCHING

- A. Where Work requires that particular existing building element such as partition, wall, paving, window, or similar element of existing building construction be removed, it is the intention of this Specification that such Work be part of the Demolition Section and not part of Cutting and Patching.
- B. New Work required to replace such removals is considered as part of separate sections of Specifications covering similar new construction.

- C. Where incidental cutting and patching is required for installation of a specific item or piece of equipment (including piping, ductwork, conduit, etc.), such cutting and patching is considered to be specified as part of that Section.
- D. Contractor shall verify and check areas to be cut and patched and shall coordinate Work of various trades involved.
- E. Where doubt exists as to size, location, or method of cutting concrete or any other structural element, including metal stud framing, Contractor shall contact Architect before proceeding.
- F. Where doubt exists, Contractor shall distinguish between "cutting" and "demolition".
- G. Unless specifically indicated otherwise, existing Work cut, altered, or revised to accommodate new Work shall be patched to duplicate undisturbed adjacent finishes, colors, textures, and profiles. New Work in existing portions shall also be finished to match adjacent existing Work unless noted otherwise.
- H. Submit written request in advance of cutting or alteration which affects any of the following.
  - 1. Structural integrity of any element of Project
  - 2. Integrity of weather-exposed or moisture-resistant element
  - 3. Efficiency, maintenance or safety of any operational element
  - 4. Visual qualities of sight exposed elements
  - 5. Work of Owner or separate Contractor
- I. Include in request:
  - 1. Identification of Project.
  - 2. Location and description of affected Work.
  - 3. Necessity for cutting or alteration.
  - 4. Description of proposed Work and products to be used.
  - 5. Alternatives to cutting and patching.
  - 6. Effect on Work of Owner or separate Contractor.
  - 7. Written permission of affected separate Contractor.
  - 8. Date and time Work will be executed.

#### 1.08 QUALITY ASSURANCE - CLEANING

- A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.
- B. Codes and Standards: In addition to requirements specified herein, comply with pertinent requirements of authorities having jurisdiction.
- C. For final cleaning, use only professional cleaning company experienced in commercial cleaning.

1.09 PAYMENT WITHHELD - CLEANING

- A. Architect reserves right to withhold certification of payment requests for failure on part of Contractor to regularly clean Project in conformance with Requirements of this Section.

1.10 CLOSEOUT PROCEDURES

A. Owner Occupancy:

1. Conform to Part 1, Title 24, Section 4-336 7-151 CCR Requirements for Verified Reports and Closeout Procedures.
2. In conjunction with Project Inspector, Contractor shall prepare list of items (Punchlist) to be completed or corrected. List may be developed by areas when approved by Architect.
3. Within time specified in the Certificate for Substantial completion after receipt of list, Architect will inspect to determine status of completion.
4. Should Architect determine that Work is not complete:
  - a. Architect will promptly notify Contractor in writing, giving reasons for his determination.
  - b. Contractor shall remedy deficiencies and notify Architect when Work is ready for re-inspection.
  - c. Architect will re-inspect Work.
5. When Architect concurs that Work is substantially complete and ready for occupancy.
  - a. Architect will prepare a Certificate of Substantial Completion accompanied by Contractor's list (Punchlist) of items to be completed or corrected as verified by Architect.
  - b. Contractor shall provide consent by insurer for Partial or Beneficial Occupancy.

B. Final Completion:

1. Prepare and submit notice that Work is ready for final inspection and acceptance.
2. Verify Work is complete.
3. Clarify that:
  - a. Work has been inspected by all governing agencies and is in compliance with Contract Documents.
  - b. Work has been completed in accordance with Contract Documents.
  - c. Equipment and systems have been tested as required and are operational.
  - d. Work is completed and ready for final inspection.
4. Architect will make an inspection to verify status of completion.
5. Should Architect determine Work is incomplete or defective:
  - a. Architect will promptly notify Contractor in writing, listing incomplete or defective Work.
  - b. Contractor shall remedy deficiencies promptly and notify Architect when ready for re-inspection.
6. When Architect determines Work is acceptable under the Contract Documents, he will request Contractor to make closeout submittals.

C. Closeout Submittals include, but are not necessarily limited to:

1. Project Record Documents.



2. Operation and maintenance data for items so listed in pertinent Sections of these Specifications and for other items when so approved by Architect.
3. Warranties and Guarantees.
4. Keys and keying schedule.
5. Spare parts, materials, extra stock to be turned over to Owner.
6. Evidence of payment and release of Stop Notices , when requested by Owner.
7. List of subcontractors, service organizations and principal vendors, including names, addresses and telephone numbers, where they may be contacted for emergency service at all times, including nights, weekends and holidays.
8. Final Site Survey.
9. Notification of insurer for completion of Project.
- 10.

D. Final Payment:

1. Submit Final Payment Request, showing all adjustments to Contract Sum.
2. Retention will be released no sooner than 35 days after Notice of Completion has been recorded with County Recorders Office.

1.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.12 PROJECT RECORD DOCUMENTS

- A. Record Documents: As-Built Drawings, Project Manual with Specifications including but not limited to the documents required herein.

- B. Owner will provide one set of drawings and one copy of Project Manual for use during construction to record changes made during construction.

- C. Record Documents: As-Built drawings and Project Manual, record in concise manner using industry-standard drafting techniques on drawings, on weekly basis all actual revisions to Work and transfer as built information to Auto CAD drawings at the completion of the project.

1. Changes made on Drawings, including Clarification Drawings.
2. Changes made to Specifications.
3. Changes made by Addenda.
4. Changes made by Construction Change Directives/Instruction Bulletins, Architect's Supplemental Instructions, minor changes.
5. Change Orders or other authorized Modifications to Contract.
6. Revisions made to shop drawings, product data and samples.

- D. Store Record Documents separate from documents used for construction. Replace soiled or illegible documents.

- E. Record information concurrent with construction progress.

- F. Specifications: Legibly mark and record at each product Section description of actual products installed, including following:

1. Manufacturer's name, trade name, product model and number and supplier.
2. Authorized product substitutions or alternates utilized.

3. Changes made by Addenda and Modifications.

- G. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
  2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Identify drains and sewers by invert elevation.
  3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of Work. Identify ducts, dampers, valves, access doors and control equipment wiring.
  4. Field changes of dimension and detail.
  5. Details not on original drawings.
- H. Obtain Architect's signed certification that Record Documents have been fully updated prior to submitting monthly payment requests. Compliance is mandatory before payment will be made.
- I. Submit Record Documents certified by Inspector to Architect with claim for final Application for Payment. Fully completed Record Documents are a prerequisite to final payment.

J.

K.

1.13 OPERATION AND MAINTENANCE DATA

- A. Submit six (6) sets prior to final inspection, bound in 8-1/2 by 11 inch text pages, in binders with durable covers. Include operation and maintenance data for all items for which submittals are requested in individual Sections of Specifications.

1.14 WARRANTY AND GUARANTEE

- A. Contractor, manufacturer's warranties and guarantees notwithstanding, warrants entire Work against defects in materials and workmanship for twelve (12) months from date of Certified Substantial Completion. Warranties and guarantees between Contractor and manufacturers and Contractor and suppliers shall not affect warranties or guarantees between Contractor and Owner. Refer to General and Supplementary Conditions for additional requirements.
- B. Execute and assemble documents from subcontractors, suppliers and manufacturers.
- C. Submit prior to final Application for Payment.
- D. For items of Work delayed beyond date of Notice of Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of Guarantee Period.

#### 1.15 WARRANTIES - FORM OF SUBMITTALS

- A. Bind in commercial quality, 8-1/2 by 11 inch, three-ring side binders with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible principal.
- C. Table of Contents: Neatly typed, in sequence of Table of Contents of Project Manual, with each item identified with number and title of Specification Section in which specified, and name of product or Work item.
- D. Separate each warranty or bond with index tab sheets keyed to Table of Contents listing. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

#### 1.16 WARRANTIES – PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item or Work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until date of Certified Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

#### 1.17 WARRANTIES – TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission submit documents within ten days after acceptance.
- B. Make other submittals within ten days after date of Certified Substantial Completion, prior to final Application for Payment.
- C. For items of Work when acceptance is delayed beyond date of Notice of Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty period.

#### 1.18 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
- B. Deliver to project site location as directed by Owner.

## 1.19 INSTRUCTIONS TO OWNER'S PERSONNEL

- A. Instruct Owner's personnel in proper operation and maintenance of all systems, equipment and similar items which were provided as part of Work. Provide maintenance and inspection schedules that conform to manufacturer's recommendations.
- B. Contractor shall provide schedule to Owner for approval for each of instruction periods required.
  - 1.
- C. Instruction sessions will be held in Owner designated area on project site and at Owner's convenience.
- D. Prepare and submit to Architect a sign-in sheet with subject, date and time, signed by all participants for each session.
- E. Instructors shall be qualified by product manufacturer in subject matter presented at each session.

## PART 2 - PRODUCTS

### 2.01 MATERIALS - CUTTING AND PATCHING

- A. Primary Products: Those required for original installation.

### 2.02 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 inspecting and testing products where necessary, referring to existing Work as standard.

### 2.03 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment and materials needed to maintain specified standard of cleanliness.

### 2.04 COMPATIBILITY

- A. Use cleaning materials and equipment that are compatible with surfaces being cleaned, as recommended by manufacturer of material to be cleaned.

## PART 3 - EXECUTION

### 3.01 EXAMINATION – CUTTING AND PATCHING

- A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching. Confirm status and current warranties and guarantees.

- B. Indicate proposed routing of utilities in Coordinated Drawings and submit to Architect. Do not commence coring cutting operations prior to approval of Coordinated Drawings.
- C. After uncovering existing Work, inspect conditions affecting performance of Work.
  - 1. Prior to cutting, boring or drilling through new or existing structural members or elements including reinforcing bars not specifically detailed, Contractor shall prepare detailed drawings for review and approval by Architect, Structural Engineer of Record and DSA Field Engineer. Approval by DSA is required prior to commencement of Work. Agency approvals will be obtained by Architect not Contractor.
- D. Beginning of cutting or patching means acceptance of existing conditions.

### 3.02 PREPARATION - CUTTING AND PATCHING

- A. Provide temporary support to ensure structural integrity of Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas that may be exposed by uncovering Work.
- C. Maintain excavations free of water.

### 3.03 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete Work.
- B. Fit products together, to integrate with other Work.
- C. Uncover Work to install ill-timed Work.
- D. Remove and replace defective non-conforming Work.
- E. Provide openings in Work for penetration of mechanical and electrical Work.

### 3.04 PERFORMANCE - CUTTING AND PATCHING

- A. Execute Work by methods to avoid damage to other Work and which will provide appropriate surfaces to receive patching and finish.
- B. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval. Torches or other flame cutting equipment shall not be used to cut metal studs without prior approval of the Architect.
- C. Restore Work with new products in accordance with requirements of Contract Documents.
- D. Fit Work air tight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.
- E. At penetrations of fire-rated walls, partitions, ceiling or floor construction, completely seal voids with UL-approved fire-rated devices to full thickness of penetrated element.

- F. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- G. Extend patching to point where patching is not evident unless directed otherwise by Architect.

### 3.05 SLEEVES AND HANGERS

- A. Provide conduit, outlets, piping sleeves, boxes, inserts or other materials or equipment necessary to be built into Work. Promptly furnish same and set such sleeves or other materials as construction program required.
- B. In event delays occur in delivery of sleeves or other materials, arrange to have boxes or other forms set at locations where piping or other material is to pass through or into slabs or other Work.
- C. Upon subsequent installation of sleeves or other material, install fill materials as required. Necessary expenditures incurred for boxing out or filling shall be without extra cost to Owner.

### 3.06 PROGRESS CLEANING

- A. General:
  - 1. Comply with all requirements of Owner's Storm Water Pollution Prevention Plan, Section 01 57 23.
  - 2. Retain stored items in orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing required protection of materials.
  - 3. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
  - 4. At least twice each month, and more often if necessary, remove scrap, debris, and waste material from jobsite.
  - 5. Provide adequate storage for items waiting removal from jobsite, observing requirements for fire protection and protection of ecology.
- B. Site:
  - 1. Daily, and more often if necessary, inspect site and pick up all scrap, debris, and waste material. Remove items to place designated for their storage. Combustible waste shall be removed from site. Flammable waste shall be kept in sealed metal containers until removed from site.
  - 2. Weekly, and more often if necessary, inspect, arrangements of materials stored on site, re-stack, tidy, or otherwise service arrangements to meet requirements specified above.
  - 3. Maintain site in neat and orderly condition.
- C. Structures:
  - 1. Weekly, and more often if necessary, inspect structures and pick up scrap, debris, and waste material. Remove items to place designated for their storage.
  - 2. Weekly, and more often if necessary, sweep interior spaces clean.
    - a. "Clean", for purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom, i.e., "broom-clean".

3. As required preparatory to installation of succeeding materials, clean structures of pertinent portions thereof to degree of cleanliness recommended by manufacturer of succeeding material, using equipment and materials required to achieve required cleanliness.
4. Clean substrate; remove dirt, oil, grease, construction markings, and foreign matter that could adversely affect surface finish appearance or performance.
5. Following installation of finish floor materials, clean finish floor daily, and more often if necessary, and while Work is being performed in space in which finish materials have been installed.
  - a. "Clean", for purpose of this subparagraph, shall be interpreted as meaning free from foreign materials which, in opinion of Architect, may be injurious to finish floor material, i.e., "vacuum clean".

### 3.07 FINAL CLEANING

- A. Definition: Except as otherwise specifically provided, "clean", for purpose of Article, shall be interpreted as meaning level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials, i.e., "scrub and polish clean".
- B. General: Complete following cleaning operations before requesting inspection for certification of Substantial Completion.
  1. Prior to completion of Work, remove from jobsite all tools, surplus materials, equipment, scrap, debris, and waste, conduct final progress cleaning as described above.
  2. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - a. Unless otherwise specifically directed by Architect, water and broom clean paved areas on site and public paved areas directly adjacent to site. Remove resultant debris.
  3. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
  4. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- C. Structures:
  1. Exterior: In areas affected by Work under this Contract, visually inspect exterior surfaces and remove traces of soils, waste material, smudges and other foreign matter. Remove traces of splashed material from adjacent surfaces. If necessary to achieve uniform degree of exterior cleanliness, hose down exterior of structure. In event of stubborn stains not removable with water, Architect may require light sandblasting or other cleaning at no additional cost to Owner.
  2. Interior: In areas affected by Work under this Contract, visually inspect interior surfaces and remove traces of soil waste material, smudges, and other foreign matter. Remove traces of splashed materials from adjacent surfaces. Remove paint drippings, spots, stains, and dirt from finished surfaces. Use only cleaning materials and equipment instructed by manufacturer of surface material.

3. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
4. Polished Surfaces: On surfaces requiring routine application of buffed polish, apply polish recommended by manufacturer of material being polished. Glossy surfaces shall be cleaned and shined as intended by manufacturer.
5. Carpet: Use only dry-chemical method of cleaning. Steam cleaning or water based cleaning shall not be used on carpet. Use only dry-chemical materials and methods fully approved by carpet manufacturer, as instructed in manufacturer's published literature.
6. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

D. Mechanical and Electrical Systems

1. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
2. Replace parts subject to unusual operating conditions.
3. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
4. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
5. Clean ducts, blowers, and coils if units were operated without filters during construction.
6. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

- E. Timing: Schedule final cleaning acceptable to the Architect to enable Owner to accept completely clean project.

3.08 CLEANING DURING OWNER'S OCCUPANCY

- A. Should Owner occupy Work or any portion thereof prior to its completion by Contractor and acceptance by Owner, responsibilities for interim and final cleaning of occupied spaces shall be determined by Architect in accordance with General Conditions of the Contract.

**END OF SECTION**



## SECTION 01 74 19

### CONSTRUCTION WASTE MANAGEMENT

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Preparation and implementation, including reporting and documentation, of a Waste Management Plan for reusing, recycling, salvage or disposal of non-hazardous waste materials generated during demolition and/or new construction (Construction & Demolition (C&D) Waste), to foster material recovery and re-use and to minimize disposal in land fills.
- B. Related Sections
  - 1. Section 01 30 00 Administrative Requirements

##### 1.02 REFERENCES

- A. California Integrated Waste management Act of 1989 (AB 939)
- B. California Code of Regulations Title 14, Section 18700

##### 1.03 ACTION SUBMITTALS

- A. Waste Management Plan (Appendix A): Within 10 calendar days after the Notice to Proceed and prior to any waste removal, submit the following to the Architect for review and approval. Update quarterly. Include:
  - 1. Materials to be recycled, reused, or salvaged, either onsite or offsite.
  - 2. Estimates of construction waste quantity (in tons) by type of material. (If waste is measured by volume, give factors for conversion to weight in tons.)
  - 3. Procedures for recycling/ reuse program.
  - 4. Permit or license and location of Project waste-disposal areas.
  - 5. Site plan for placement of waste containers.
- B. Waste Management Monthly Progress Report (Appendix B): Summary of waste generated by Project, monthly with Application for Payment. Include:
  - 1. Firms accepting the recovered or waste materials.
  - 2. Type and location of accepting facilities (landfill, recovery facility, used materials yard, etc.). If materials are reused or recycled on the Project site, location should be designated as "on-site reuse / recycling".
  - 3. Type of materials and net weight (tons) of each.
  - 4. Value of the materials or disposal fee paid.
  - 5. Attach weigh bills and other documentation confirming amount and disposal location of waste materials.
- C. Waste Management Final Compliance Report: Final update of Waste Management Plan to provide summary of total waste generated by Project.

## PART 2 - PRODUCTS

### 2.01 SYSTEM DESCRIPTION

- A. Collection and separation of all construction waste materials generated on-site, reuse or recycling on-site, transportation to approved recyclers or reuse organizations, or transportation to legally designated landfills, for the purpose of recycling salvaging and/or reusing a minimum of 75% of the construction waste generated.

## PART 3 - EXECUTION

### 3.01 IMPLEMENTATION

- A. Implement approved Waste Management Plan including collecting, segregating, storing, transporting and documenting each type of waste material generated, recycled or reused, or disposed in landfills.
- B. Designate an on-site person to be responsible for instructing workers and overseeing the sorting and recording of waste/recyclable materials.
- C. Include waste management and recycling in worker orientation and as an agenda item for regular Project meetings.
- D. Recyclable and waste bin areas shall be limited to areas approved on the Waste Management Plan. Keep recycling and waste bins neat and clearly marked to avoid contamination of materials.

### 3.02 ATTACHMENTS

- A. Appendix A: Waste Management Plan
- B. Appendix B: Waste Management Monthly Progress Report

**END OF SECTION**

**APPENDIX A**

**WASTE MANAGEMENT PLAN**

Date: \_\_\_\_\_

Within 10 calendar days after the Notice to Proceed and prior to any waste removal, the Contractor [Construction Manager] shall submit the following to the Architect for review and approval. Update quarterly.

PROJECT:  
OWNER:

**CONTRACTOR [CONSTRUCTION MANAGER]**

Name:  
Address:  
Telephone, fax, email:

Material Type (1)	Estimated Tons Recycled (2)	Estimated Tons Reused (3)	Estimated Tons Salvaged (4)	Estimated Tons Landfilled (5)	Proposed Disposal or Recycling Facility (6)
<b>Total</b>					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					

Provide type of material targeted for recycling, reuse, and/or salvage, either on or off site, and include a category for general waste materials requiring landfill disposal.  
 (2) through (4) Provide estimated quantities (in tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated.  
 Provide estimated quantities (in tons) of material to be disposed in landfill.  
 Provide destination of recycled, salvaged, and disposed materials (i.e. onsite, recycling facility, etc.)  
 General: Attach proposed Recycling & Waste Bin Location Plan.  
 Attach name and contact data for each recycling or disposal destination to be used.

APPENDIX B

**WASTE MANAGEMENT MONTHLY  
PROGRESS REPORT**

Starting Date \_\_\_\_\_

Ending Date \_\_\_\_\_

Contractor [Construction Manager] shall submit this report monthly along with Application for Payment.

PROJECT:

OWNER:

**CONTRACTOR [CONSTRUCTION MANAGER]**

Name:

Address:

Telephone, fax, email:

Material Type (1)	Actual Tons Recycled (2)	Actual Tons Reused (3)	Actual Tons Salvaged (4)	Actual Tons Landfilled (5)	Disposal or Recycling Facility (6)
<b>Total</b>					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					

Provide type of materials recycled, reused, and/or salvaged, either on or off site, and include a category for general waste materials disposed in a landfill.

(2) through (4) Provide quantities (in tons) of recyclable, reusable, or salvageable waste materials generated.

Provide quantities (in tons) of material disposed in landfill.

Provide destination of recycled, salvaged, and disposed materials (i.e. onsite, recycling facility, etc.)

General: Attach name and contact data for each recycling or disposal destination to be used.

**SECTION 01 80 00**  
**FACILITY OPERATION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting and balancing.

**1.02 STARTING SYSTEMS**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and Owner 7 days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper control sequence or other conditions that may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for each equipment are complete and tested.
- F. Execute start-up under supervision of responsible manufacturer's representative or approved Contractors' personnel in accordance with manufacturers' instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present as site to inspect, check and approved equipment or system installation prior to start-up and to supervise placing equipment or system in operation.
- H. Submit written report that equipment or system has been properly installed and is functioning correctly.

**1.03 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstrate operation and maintenance of Product to Owner's personnel two weeks prior to date of Notice of Completion.
- B. Demonstrate Project equipment and provide instruction by qualified manufacturer's representative who is knowledgeable about Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
  - E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance and shutdown of each item of equipment at agreed-upon times at equipment location.
  - F. Prepare and submit to Architect a sign-in sheet with subject, date and time, signed by all participants for each session.
  - G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
  - H. Amount of time required for instruction on each item of equipment and system is that specified in individual Sections.
- 1.04 TESTING, ADJUSTING AND BALANCING OF EQUIPMENT
- A. Refer to Division 23 Heating, Ventilating, and Air Conditioning.
  - B. Owner will appoint, employ, and initially pay for services of independent firm to perform testing, adjusting and balancing. Amounts paid will be deducted by Change Order from the Contractor's final payment or from any funds due and payable.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 NOT USED.

**END OF SECTION**

## SECTION 01 81 19

### CONSTRUCTION INDOOR AIR QUALITY

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Temporary construction ventilation, dust protection, preconditioning of materials, protection of materials, sequencing, duct protection, and duct cleaning to insure good indoor air quality after occupancy to be performed by the CONTRACTOR.

###### B. Related Sections

1. Section 01 30 00, Administrative Requirements
2. Section 01 35 43, Special Environmental Requirements
3. Section 01 60 00, Product Requirements

##### 1.02 REFERENCES

- A. SMACNA – IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3.
- B. ASHRAE Standard 52.2-1999 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI approved)

##### 1.03 CLASSIFICATION OF RELEVANT MATERIALS

###### A. VOC-Emitting Materials

1. Section 06 10 00 Rough Carpentry
  - a. Composite wood products containing added urea-formaldehyde
2. Section 06 17 13 Structural Panel Web Joists
  - a. Composite wood products containing added urea-formaldehyde
3. Section 06 18 13 Glue Laminated Beams
  - a. Composite wood products containing added urea-formaldehyde
4. Section 06 41 16 Casework
  - a. Adhesives applied on-site
  - b. Composite wood products containing added urea-formaldehyde
5. Section 06 61 16 Solid Polymer Fabrications
  - a. Adhesives and sealants applied on-site
6. Section 07 21 00 Insulation
  - a. Batt insulation, unless formaldehyde-free
  - b. Adhesives applied on-site
7. Section 07 21 13 Rigid Thermal Insulation
  - a. Adhesives applied on-site, only when exposed to the interior side of the building envelope
8. Section 07 84 00 Firestopping
  - a. All sealants, caulking, or spray materials.



9. Section 07 92 00 Joint Sealants
  - a. All joint sealants applied on-site on the interior side of the building envelope.
10. Section 09 30 13 Ceramic Tile
  - a. Adhesives and joint sealers applied on the interior side of the building envelope.
11. Section 09 65 19 Resilient Tile Flooring
  - a. Adhesives
12. Section 09 65 13 Resilient Base
  - a. Adhesives
13. Section 09 68 16 Sheet Carpeting
  - a. Carpet
  - b. Adhesives
14. Section 09 68 13 Carpet Tile
  - a. Carpet
  - b. Adhesives
15. Section 09 72 17 Fiberglass Reinforced Plastic Panels
  - a. Adhesives
  - b. Sealants
16. Section 09 90 00 Painting

B. Porous and Fibrous Materials

1. Section 07 21 00 Insulation
  - a. Batt insulation (exposed to interior only)
2. Section 09 51 00 Acoustical Ceilings – Lay-In
3. Section 09 68 13 Carpet Tile

1.04 SUBMITTALS

- A. Submit eighteen (18) photographs documenting compliance with this Section. Provide six (6) photographs each at three (3) different phases of construction.
- B. Contractor shall develop and submit to the Architect for review the Construction Indoor Air Quality (IAQ) Plan as required in this Section. A template form is provided as Appendix A of this Specification. The plan shall be submitted along with the first submittal for any of the products listed above.

1.05 SUBSTITUTIONS

- A. Construction Indoor Air Quality (IAQ) requirements described below are based upon practices described in *SMACNA IAQ Guidelines for Occupied Buildings Under Construction*, 1995. Any modifications to or substitutions of requirements described in this Section must comply with the abovementioned SMACNA guideline.

## PART 2 - PRODUCTS

2.01 NOT USED.

## PART 3 - EXECUTION

### 3.01 QUALITY ASSURANCE

- A. Inspection: Contractor shall conduct inspections to confirm that construction IAQ measures proposed in the Construction IAQ Plan are being followed, and be prepared to report compliance with the Plan at progress meetings.

### 3.02 PROJECT CONDITIONS

A. Air Filtration:

1. Systems designed with particle filters shall not be operated without filters in place. Temporary construction filters shall have a minimum MERV rating of 8.
2. Replace all air filtration media immediately prior to occupancy. Post-construction air filters shall have a minimum MERV rating of 13.

B. Construction Ventilation: Following building enclosure, maintain continuous temporary ventilation of areas during installation of VOC-Emitting Materials identified in paragraph 1.04 of this Section. Construction Ventilation shall be provided for post-occupancy touch-up work involving VOC-Emitting materials. It is not required during Building Flush-Out.

1. Ventilation shall be supplied via open windows and doors, temporary ducts, and temporary fans, sufficient to provide no less than three (3) air changes per hour.
2. When continuous ventilation is not practical via temporary fans and exhaust to outside, then ventilation shall be supplied via the building's HVAC system and shall comply with the following requirements:
  - a. Provide temporary air filters at return air grilles.
  - b. Provide 100% outside air. Relative humidity not to exceed 60%.
  - c. Provide a minimum of three (3) air changes per hour.
3. Maintain continuous ventilation for a minimum period of 72 hours after installation of VOC-Emitting Materials, unless otherwise indicated elsewhere in these Specifications.
4. Ventilate areas directly to outside; ventilation to other enclosed areas is not acceptable.

C. Preconditioning: Prior to installation, allow contractor-furnished contractor-installed VOC-Emitting Furnishings and Equipment as identified in paragraph 1.04 of this Section to off-gas in dry, well-ventilated space for 14 calendar days to allow for reasonable dissipation of odors and emissions.

1. Remove containers and packaging to maximize off-gassing of VOCs.
2. Precondition products in ventilated warehouse or other ventilated building. Preconditioning at the project site is acceptable, provided that Temporary Construction Ventilation and Sequencing measures are taken as described elsewhere in this Specification.

3. Products requiring preconditioning include, at minimum, contractor-furnished and contractor-installed VOC-Emitting Furnishings and Equipment that contain vinyl or other flexible plastics, resins, adhesives, foam rubber, and fiberboards with urea-formaldehyde binders. Products bearing Greenguard certification ([www.greenguard.org](http://www.greenguard.org)) shall be excluded from the preconditioning requirement.

### 3.03 SEQUENCING

- A. On-Site Application: Where VOC-Emitting Materials as identified in paragraph 1.03 of this Specification are applied on-site, apply prior to installation of Porous and Fibrous Materials as identified in paragraph 1.04 of this Specification. Maintain continuous ventilation for a period of 72 hours before installation of porous and fibrous materials.
  1. Where this sequencing requirement is not possible, protect porous materials with polyethylene vapor retarders. Tape all polyethylene edges to insure a complete seal. Maintain continuous ventilation per temporary construction ventilation requirements described above for a period of 72 hours before removing polyethylene.
- B. Completion: Complete interior finish material installation prior to Building Flush-Out as described in paragraph 3.06 of this Section.

### 3.04 PROTECTION

- A. Moisture Protection: Protect interior materials from water intrusion or penetration as described in Section 01 60 00 Product Requirements.
  1. Porous or fibrous materials with visible microbial growth shall not be installed.
  2. Non-porous materials with visible microbial growth shall be decontaminated.
- B. Duct Protection: during dust-producing activities (e.g. sanding, cutting, or grinding), or when VOC-Emitting Materials (as described in paragraph 1.04 above) are being installed, implement the following measures:
  1. If possible, damper off the return (negative pressure) side of HVAC air distribution system and seal return system openings with polyethylene sheet.
  2. If HVAC system must be operated during dust-producing activities, provide temporary construction air filters with a minimum MERV rating of 8 at all return air grilles.
  3. If HVAC supply air is off, protect diffusers and openings with polyethylene sheet.

### 3.05 CLEANING

- A. Provide the following cleaning in addition to requirements described in Section 01 70 00 Execution Requirements:
  1. Clean all coils, air filters, and fans prior to Testing and Balancing.
  2. If significant dust collection is observed at diffusers, return air grilles, or in ducts, clean prior to system start-up.

### 3.06 BUILDING FLUSH-OUT

- A. Just prior to Substantial Completion, but following Testing and Balancing, flush out building using the building HVAC system, maintaining a minimum temperature of 60° F and maximum 60% relative humidity as follows:

1. Provide continuous 24 hour ventilation with all air handling unit dampers at their maximum outdoor air position and all supply fans at their maximum position and maximum rate for at least 14 days.
  2. Following building occupancy, if touch up work involving products with chemical emissions is required, provide temporary construction ventilation during application and following flush out requirements above for a minimum of 4 days after touch up application.
  3. During occupancy, in the event that the schedule does not permit a 14 day flush-out prior to occupancy, the contractor must conduct the flush-out while the building is occupied. Prior to occupancy, the contractor must comply with all measures to protect building occupants outlined in CHPS, 2009 Credit EQ2.0A.P2.
- B. Insure that MERV 13 air filters are in place during Building Flush-Out.
- C. Installation of furniture and equipment may occur during Building Flush-Out.
- D. Return ventilation system to normal operation following Building Flush-Out period to minimize energy consumption.
- E. Immediately following Building Flush-Out, replace air filters with new MERV 13 air filters. Air filters that handle solely outside air need not be replaced.

**END OF SECTION**

**APPENDIX A**

**CONSTRUCTION INDOOR AIR QUALITY (IAQ) PLAN**  
**CONTRACTOR [CONSTRUCTION MANAGER]:**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

I have read and understood and will implement the following Construction IAQ Plan:

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**CONSTRUCTION VENTILATION**

List all project materials requiring Construction Ventilation per Specification Section 01 81 19. Attach additional sheet if necessary.	
Y / N	Ventilation will be supplied via open windows, temporary ducts, and temporary fans. If "Y", then supply air diffusers, return air grilles, and/or open ducts will be sealed.
Y / N	Ventilation will be supplied via area exhaust fans. If "Y", check applicable: <input type="checkbox"/> Supply air diffusers, return air grilles, and/or open ducts will be sealed. Make-up air will be provided through open windows or doors or other transfer air devices. <input type="checkbox"/> HVAC system will provide make-up air. Return air grilles will be sealed.
Y / N	Ventilation will be supplied via building's HVAC system. If "Y", check applicable: <input type="checkbox"/> Return air grilles are sealed. Exhaust is provided via open windows or doors. <input type="checkbox"/> Return air grilles are used for exhaust. HVAC will provide 100% outside air. Air filters with a minimum MERV rating of 8 will be provided at return air grilles.
<input type="checkbox"/> Required	Areas will be ventilated directly to outside. No ventilated air will be returned.
<input type="checkbox"/> Required	Ventilation will provide no less than three air changes per hour.
<input type="checkbox"/> Required	Ventilation will be continuous for a period no less than 72 hours after completion of installation.
<input type="checkbox"/> Required	All filtration used during Construction Ventilation will be replaced prior to Substantial Completion.

**PRECONDITIONING**

List all project materials requiring Preconditioning per Specification Section **01 81 19**. Attach additional sheet if necessary.

Y / N	Preconditioning will occur in dry and well-ventilated offsite location. If "Y": Where is the offsite location?
Y / N	Preconditioning will occur onsite. If "Y", check applicable: <input type="checkbox"/> Ventilation will be supplied via open windows, temporary ducts, and temporary fans. See I.2a above. <input type="checkbox"/> Ventilation will be supplied via area exhaust fans. See I.2b above. <input type="checkbox"/> Ventilation will be supplied via building's HVAC system. See I.2c above.
<input type="checkbox"/> Required	Containers and packaging will be removed prior to Preconditioning.
<input type="checkbox"/> Required	Preconditioning will occur for fourteen (14) continuous days prior to installation.

**SEQUENCING**

List all project materials requiring Sequencing consideration per Specification Section **01 81 19**. Attach additional sheet if necessary.

<input type="checkbox"/> Required	Previously installed Porous or Fibrous Materials located in a room where VOC-Emitting Materials are to be installed will be protected with polyethylene vapor retarder. Polyethylene will not be removed until completion of a 72-hour ventilation period.
<input type="checkbox"/> Required	Installation of interior finish materials will complete fourteen (14) days prior to Substantial Completion.

**PROTECTION**

List all project materials requiring Protection per Specification Section 01 81 19. Attach additional sheet if necessary.	
<input type="checkbox"/> Required	Porous or Fibrous Materials with visible microbial growth shall not be installed.
<input type="checkbox"/> Required	Materials that are not defined as Porous or Fibrous with visible microbial growth shall be decontaminated prior to installation.
<input type="checkbox"/> Required	Temporary ventilation will be provided during all dust producing activities. See Item I Construction Ventilation above. All supply air diffusers and return air grilles will be covered.
<input type="checkbox"/> Required	Ducts will be sealed during transportation, delivery, and construction.

**END OF APPENDIX A**

## SECTION 01 91 13

### GENERAL COMMISSIONING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. General requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. Related Sections
  - 1. Division 01, General Requirements for specific requirements for commissioning HVAC systems.

##### 1.02 DEFINITIONS

- A. BoD: Basis of Design.
- B. CxA: Commissioning Authority.
- C. OPR: Owner's Project Requirements.
- D. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- E. TAB: Testing, Adjusting, and Balancing.

##### 1.03 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
  - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
  - 2. Representatives of the facility user and operation and maintenance personnel.
  - 3. Architect and engineering design professionals.



#### 1.04 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and each Contractor for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
  - 1. Coordination meetings.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Testing meetings.
  - 4. Demonstration of operation of systems, subsystems, and equipment.
- C. Provide the BoD documents prepared by Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

#### 1.05 CONTRACTOR'S RESPONSIBILITIES

- A. Provide utility services required for the commissioning process.
- B. Each Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
  - 1. Participate in design- and construction-phase coordination meetings.
  - 2. Participate in maintenance orientation and inspection.
  - 3. Participate in operation and maintenance training sessions.
  - 4. Participate in final review at acceptance meeting.
  - 5. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
  - 6. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
  - 7. Review and approve final commissioning documentation.
- C. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
  - 1. Participate in design- and construction-phase coordination meetings.
  - 2. Participate in maintenance orientation and inspection.
  - 3. Participate in procedures meeting for testing.
  - 4. Participate in final review at acceptance meeting.
  - 5. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
  - 6. Provide information to the CxA for developing construction-phase commissioning plan.
  - 7. Participate in training sessions for Owner's operation and maintenance personnel.
  - 8. Provide updated Project Record Documents to the CxA on a daily basis.

9. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 01 Section "Operation and Maintenance Data."
10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

#### 1.06 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare a construction-phase commissioning plan. Collaborate with each Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
- C. Review and comment on submittals from each Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.
- D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.
- F. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
- G. Prepare Project-specific test and inspection procedures and checklists.
- H. Schedule, direct, witness, and document tests, inspections, and systems startup.
- I. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- J. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

- K. Review Project Record Documents for accuracy. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Division 01 Section "Project Record Documents."
- L. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirements are specified in Division 01 Section "Operation and Maintenance Data."
- M. Prepare operation and maintenance training program and provide qualified instructors to conduct operation and maintenance training. Operation and maintenance training is specified in Division 01 Section "Demonstration and Training."
- N. Prepare commissioning reports.
- O. Assemble the final commissioning documentation, including the commissioning report and Project Record Documents.

#### 1.07 COMMISSIONING DOCUMENTATION

- A. Index of Commissioning Documents: CxA shall prepare an index to include storage location of each document.
- B. OPR: A written document, prepared by Owner, that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- C. BoD Document: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- D. Commissioning Plan: A document, prepared by CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:
  1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
  2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
  3. Identification of systems and equipment to be commissioned.
  4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
  5. Identification of items that must be completed before the next operation can proceed.

6. Description of responsibilities of commissioning team members.
  7. Description of observations to be made.
  8. Description of requirements for operation and maintenance training, including required training materials.
  9. Description of expected performance for systems, subsystems, equipment, and controls.
  10. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.
  11. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.
  12. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
  13. Process and schedule for completing pre-start and startup checklists for systems, subsystems, and equipment to be verified and tested.
  14. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.
- E. Test Checklists: CxA, with assistance of Architect, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in Division 01, General Requirements for commissioning HVAC systems. Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification code of tested item.
  2. Test number.
  3. Time and date of test.
  4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
  5. Dated signatures of the person performing test and of the witness, if applicable.
  6. Individuals present for test.
  7. Deficiencies.
  8. Issue number, if any, generated as the result of test.
- F. Certificate of Readiness: Certificate of Readiness shall be signed by each Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing. Completed test checklists signed by the responsible parties shall accompany this certificate.
- G. Test and Inspection Reports: CxA shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

- H. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.
  
- I. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.
  - 1. Creating an Issues Log Entry:
    - a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
    - b. Assign a descriptive title of the issue.
    - c. Identify date and time of the issue.
    - d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
    - e. Identify system, subsystem, and equipment to which the issue applies.
    - f. Identify location of system, subsystem, and equipment.
    - g. Include information that may be helpful in diagnosing or evaluating the issue.
    - h. Note recommended corrective action.
    - i. Identify commissioning team member responsible for corrective action.
    - j. Identify expected date of correction.
    - k. Identify person documenting the issue.
  - 2. Documenting Issue Resolution:
    - a. Log date correction is completed or the issue is resolved.
    - b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
    - c. Identify changes to the OPR, BoD, or Contract Documents that may require action.
    - d. State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.
    - e. Identify person(s) who corrected or resolved the issue.
    - f. Identify person(s) documenting the issue resolution.
  - 3. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, CxA shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, CxA shall include the following information in the issues log and expand it in the narrative:
    - a. Issue number and title.
    - b. Date of the identification of the issue.
    - c. Name of the commissioning team member assigned responsibility for resolution.
    - d. Expected date of correction.
  
- J. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents. The commissioning report shall include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances in the OPR, BoD, and Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the OPR, BoD, and Contract Documents and those that do not meet requirements of the OPR, BoD, and Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
  2. OPR and BoD documentation.
  3. Commissioning plan.
  4. Testing plans and reports.
  5. Corrective modification documentation.
  6. Issues log.
  7. Completed test checklists.
  8. Listing of off-season test(s) not performed and a schedule for their completion.
- K. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:
1. OPR and BoD, including system narratives, schematics, and changes made throughout the Project.
  2. Project Record Documents as specified in Division 01 Section "Project Record Documents."
  3. Final commissioning plan.
  4. Commissioning report.
  5. Operation and maintenance data as specified in Division 01 Section "Operation and Maintenance Data."
- 1.08 SUBMITTALS
- A. Commissioning Plan Pre-final Submittal: CxA shall submit two hard copies of pre-final commissioning plan. Deliver one copy to each Contractor, one to Owner, and one to Architect. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final construction-phase commissioning plan.
  - B. Commissioning Plan Final Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of final commissioning plan. Deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments. The final submittal shall include a copy of the pre-final submittal review comments along with a response to each item.
  - C. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to each Contractor quality-control manager and subcontractors for review and comment. Submit two copies of each checklist and report form.
  - D. Certificates of Readiness: CxA shall submit Certificates of Readiness.
  - E. Test and Inspection Reports: CxA shall submit test and inspection reports.
  - F. Corrective Action Documents: CxA shall submit corrective action documents.

- G. Pre-final Commissioning Report Submittal: CxA shall submit two hard copies of the pre-final commissioning report. Include a copy of the preliminary submittal review comments along with CxA's response to each item. CxA shall deliver one copy to Owner and one copy to Architect. One copy, with review comments, will be returned to the CxA for preparation of final submittal.
- H. Final Commissioning Report Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of the final commissioning report. CxA shall deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments and shall include a copy of the pre-final submittal review comments along with a response to each item.

#### 1.09 QUALITY ASSURANCE

- A. Instructor Qualifications: Factory-authorized service representatives, experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

#### 1.10 COORDINATION

- A. Coordinating Meetings: CxA shall conduct weekly coordination meetings of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- B. Pre-testing Meetings: CxA shall conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.
- C. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- D. Manufacturers' Field Services: CxA shall coordinate services of manufacturers' field services.

## PART 2 - PRODUCTS

2.01 NOT USED.

## PART 3 - EXECUTION

### 3.01 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, each Contractor, and subcontractors
1. Review the OPR and BoD.
  2. Review installed systems, subsystems, and equipment.
  3. Review instructor qualifications.
  4. Review instructional methods and procedures.
  5. Review training module outlines and contents.
  6. Review course materials (including operation and maintenance manuals).
  7. Inspect and discuss locations and other facilities required for instruction.
  8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
  9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

3.02 Training Modules: Develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in Division 01, General Requirements for Demonstration and Training.

### 3.03 ACOUSTIC PERFORMANCE TESTING

- A. Provide acoustic performance testing in accordance with the requirements of EQ3.0 of the "CA-CHPS 2009" Criteria.
1. Maximum Background Noise Level: Unoccupied classrooms must have a maximum background noise level of no more than 45 dBA.
  2. The standard anticipates two primary noise sources, steady HVAC equipment noise and the usually unsteady exterior environmental noise. Where the measured ambient noises due to sources other than HVAC are within 5 dBA of the measured overall noise (HVAC and exterior intrusive noise) a measurement of at least 1/2 hour duration shall be made in at least two classrooms in each building in the worst case (noisiest) locations on the school site during normal school days and hours.
    - a. To evaluate the significance of intrusive exterior noise, a 30-minute Equivalent Sound Level (LAeq30, in general conformance with ANSI S12.60-2002, Annex E3) measurement shall be made in the classroom that is subjectively assessed to represent the worst case exposure to exterior noise, with the HVAC system not in operation. This Leq30 measurement shall be repeated with the HVAC in operation. If the second "HVAC-on" sound level is more than 5 dB greater than the initial "HVAC-off" measurement, exterior noise intrusion shall be deemed "not significant".



- b. Where intrusive exterior noise has been deemed "not significant" short-term (15 second) A-weighted sound level measurements shall be made in each classroom with the HVAC systems in operation. Where exterior intrusive noise has been deemed "significant" (per the evaluation method noted above), LAeq30 sound level measurements shall be made in each classroom with the HVAC system in operation. In either case, where classrooms are served by variable-air-volume systems, the systems shall be operated at maximum nominal flow (typically by means of varying the thermostat set point).
  - c. Where exposure to exterior noise varies significantly between groups of classrooms (e.g. one side of a classroom wing adjacent to a street, the other side facing away), separate evaluations of exterior noise significance can be conducted to limit the need for LAeq30 measurements.
- B. Classrooms less than 10,000 cubic feet must have a 0.6-second maximum (unoccupied) reverberation time and classrooms with volumes between 10,000 cubic feet and 20,000 cubic feet must have a 0.7-second maximum (unoccupied, furnished, and fitted-out) reverberation time. (ANSI Standard S12.60-2002).

**END OF SECTION**

## SECTION 01 91 14

### O&M TRAINING REVIEW

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Section 01 30 00, Administrative Requirements
- B. Section 01 91 13, General Commissioning
- C. Section 01 91 17, Mechanical Commissioning Requirements
- D. Section 01 91 18, Electrical Commissioning Requirements
- E. Division 23, Heating, Ventilating and Air Conditioning
- F. Division 26, Electrical

#### PART 2 - PRODUCTS

##### 2.01 NOT USED

#### PART 3 - EXECUTION

##### 3.01 TRAINING OF OWNER PERSONNEL

- A. The CONTRACTOR is responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The Commissioning Provider shall be responsible for overseeing and approving the content and adequacy of the training of FACILITIES personnel for commissioned equipment.
  - 1. The CP shall interview FACILITIES personnel to determine the special needs and areas where training will be most valuable. The OWNER'S REPRESENTATIVE and CP shall decide how rigorous the training should be for each piece of commissioned equipment. The CP shall communicate the results to the CONTRACTOR and subcontractors who have training responsibilities.
  - 2. In addition to these general requirements, specific training requirements are specified in Sections 01 91 17 and 01 91 18.
  - 3. Each contractor responsible for training will submit a written training plan to the CP for review and approval prior to training. The CP will provide a template form for this purpose.
  - 4. The CP develops an overall training scope for commissioned equipment and coordinates and schedules with the CONTRACTOR. The CP develops criteria for determining that the training was satisfactorily completed, including attending some of the training. The CP recommends approval of the training to the ENGINEER using a standard form.

- C. The controls contractor shall provide operating manuals, training to maintenance and operation personnel.

**END OF SECTION**

## SECTION 01 91 16

### LANDSCAPE IRRIGATION COMMISSIONING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. General requirements that apply to implementation of commissioning of the landscape irrigation system.
- B. Related Sections:
  - 1. 01 91 13 General Commissioning Process
  - 2. 32 84 23 Landscape Irrigation

##### 1.02 RESPONSIBILITIES

- A. Contractors: Participate in the Commissioning process as a commissioning team member as described in Section 01 91 13 and in the Commissioning Plan.

##### 1.03 SUBMITTALS

- A. Contractors shall provide submittal documentation relative to commissioning as required in Section 01 30 00 Administrative Requirements.

#### PART 2 - PRODUCTS

##### 2.01 TEST EQUIPMENT

- A. Refer to Section 01 91 13 Part 2 for requirements.

#### PART 3 - EXECUTION

##### 3.01 COMMISSIONING PROCESS REQUIREMENTS

- A. Refer to Section 01 91 13 and the Commissioning Plan for information on meetings, functional testing, operations & maintenance data, training requirements, and other commissioning activities.

##### 3.02 TESTING REQUIREMENTS

- A. This section specifies the functional testing requirements for Division 2 systems and equipment. From these requirements, the Commissioning Provider will develop testing procedures in accordance with Section 01 91 13 and the Commissioning Plan. The test procedures for each piece of equipment or system will contain the information below.

1. Contractors responsible for installation, maintenance, and testing must be completed with these tasks prior to commissioning testing.
  2. Contractor responsibilities for executing functional tests
  3. A list of equipment & components being tested
  4. Functions, modes, and testing conditions
  5. Required monitoring
  6. Acceptance criteria
  7. Sampling strategies allowed
- B. This section specifies the acceptance testing requirements for the landscape irrigation system.
1. Irrigation pipes and connections
  2. Irrigation heads and coverage
  3. Back-flow devices
  4. Coverage of irrigation
  5. Automatic sensors, timers and other controls

**END OF SECTION**

## SECTION 01 91 17

### MECHANICAL COMMISSIONING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. General requirements that apply to implementation of commissioning of mechanical equipment.
- B. Related work:
  - 1. 01 91 13 General Commissioning Processes lists Divisions 21, 22 and 23 commissioned systems, and lists other commissioning sections in these Specifications.

##### 1.02 RESPONSIBILITIES

- A. Divisions 21, 22, and 23 Contractors: Participate in the Commissioning process as a commissioning team member as described in Section 01 91 13 and in the Commissioning Plan.

##### 1.03 SUBMITTALS

- A. Divisions 21, 22 and 23 Contractors shall provide submittal documentation relative to commissioning as required in Section 01 30 00 Administrative Requirements.

#### PART 2 - PRODUCTS

##### 2.01 TEST EQUIPMENT

- A. Refer to Section 01 91 13 Part 2 for Division 23 requirements and the requirements below.
- B. All standard test equipment required by the Commissioning Process for test and balance will be provided by the testing and air balance (TAB) contractor. Mechanical testing equipment will be provided by the installing contractor. The installing contractor will provide electrical testing equipment, and the portable data loggers provided by the contractors will be used to trend data for commissioning.
- C. Other special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment will be included in the base bid price to the Contractor and left on site.

- D. Testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the following tolerances: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. Equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.
- E. Refer to Part 3 of this Section for details regarding equipment that may be required to simulate required test conditions

**PART 3 - EXECUTION**

**3.01 COMMISSIONING PROCESS REQUIREMENTS**

- A. Refer to Section 01 91 13 and the Commissioning Plan for information on meetings, functional testing, operations & maintenance data, training requirements, and other commissioning activities.

**3.02 SENSOR CALIBRATION**

- A. Field-installed temperature, relative humidity, CO2, pressure sensors, pressure gages, and actuators (dampers and valves) shall be calibrated using the methods described below. Calibration procedures are documented during Contractor Start-Up or Commissioning Functional Testing. Alternate methods may be used, if approved by the Commissioning Provider.
- B. Test instruments shall have had a NIST certified calibration within the last 12 months. Sensors installed in the unit at the factory with provided calibration certification need not be field calibrated.
- C. Sensors:
  1. Verify that sensor locations are appropriate and away from causes of erratic operation.
  2. Verify that sensors with shielded cable are grounded only at one end.
  3. For sensor pairs that determine a temperature difference, make sure they are reading within 0.2°F of each other.
  4. For sensor pairs that determine a pressure difference, make sure they are reading within 2% of each other.
  5. Calibration: Put the equipment in operation. Make a reading with a calibrated test instrument within six inches of the site sensor. Verify that the sensor reading (via the permanent thermostat or gage) is within the tolerance listed in the table below of the instrument-measured value. If not, calibrate or replace sensor.
  6. Tolerances:

Sensor Required Tolerance (+/-)

Cooling coil water temps	0.4° F
AHU wet bulb dew point	2.0° F

Hot water coil 1.5° F  
Outside air, space air, duct air temps 0.4° F  
Watt-hour, voltage & amperage 1% of design  
Pressures, air, water, & gas 3% of sensor range (incl. design value)  
Flow rates, air 10% of sensor range (incl. design value)  
Flow rates, water 4% of sensor range (incl. design value)  
Flow rates, natural gas 5% of sensor range (incl. design value)  
Relative humidity 4%  
CO<sub>2</sub> monitor 100 ppm  
Sound level 5 dB

### 3.03 TESTING REQUIREMENTS

- A. This section specifies the functional testing requirements for Division 23 systems and equipment. From these requirements, the Commissioning Provider will develop testing procedures in accordance with Section 01 91 13 and the Commissioning Plan. The test procedures for each piece of equipment or system will contain the information below.
1. Contractors responsible for start-up, air balance, and other testing must be completed with these tasks prior to commissioning testing.
    - a. Contractor responsibilities for executing functional tests
    - b. A list of equipment & components being tested
    - c. Functions, modes, and testing conditions
    - d. Required monitoring
    - e. Acceptance criteria
    - f. Sampling strategies allowed
  2. Sample HVAC equipment testing requirements follow as an appendix to this Section.

**END OF SECTION**



**SECTION 01 91 18**  
**ELECTRICAL COMMISSIONING REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. General requirements that apply to implementation of commissioning of electrical equipment.
- B. Related work:
  - 1. 01 91 13 General Commissioning Processes lists Division 26 commissioned systems, and lists other commissioning sections in these Specifications.

**1.02 RESPONSIBILITIES**

- A. Division 26 Contractors: Participate in the Commissioning process as a commissioning team member as described in Section 01 91 13 and in the Commissioning Plan.

**1.03 SUBMITTALS**

- A. Division 26 Contractors shall provide submittal documentation relative to commissioning as required in Section 01 30 00 Administrative Requirements.

**PART 2 - PRODUCTS**

**2.01 TEST EQUIPMENT**

- A. Refer to Section 01 91 13 Part 2 for Divisions 21, 22, 23 requirements.

**PART 3 - EXECUTION**

**3.01 COMMISSIONING PROCESS REQUIREMENTS**

- A. Refer to Section 01 91 13 and the Commissioning Plan for information on meetings, functional testing, operations & maintenance data, training requirements, and other commissioning activities.

**3.02 TESTING REQUIREMENTS**

- A. This section specifies the functional testing requirements for Division 26 systems and equipment. From these requirements, the Commissioning Provider will develop testing procedures in accordance with Section 01 91 13 and the Commissioning Plan. The test procedures for each piece of equipment or system will contain the information below.

1. Contractors responsible for installation, burn-in, and other testing must be completed with these tasks prior to commissioning testing.
  2. Contractor responsibilities for executing functional tests
  3. A list of equipment & components being tested
  4. Functions, modes, and testing conditions
  5. Required monitoring
  6. Acceptance criteria
  7. Sampling strategies allowed
- B. Sample lighting equipment testing requirements follow as an appendix to this Section.

**END OF SECTION**

**SECTION 03 30 00**

**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. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Slabs-on-grade.
  - 3. Concrete on metal deck.
- B. Related Sections include the following:
  - 1. Division 32 Section "Concrete Paving" for concrete pavement and walks.

**1.03 DEFINITIONS**

- A. 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.
- B. Cast-in-Place Architecturally Visible Concrete: Formed concrete that is viewed on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

**1.04 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- 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. Indicate amounts of mixing water to be withheld for later addition at Project site.
  - 2. Indicate and provide documentation for each type of add mixture.
  - 3. Indicate water-cement ratio and strength for each mixture.
- C. 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.

- D. Sustainable design requirements project submittal form, found in Appendix A of Section 01810 "Sustainable Design Requirements." Provide the following information for all cast-in-place concrete:
1. Recycled content
  2. Regional materials (if applicable)

1.05 QUALITY ASSURANCE

- A. 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.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, retained by the Owner and approved by the Division of State Architect, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  2. 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 one source, and obtain admixtures through one source from a single manufacturer.
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete,"
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. Pre-installation Conference: Conduct conference at Project site with Architect, Structural Engineer and Testing Agency to comply with requirements in Division 01 Section "Project Management and Coordination."
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. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixtures.
  - c. Ready-mix concrete manufacturer.
  - d. Concrete subcontractor.
2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- G. Conformance shall be made with respect to respective requirements outlined in Section 16A of CBC.
- H. Mockups: before casting architecturally visible concrete, build mockups to verify selections made under sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the complete work:
1. Build mockups in the location and of the size indicated, if not indicated, as directed by Architect.
  2. Build mockups of typical exterior wall of cast-in-place architectural concrete as shown on drawings to show reveals, pop outs, joints, form ties, and any other architectural features. Contractor to provide shop drawings of proposed mockup for approval prior to constructing mockups.
  3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
  4. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture and demonstrate materials and techniques proposed for repair of tie holes, and surface blemishes to match adjacent undamaged surfaces.
  5. Obtain Architect's approval of mockups before casting concrete.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
  - B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## 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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

## 2.02 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
  3. Furnish ties with integral water-barrier plates to walls indicated to receive damp-proofing or waterproofing.

## 2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed. Unless otherwise indicated on drawings.

- B. Reinforcing Bars at Shear Wall Boundaries and Bars to be Welded: A 706, Grade 60, deformed.
- C. Plain-Steel Wire: ASTM A 82, as indicated.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets, 60ksi minimum.

#### 2.04 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. 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.
- C. Reinforcing Bar Couplers: Provide Type II where indicated on plans. For couplers to be used as alternate to lap splices, submit proposed coupler and proposed location for review and approval by EOR.

#### 2.05 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, as noted below for the following conditions:
  - 1. Portland Cement at Architecturally Visible Concrete: ASTM C 150, Type III gray.
  - 2. Portland Cement at all other conditions: ASTM C 150, Type II.
    - a. Fly Ash: ASTM C 618, Class C or F, 100lbs. maximum per cubic yard, containing 1% or less carbon. Fly ash shall not be used in excess of 15% by weight of total cement quantity.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Light-Weight Aggregates: ASTM C 330, expanded shale type coarse aggregate, dry loose weight maximum 38lbs. per cubic foot, maximum 9/16" size; all aggregate vacuum or thermally fully saturated for pump concrete.
- D. Water: ASTM C 94/C 94M and potable.

2.06 ADMIXTURES

- A. Chemical (Water Reducing) Admixture: ASTM C494, Type A, D, or E. Only one brand. When used, are subject to approval of University's Representative, and must reduce the mixing water at least 10% without entraining air in excess of 2% by volume. If the water reducing agent entrains more than 2% air, the water reduction shall be at least 12%, but in no case shall the water reducing agent entrain air in excess of 4%.
- B. Air-entraining admix: ASTM C260.
- C. Pozzolan: ASTM C618, Class F or C Fly Ash, 100 lbs. maximum per cubic yard, containing 1% or less carbon. Fly ash shall not be used in excess of 15% by weight of total cement quantity.
- D. Super-Plasticizers (High Range Water Reducers): ASTM C494, Type F or G. Master Builders "Rheobuild", Euclid "Eucon 37" or equal, capable of producing concrete which can be placed at 8-11" slump without segregation, capable of maintaining slump within 2" of that initially mixed for 2 hours, and of maintaining concrete temperature within 2° F. from time of batching for 2 hours minimum.

2.07 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. Manufacturers:
    - a. Greenstreak.
    - b. Progress Unlimited, Inc.
    - c. Williams Products, Inc.
    - d. Tremco Parastop II
    - e. Henry HF 302 Hydro-Flex Watertop
    - f. Cetco Waterstop-RX
    - g. Or approved equal

2.08 VAPOR RETARDERS

- A. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.
- C. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.



1. Stego Wrap; 15 mils.

## 2.09 CURING MATERIALS

- A. Curing and Sealing Compound: Curing and sealing compound shall be VOC compliant, comply with ASTM C309, compatible with flooring adhesives.
  1. SpecChem E-Cure.
  2. Or approved equal.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

## 2.10 RELATED MATERIALS

- A. Expansion and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Styrofoam: Expanded Polystyrene, Type X1, Density = 1pcf, Compressive strength 5psi @ 10% deformation.

## 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3,000 psi or as indicated on drawings at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.50.
  3. Slump Limit: Maximum 5 inches, plus or minus 1 inch.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3,000 psi or as indicated on drawings at 28 days.
  2. Minimum Cementitious Materials Content: 540 lb/cu. yd.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete surfaces to receive adhered flooring – 0.50 (elsewhere)

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Refer to Architectural drawings for locations of finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete as directed by Architect.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

- M. Provide metal (smooth) formwork for Architecturally Visible Concrete to attain desired finish as directed in mockup.

### 3.2 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's "Code of Standard Practice for Steel Buildings and Bridges."

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50° F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 VAPOR RETARDERS

- A. Granular Course: Cover vapor retarder with granular fill or fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

### 3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- 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.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.6 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. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 3. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Do not cut reinforcing.
- 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 or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "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 one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.7 WATERSTOPS

- 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.

### 3.8 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. 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 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.
- D. 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. Screenshot 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.
- E. 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.

1. 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.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. During hot weather, proper attention shall be provided for ingredients, production methods, handling, placing, protection and curing, to prevent excessive concrete temperatures or water evaporation which could impair required strength or durability.
2. 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.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.9 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 (Architecturally Visible Concrete).
- C. 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.

### 3.10 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. 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 indicated on drawings.
- C. Broom Finish: Exterior stair treads and landings shall be provided with a non-slip broom finish in addition to abrasive finish specified.
  - D. Abrasive Stair Nosing: Nosing shall be installed according to manufacturers written recommendations.
- 3.11 MISCELLANEOUS CONCRETE ITEMS
- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. 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.
  - C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
  - D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.
- 3.12 CONCRETE PROTECTING AND CURING
- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
  - B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
  - C. 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 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, 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 surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions where indicated on drawings.
  1. Defer joint filling until concrete has aged at least one month. 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 semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.14 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 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 in any dimension in solid concrete, but not less than 1 inch in depth. 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 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. Repair defective areas, except random cracks and single holes 1 inch 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 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.
  5. Repair random cracks and single holes 1 inch 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.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.15 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. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Headed bolts and studs.
  - 3. Verification of use of required design mixture.
  - 4. Concrete placement, including conveying and depositing.
  - 5. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: 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 one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  - 2. 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.
  - 3. 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.
  - 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. Cast and field cure 2 sets of two standard cylinder specimens for each composite sample.
  - 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.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  - 7. 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.

8. 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.
9. 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.
10. 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.
11. 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.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

**END OF SECTION**



**SECTION 11 51 19**

**SELF-CHECKOUT AND BOOK THEFT PREVENTION SYSTEMS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

**A. Work Included:**

1. Under this Section, the Contractor is to provide a Book Theft Prevention System (SCBTPS), including procuring, installing, and rendering fully operational all necessary components, conduits, wiring, and any other related or required appurtenance or device, as required for a complete and workable installation which meets or exceeds the project performance specifications, whether or not such components, conduits, wiring or other related or required appurtenance or device are specifically mentioned.
2. Equipment to be provided and installed includes, but is not limited to:
  - a. 3M model Bibliotheca RFID Gate - Lane count as required for 36" wide door at each location
  - b. 3M model Bibliotheca Self-Check 500
  - c. RFID Detection Tags (Owner Provided Contractor Installed)
  - d. 3M Bibliotheca System Software
  - e. Any other hardware, firmware, or software required for a fully operational system
3. Self-Checkout & Book Theft Prevention Systems shall be capable of being connected to an Owner provided security TCP/IP V-LAN network. Security Contractor shall coordinate said connectivity with the Communications Contractor.
4. The work includes providing all labor, materials, tools, equipment, and documentation required for a complete and working Self-Checkout & Book Theft Prevention System as specified in this document.

**B. Related Work Provided by Owner:**

1. The Contractor shall coordinate the work with the related work provided by the Owner including but not limited to the following:
  - a. Network Conduit and Cabling
  - b. Non-data / telecom cabling pathway
  - c. Provision of RFID Tags

**C. Abbreviations and Acronyms**

1. ADA = Americans with Disabilities Act
2. BTPS = Book Theft Prevention System
3. DHCP = Dynamic Host Configuration Protocol
4. DVD = Digital Video Disc
5. EACS = Embedded Access Control System
6. LAN = Local Area Network
7. LED = Light Emitting Diode
8. Mbps = Mega-Bit Per Second
9. RFID = Radio Frequency Identification
10. TCP/IP = Transport Control Protocol / Internet Protocol

11. UPS = Uninterruptable power Supply
12. PVT = Performance Verification Testing
13. V-LAN = Virtual Local Area Network
14. VMS = Video Monitoring System
15. VSS = Video Surveillance System
16. WAN = Wide Area Network
17. WEP = Wired Equivalent Privacy

## 1.02 RELATED DOCUMENTS

- A. Section 27 05 00
- B. Section 28 23 00 Video Surveillance System
- C. The Specifications and Drawings are intended to be complementary. A specific section, paragraph or heading in a Division may not describe all details concerning work to be done and materials to be furnished. The Drawings are diagrammatic and may not show all the work required or all construction details. Dimensions are shown for critical areas only; all dimensions and actual placements are to be verified in the field. It is to be understood that the best trade practices of the Division will prevail. It remains the responsibility of the Contractor or Subcontractor to provide all items, equipment, construction, and services required to the proper execution and completion of the Work.
- D. Reference listings are provided as a convenience to the Contractor or Subcontractor providing the Work of this Section and may not contain all the requirements affecting this Section. It remains the responsibility of the Contractor or Subcontractor to locate and comply with all requirements of the Contract Documents.
- E. All related specification sections shall be used in conjunction with this section.

## 1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer of all equipment installed as a part of this contract shall meet the following criteria:
  1. Shall be regularly engaged in the manufacture and assembly of similar type equipment for a minimum of five (5) continuous years preceding the date of this document.
  2. Shall have an office staffed with factory trained technicians, fully capable of engineering, supervising installation, system start-up, providing Owner training and supervising of both hardware and software for the all systems installed as a part of this project.
- B. Contractor Qualifications: The Contractor shall meet the following qualifications at a minimum:
  1. Shall be an authorized factory trained and certified reseller of all system components installed or interfaced with as a part of this contract.
  2. Contractor shall be regularly engaged in installing similar equipment, and shall have successfully completed 5 systems of a similar size and scope within the preceding 3 years of the date of this document. These systems must be currently in

operation, and the contractor shall supply the following reference information with their proposal:

- a. Name of Client
  - b. Type of Facility
  - c. System Installed
  - d. Date of Substantial Completion
  - e. Names of Contractor's Key Personnel on Project
  - f. Contact Name, Title, Phone, and Email
3. It is expected by the Owner that the same key personnel will execute this project as completed the referenced work. This would include the Project Manager, the Project Engineer, and the Lead Installer. Resumes will be provided for these personnel. If different key personnel are executing this project than executed the reference projects, resumes for these personnel shall be provided for the Owner's approval with the Contractor's bid package.
  4. Sub-contractors shall provide resumes showing qualification for the specific system that the sub-contractor will be installing /configuring.

#### 1.04 SUBMITTALS

##### A. General:

1. Prior to installing any material related to or required by this section, submit the following information for review.
  - a. Block diagrams of the proposed system and interconnection wiring diagrams showing all connections required between system components.
  - b. A materials list with names of manufacturers, model numbers, and technical information on all equipment proposed. Product technical information sheets for each principal component in the proposed system. Include wire/cable specifications and wire/cable marking material. Where the data sheet covers a range of material, the specific part number shall be highlighted
  - c. 6 complete sets of operations and maintenance manual for the system products being supplied, provided in 3-ring binders, and 1 complete set submitted in electronic format on DVD. Include complete sets of the equipment operating instructions, installation instructions, and troubleshooting guides.

##### B. Testing:

1. PVT Plan to be submitted a minimum of 20 working days prior to planned start of PVT procedure.

##### C. Close Out:

1. Within 10 working days of substantial completion and prior to project closeout, the Contractor shall provide to the Owner a complete set of As-Built drawings, showing any deviation from the original plans and specifications, in mounting location, infrastructure pathway, and / or any other substantive change.

#### 1.05 WARRANTY

##### A. General:

1. All equipment and system shall be warranted against defects in material and workmanship for a period of one (1) year from the date of startup. Warranty

coverage shall include parts, labor, travel, expenses, and labor to remove/reinstall all products. The warranty document shall be submitted with the Contractor's submittals and shall include details on inclusions and exclusions, deductibles, and availability of extended coverage options, priced for extended coverage in years 2, 3, and 4 past expiration of the original warranty period.

2. Warranty service shall be separated into 2 classes of service, critical item service and non- critical item service.
3. Critical items shall be described as any part or device which if fails would cause major portions (more than 50%) of the system to be inoperable. Critical failures are to be corrected within 24 hours of notification to the Contractor, 7 days per week. Non- critical failures are to be corrected within 7 days of notification to the Contractor.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

#### A. Self-Checkout System

1. Bibliotheca Self-Check 500 by 3M This device is being installed as part of an expansion to an existing District system, and in order to assure compatibility as well as simplify maintenance procedures and spare parts procurement, device shall be as specified with no equivalent.

#### B. Book Theft Prevention System

1. Bibliotheca RFID Gate by 3M. This device is being installed as part of an expansion to an existing District system, and in order to assure compatibility as well as simplify maintenance procedures and spare parts procurement, device shall be as specified with no equivalent.

## PART 3 - EXECUTION

3.01 GENERAL INTENT – It is the intent of the Owner to have a qualified contractor install a complete and fully operational Self-Checkout and Book Theft Prevention System, as shown on the project drawings, which provides a means for self-checkout of library materials and provides an alert to library personnel when un-checked out materials are being removed from the space.

3.02 The contractor shall procure, provide, install, and make fully operational the system as described in this specification and shown on the project drawings. Specific scope items include, but are not limited to:

- A. Provision and installation of Self-Checkout and Book Theft Prevention System components as shown on project drawings
- B. Provision and installation of Self-Checkout and Book Theft Prevention System software (Owner to provide workstations)

### 3.03 DELIVERY, STORAGE AND HANDLING:

- A. Product Acceptance, Storage, and Handling Requirements



1. Acceptance – Upon delivery to the project site, Contractor shall inspect all products and materials to assure that all products and material have been received in a new and undamaged state. Acceptance of the shipment, by the Contractor, shall constitute acknowledgement that the Contractor has reviewed the products and material and has found no discrepancies in quantity or condition, and that any products or materials subsequently found to be missing or damaged will be the sole responsibility of the Contractor.
2. Storage and Handling - Store products and materials in the original manufacturer's sealed packaging, in an environmentally controlled area per the manufacturer's specifications.

B. Before Beginning Work

1. Site Verification of Conditions – Contractor shall be responsible for examining the pathway elements intended for cables. Check Owner provided raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions which would affect the project execution. Any such unsatisfactory pathways shall be reported to the Owner.
2. Proceed with installation only after all unsatisfactory issues have been corrected or resolved.

C. General Installation Requirements:

1. Maintain strict site security throughout the course of the project. Rooms housing the equipment and workstations shall be locked up and secure during periods when Contractor personnel are not present.
2. Contractor shall submit to the manufacturer all required planning and locational information required by the manufacturer to finalize design and ship product.
3. Install system per the manufacturer's instructions.
4. The installed system must meet all local, state, and federal codes.
5. Book Theft Prevention System units to be placed as shown on project drawings. Locations are conceptual, and Contractor shall confirm final location with architect before beginning installation.
6. Self-Checkout System units to be placed as shown on project drawings. Locations are conceptual, and Contractor shall confirm final location with architect before beginning installation.
7. Contractor shall verify that all IDF outlets used for powering Self-Checkout and Book Theft Prevention System components are connected to the buildings emergency power UPS.
8. Contractor shall be responsible for providing all conduit, junction boxes, conductors, equipment plugs, terminal strips and labor to install a complete and operational system.
9. All cables within racks and cabinets shall be carefully emplaced and bound or laced with Velcro. All cables shall be identified by wire markers. Wire markers shall be machine printed polyolefin wire markers utilizing heat shrink (Brady Type B-321 or Equivalent). The markings shall clearly indicate the function, source, or destination of all cables and wiring. All cabinets and panels shall be provided with permanently attached lamicaid labels with 1" high white lettering on black background. Labels must contain the text name and alpha- numeric identifier as called out on the single line.

10. Equipment racks shall be seismically bolted to the floor by the Contractor once the Owner determines the final location for each rack. Any mounting brackets attached to walls shall be screwed to studs, not drywall. All rack-mounted equipment shall be able to be serviced within the rack and in the rack's final location. The need to unbolt racking equipment to access or service equipment shall not be acceptable.
11. Cables shall not be spliced in underground enclosures.
12. Splices must be kept to a minimum. Any field splices must be secured in a NEMA box appropriate to the conditions.
13. The use of wire lubricants is highly discouraged. If usage of such lubricant cannot be avoided, Contractor shall procure verification, in writing, from the cable manufacturer stating that the specific lubricant used is acceptable and will not damage or degrade the cable.
14. Cable tray pathways designated for telecom shall not be utilized for support of conduit, conductors, or control wiring of any type. No Book Theft Prevention, Access Control, Surveillance, or Intrusion Detection cabling which is not Category 6A shall be intermingled with such Category 6A or 6 cabling. Non-telecom low voltage cabling shall utilize its own supports and pathways. Security Contractor shall coordinate pathway for said cabling with Electrical Contractor

D. Coordination

1. Contractor shall coordinate all work with any other trades present on the project which will be directly affected by or will affect the execution of this contract.

E. Testing and Commissioning:

1. The Contractor shall be responsible for final system hardware configuration and pre-testing prior to performance verification testing being conducted with the Owner. The Contractor shall pre-test all non-data / telecom cabling to assure cabling is free from interference, opens, grounds, or short circuits.
2. The Contractor shall develop a Performance Verification Testing (PVT) plan. The PVT plan shall identify each new system component included in the project, the intent of testing it, methods and tools required for the testing, and expected result. Each component shall be individually listed with space for noting PASS or FAIL, Contractor / Owner Sign-off, time and date of test, and related comments. The PVT plan shall be submitted to the Owner a minimum of 20 (TWENTY) working days prior to the scheduled beginning of PVT. No testing shall take place until Owner has approved the PVT.
3. As a part of the final system commissioning, Contractor shall submit a listing of all enabled passwords within the system, and shall provide instruction specific to changing the password after the Contractor's departure from the site.
4. Following satisfactory completion of PVT plan, the system shall be operated at normal facility load for a period of 30 calendar days as a burn-in period. If any item or system fails during the burn-in period, the burn-in period shall be suspended until such item or system has been corrected, at which time the test period will recommence. Notice of final System Acceptance will be withheld until burn-in period has been successfully completed.
5. Notice of Final System Completion will not be issued until the following requirements have all been met:
  - a. All required submittals accepted.
  - b. Delivery of final documentation, including but not limited to As-Built drawings.

- c. Successful PVT & burn-in period
- d. Completion of all required training activities.
- e. Purging of all Contractor passwords and removal of all Contractor access to the systems.

F. Training and Instruction:

1. Before the system is turned over to the owner, the manufacturer shall provide 16 hours of system operations and maintenance training at the project site using the customer's equipment for up to 10 of the owner's representatives. The Owner shall determine hours to be allocated to each training type.
2. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
3. This training shall be conducted by a manufacturer certified trainer.
4. Training materials shall not be generic, and shall be specific to the project.

G. Warranty:

1. The system shall be warrantied for a period of 1 year from date of acceptance. Written notification shall be sent to the owner stating the date this warranty period has started.
2. The equipment manufacturer shall provide with their bid package to the owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.
3. The Contractor shall provide with their bid package to the Owner a proposal for an extended parts and labor warranty service, priced for the 1st, 2nd, and 3rd years of post-warranty period operation.

H. Site Clean-up

1. Upon completion of the contract, Contractor shall be responsible for project site cleanup. All installed materials shall be clean, enclosures free of dust and debris, and surfaces wiped free of smudges and fingerprints. The Contractor shall remove all project associated debris and rubbish occasioned by the work from the site. The contractor shall clean all interior spaces dirtied by the work. Remove all temporary protective covers and shrouds from all equipment.

**END OF SECTION**

**SECTION 26 01 00**

**ELECTRICAL GENERAL PROVISIONS**

**ARTICLE 1 SUMMARY**

- 1.1 This Division of the specification outlines the provisions of the contract work to be performed under this Division.
- 1.2 This Section applies to and forms a part of each section of specifications in Division 26 and all work performed under the electrical and communications contracts.
- 1.3 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.
- 1.4 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- 1.5 Where the words 'provide' or 'provision' are used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- 1.6 Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

**ARTICLE 2 CONTRACTOR QUALIFICATIONS**

- 2.1 The Contractor shall have a current California C-10 Electrical Contractor's license and all individuals working on this project shall have passed the Department of Industrial Relations Division of apprenticeship Standards – "Electrician Certification Program."

**ARTICLE 3 CODES, PERMITS AND FEES**

- 3.1 Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA, and serving utility requirements.
- 3.2 Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.
- 3.3 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

ARTICLE 4 EXAMINATION OF PREMISES

- 4.1 Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

ARTICLE 5 STANDARDS

- 5.1 The following standard publications of the latest editions enforced and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.

- 5.1.1 2016 California Electrical Code (CEC), Part 3 Title 24 CCR.
- 5.1.2 National Fire Protection Association.
- 5.1.3 Underwriters' Laboratories, Inc. (UL).
- 5.1.4 Certified Ballast Manufacturers' Association (CBM).
- 5.1.5 National Electrical Manufacturers' Association (NEMA).
- 5.1.6 Institution of Electrical & Electronics Engineers (IEEE).
- 5.1.7 American Society for Testing & Materials (ASTM).
- 5.1.8 National Board of Fire Underwriters (NBFU).
- 5.1.9 National Board of Standards (NBS).
- 5.1.10 American National Standards Institute (ANSI).
- 5.1.11 Insulated Power Cable Engineers Association (IPECS).
- 5.1.12 Electrical Testing Laboratories (ETL).
- 5.1.13 National Electrical Safety Code (NESEC).
- 5.1.14 2016 California Building Code (CBC), Part 2, Title 24 CCR.
- 5.1.15 2016 California Fire Code (CFC), Part 9, Title 24, CCR.
- 5.1.16 2016 NFPA 72 with California State Amendments
- 5.1.17 National Electrical Testing Association (NETA), 2010 or most current

ARTICLE 6 DEFINITIONS

- 6.1 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- 6.2 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- 6.3 Finish Space: Any space ordinarily visible, including exterior areas.

ARTICLE 7 WORK AND MATERIALS

- 7.1 Unless otherwise specified, all materials must be new and of the best quality. Materials previously incorporated into other projects, salvaged, or refurbished are not considered new. Perform all labor in a thorough and workmanlike manner.

- 7.2 All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

#### ARTICLE 8 SHOP DRAWINGS AND SUBMITTALS

- 8.1 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.
- 8.2 Shop drawings submittals demonstrate to the Architect that the Contractor understands the design concept. The Contractor demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, notify the Architect immediately.
- 8.3 Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.
- 8.4 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

#### ARTICLE 9 EQUIPMENT PURCHASES

- 9.1 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.
- 9.2 Provide all materials of similar class or service by one manufacturer.

#### ARTICLE 10 COOPERATIVE WORK

- 10.1 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.
- 10.2 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other

sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

#### ARTICLE 11 VERIFICATION OF DIMENSIONS

- 11.1 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- 11.2 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

#### ARTICLE 12 CUTTING AND PATCHING

- 12.1 All cutting and patching shall be in accordance with Division 1 of these specifications and as noted below.
- 12.2 Cut existing work and patch as necessary to properly install new work. As the work progresses, leave necessary openings, holes, chases, etc., in their correct location. If the required openings, holes, chases, etc., are not in their correct locations, make the necessary corrections at no cost to the Owner. Avoid excessive cutting and do not cut structural members including wall framing without the consent of the Architect.

#### ARTICLE 13 CLOSING-IN OF UNINSPECTED WORK

- 13.1 Cover no work until inspected, tested, and approved by the Architect. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

#### ARTICLE 14 EXCAVATION AND BACKFILL

- 14.1 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.
- 14.2 Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary.
- 14.3 Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any

trench near or under footings without first consulting the Architect. All trenches shall be done in accordance with OSHA standards and regulations.

- 14.4 Backfilling shall be done with each layer compacted before another layer is added. No stones or coarse lumps shall be laid directly on a conduit or conduits.
- 14.5 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.
- 14.6 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.
- 14.7 Perform all backfilling in accordance with the requirements of and under the direction of the Geotechnical Engineer (90% *Compaction*)
- 14.8 Where new underground trenching is required on sites or in any area where existing underground utilities exist, the Contractor shall provide an independent professional utility locating service to locate exact vertical and horizontal locations of all existing utilities. Where existing utilities are found the Contractor shall hand dig those areas to avoid disruption. The Contractor shall be responsible for immediate repairs to existing underground utilities damaged during construction. The Contractor shall repair all existing asphalt, concrete and landscape surfaces damaged or removed during construction to match their original conditions. Where trenching extends through public streets or roadways, the Contractor shall notify underground service alert in addition to the independent locating service 48 hours before start of construction to determine location of existing utilities by calling (800) 422-4133.

#### ARTICLE 15 CONCRETE

- 15.1 Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under Division 3 of these specifications.
- 15.2 See other sections for additional requirements for underground vaults, cable ducts, etc.

#### ARTICLE 16 ACCESSIBILITY

- 16.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.
- 16.2 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.
- 16.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.



- 16.4 Refer to 'finish schedule' for types of walls and ceilings in each area and the architectural drawings for rated wall construction.
- 16.5 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

#### ARTICLE 17 FLASHING

- 17.1 Flash and counter flash all conduits penetrating roofing membrane as shown on Architectural drawings. All work shall be in accordance with Division 7 of these specifications.

#### ARTICLE 18 IDENTIFICATION OF EQUIPMENT

- 18.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:

##### 18.1.1 General:

- 18.1.1.1 In general, the installed laminated nameplates as hereinafter called for shall also clearly indicate its use, areas served, circuit identification, voltage and any other useful data.
- 18.1.1.2 All auxiliary systems, including communications, shall be labeled to indicate function.

##### 18.1.2 Lighting and Local Panelboards:

- 18.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.
- 18.1.2.2 Circuit directory shall be two column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.

##### 18.1.3 Distribution Switchboards and Feeders Sections:

- 18.1.3.1 Identification shall be with 1" x 4" laminated white micarta nameplates with black lettering on each major component, each with name and/or number of unit and other pertinent data as required. Letters shall be no less than 3/8" high.
- 18.1.3.2 Circuit breakers and switches shall be identified by number and name with 3/8" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

18.1.4 Disconnect Switches, Motor Starters and Transformers:

18.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

18.1.5 All communication system terminal boxes including T.V., telephone/intercom, security, fire alarm, clock, and computer networking shall be provided with white micarta laminated labels and 3/8" high black lettering.

ARTICLE 19 CONSTRUCTION FACILITIES

19.1 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.

19.2 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

ARTICLE 20 GUARANTEE

20.1 Guarantee all material, equipment and workmanship for all sections under this Division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proven defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

ARTICLE 21 PATENTS

21.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

ARTICLE 22 PLUMBING (DIVISION 22) / HEATING, VENTILATING, AND AIR CONDITIONING (DIVISION 23) / ELECTRICAL – COORDINATION REQUIREMENTS

22.1 All electrical work performed for this project shall conform to the California Electrical Code, to Local Building Codes and in conformance with Division 22, 23, and 26 of these specifications, whether the work is provided under the "Plumbing", "Heating, Ventilating, and Air Conditioning", or the "Electrical" Division of these specifications. Where the Division 22 and/or Division 23 Contractor is required to provide electrical work, he shall arrange for the work to be done by a licensed Division 26 Contractor, using qualified electricians. The Division 22 and/or Division 23 Contractor shall be solely and completely responsible for the correct functioning of all equipment regardless of who provided the electrical work.

- 22.2 The work under Division 22 and/or Division 23 shall include the following:
  - 22.2.1 All motors required by mechanical equipment.
  - 22.2.2 All starters for mechanical equipment which are not provided under the electrical division as part of a motor control center or otherwise indicated on the electrical drawings.
  - 22.2.3 All wiring interior to packaged equipment furnished as an integral part of the equipment.
  - 22.2.4 All control **wiring and conduit** for mechanical control systems.
  - 22.2.5 All control systems required by mechanical equipment.
- 22.3 The work under Division 26 shall include the following:
  - 22.3.1 All power wiring and conduit; and conduit only for EMS control conductors between each building and the main control panel.
  - 22.3.2 Electrical disconnects as shown on the electrical drawings.
  - 22.3.3 Starters forming part of a motor control center.
- 22.4 All power wiring and conduit to equipment furnished under Division 22 and/or Division 23 shall be provided under Division 26. Control wiring and conduit, whether line voltage or low voltage, shall be provided under the division which furnishes the equipment.
- 22.5 Power wiring shall be defined as all wiring between the panelboard switchboard overcurrent device, motor control center starter or switch, and the safety disconnect switch or control panel serving the equipment. Also, the power wiring between safety disconnect switch and the equipment line terminals.
- 22.6 Control wiring shall be defined as all wiring, either line voltage or low voltage, required for the control and interlocking of equipment, including but not limited to wiring to motor control stations, solenoid valves, pressure switches, limit switches, flow switches, thermostats, humidistats, safety devices, smoke detectors, and other components required for the proper operation of the equipment.
- 22.7 All motor starters which are not part of motor control centers and which are required for equipment furnished under this Division shall be furnished and installed by the Division furnishing the equipment and power wiring connected under Division 26. Motor starters and control devices in motor control centers shall be furnished and installed under Division 26.

- 22.8 Division 26 Contractor shall make all final connections of power wiring to equipment furnished under this Division.
- 22.9 Wiring diagrams complete with all connection details shall be furnished under each respective Section.
- 22.10 Motor starters supplied by Plumbing and/or Heating, Ventilating and Air Conditioning shall be fused combination type minimum NEMA Size 1, and conform to appropriate NEMA standards for the service required. Provide NEMA type 3R/12 gasketed enclosures in wet locations. Provide all starters with appropriately sized overload protection and heater strips provided in each phase, hand/off auto switches, a minimum of 2 NO and NC auxiliary contacts as required, and an integral disconnecting means. For ½ horsepower motors and below, when control requirements do not dictate the use of a starter, a manual motor starter switch with overload protection in each phase may be provided. Acceptable manufacturers are Allen Bradley, General Electric, Square D, Furnas and Cutler Hammer.

ARTICLE 23 EQUIPMENT ROUGH-IN

- 23.1 Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the Architectural Designs. The Contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in the contract drawings shall be anticipated and provided for under this Division of the specifications to comply with rough-in requirements.

ARTICLE 24 OWNER FURNISHED AND OTHER EQUIPMENT

- 24.1 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

ARTICLE 25 EQUIPMENT FINAL CONNECTIONS

- 25.1 Provide all final connections for the following:
  - 25.1.1 All equipment furnished under this Division.
  - 25.1.2 Electrical equipment furnished under other sections of the specification.
  - 25.1.3 Owner furnished equipment as specified under this Division.

ARTICLE 26 INSERTS, ANCHORS, AND MOUNTING SLEEVES

- 26.1 Inserts and anchors must be:
  - 26.1.1 Furnished and installed for support of work under this Division.

26.1.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.

26.1.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in "Conduit and Fittings" Section 26 05 33.

#### ARTICLE 27 SEISMIC ANCHORING

27.1 All switchgear and other free standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1616A.1.12. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

27.2 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1616A.1.12. The Contractor shall submit drawings signed by the Contractors registered Structural Engineer indicating method of compliance prior to installation.

#### ARTICLE 28 RUST PROOFING

28.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

28.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

28.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

#### ARTICLE 29 GENERAL WIRING

29.1 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.

29.2 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.

- 29.3 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

ARTICLE 30 SEPARATE CONDUIT SYSTEMS

- 30.1 Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, standby system, sound system, control system, fire alarm system, etc.
- 30.2 Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

ARTICLE 31 CLEANUP

- 31.1 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.
- 31.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.
- 31.3 During the progress of the work, keep the premises clean and free of debris.

ARTICLE 32 PAINTING

- 32.1 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)

ARTICLE 33 PROJECT CLOSEOUT

- 33.1 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division, in accordance with Division 1 of these specifications and as described below.
- 33.2 Equipment Lists and Maintenance Manuals:
- 33.2.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this Section of the specifications:

- 33.2.1.1 Name, model, and manufacturer.
- 33.2.1.2 Complete parts drawings and lists.
- 33.2.1.3 Local supply for parts and replacement and telephone number.
- 33.2.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.

33.3 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

#### ARTICLE 34 RECORD DRAWINGS

- 34.1 The Division 26 Contractor shall maintain record drawings as specified in accordance with Division 1 of these specifications, and as noted below.
- 34.2 Drawings shall show locations of all concealed underground conduit runs, giving the number and size of conduit and wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all of the actual additions or changes made. All as-built drawing information shall be prepared by the contractor in AutoCAD, updating the contract computer files as needed to reflect actual installed conditions for all site plans, lighting, power, communication, networking, audio visual, security or fire alarms systems included in the scope of work for this project.
- 34.3 One set of these record drawings shall be delivered to the Architect. The engineer will review documents for completeness, and will not be responsible for editing contractor computer files.

#### ARTICLE 35 CHANGES AND EXTRA WORK

- 35.1 When **changes** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:
  - 35.1.1 The material Costs shall **not exceed** the latest edition of the "Trade Service" end column "C" price list. The materials prices may be higher only where the Contractor can produce invoices to substantiate higher

material costs. The Contractor shall submit a print out copy of the trade service sheets with the change order to substantiate these values.

35.1.2 The labor Costs shall **not exceed** the latest edition of the "NECA Manual of Labor Units" **normal column**.

35.2 When **credits** in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

35.2.1 The Material Costs shall **not be less than 80% of** the latest edition of the "Trade Service" end column price list. The materials prices may be lower only where the Contractor can produce invoices to substantiate lower material costs. Restocking fees may also be included in this amount where applicable.

35.2.2 The Labor Costs shall **not be less than 80% of** the latest edition of the "NECA Manual of Labor Units" **normal column**.

35.3 Conduit pricing for conduits of all types sized 3" or smaller.

When changes in the scope of work require the Contractor to estimate conduit Installations, they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for conduit installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

35.3.1 Couplings.

35.3.2 Set Screw or Compression Fittings, locknuts, Bushings and washers.

35.3.3 Conduit straps and associated screws or nails.

35.3.4 LB fittings or other specialty fittings or specialty mounting hardware may be included where needed.

35.4 Wire pricing for all types and sizes.

When changes in the scope of work require the Contractor to estimate wire installations they shall **NOT include labor values (only material cost may be included)** for any of the below items. The labor values for wire installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

35.4.1 Locknuts, Bushings, tape, wire markers.

35.5 When changes in the scope of work require other equipment installations such as lighting fixtures, panelboards, switchboards, wiring devices, communications equipment etc. the Contractor shall **NOT include labor values (only material**



**cost may be included**) for any of the below items. The labor values for these equipment items represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

35.5.1 Associated screws, nails, bolts, anchors or supports.

35.5.2 Locknuts, washers, tape.

35.6 The total labor hours for extra work will be required to be calculated as follows:

35.6.1 Change orders with 1 to 30 total labor hours

General Laborer	10%	of total labor hours
Journeyman	10%	of total labor hours
Foreman	80%	of total labor hours

35.6.2 Change orders with 31 to 100 total labor hours

General Laborer	20%	of total labor hours
Journeyman	40%	of total labor hours
Foreman	40%	of total labor hours

35.6.3 Change orders with over 100 total labor hours

General Laborer	30%	of total labor hours
Journeyman	50%	of total labor hours
Foreman	20%	of total labor hours

35.7 When change orders are issued which allow the work to be completed in the normal sequence of construction, the labor rates shall be based on the most current "Prevailing Wage" – straight time total hourly rate. When change orders require the Contractor to work out of sequence the "Prevailing Wage" – daily overtime hourly rate shall apply. Special condition situations shall be reviewed on an individual basis for alternate hourly rate schedules.

35.8 Costs **will not** be permitted for additional supervision on site or office time for processing any change order other than the 10% overhead allowance as described in Division 1. Cost for special equipment required to install items for an individual change order are permitted and must be individually identified. Lump Sum cost for small tools or any other cost not specifically required for the change order are not permitted.

35.9 Contractor estimates shall be formatted to clearly identify each of the following:

35.9.1 Line item description of each type of material or labor item.

35.9.2 Description of quantity for each item.

35.9.3 Description of (material cost per / quantity).

35.9.4 Description of (labor cost per / quantity).

35.9.5 Description of total labor hour breakdown per Foreman, Journeyman or General Laborer as described above.

ARTICLE 36 ELECTRONIC FILES

36.1 The Contractor shall make a **written** request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:

36.1.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).

36.1.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.

36.1.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.

36.2 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, **will not be made available to the Contractor.**

36.3 Files will only be provided in the AutoCAD format in which they were created.

36.4 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.

END OF SECTION

SECTION 26 05 19

POWER CONDUCTORS

PART 1 – GENERAL

- 1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.
- 1.2 Submittals: Submit manufacturers' data for the following items:
  - 1.2.1 All cables and terminations
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining, or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed

PART 2 – PRODUCTS

- 2.1 Wire and cable Rated 120 volt to 600 volt.
  - 2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.

- 2.1.2 Aluminum conductors will be permitted (only where specifically identified on the drawings. See "600 Volt Feeder Schedule") in sizes 2/0 or larger. Conductors shall be listed by Underwriters Laboratories (UL) and suitable for operation at 600 volts or less, at a maximum operating temperature of 90N C maximum in wet or dry locations. Conductors shall be marked "SUN-RES". Aluminum alloy conductors shall be compact stranded conductors of STABILOY® (AA-8030) as manufactured by Alcan Cable or Listed equal. AA-8000 Series aluminum alloy conductor material shall be recognized by The Aluminum Association.
- 2.1.3 MC type armored cable reference Section 26 05 33.
- 2.2 Wire and cable for systems below 120 volts.
  - 2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn "Aquaseal" or equal, unless otherwise specified.

### PART 3 - EXECUTION

- 3.1 Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.
- 3.2 All connections of wires shall be made as noted below:
  - 3.2.1 Connections to outlets and switches: Wire formed around binding post of screw.
  - 3.2.2 No. 10 wire and smaller: Circuit wiring connections to lighting fixtures and other hard wired equipment shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal. Alternate "WAGO" #773 series or "IDEAL" #32, 33, 34 and 39 series push wire style connectors are also acceptable.
- 3.3 All wiring shall be continuous without splicing unless where specifically noted on the drawings or where permitted below.
  - 3.3.1 No. 10 wire and smaller above grade: Quantities as needed, connection made with pressure type solderless connectors, Scotchlock or equal.
  - 3.3.2 No. 10 wire and smaller below grade: Quantities as needed, connection made with 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.3 No. 8 wire and larger above grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.4 No. 8 wire and larger below grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.4 All wiring throughout shall be color coded as follows:

	<u>480 volt system</u>	<u>208 or 240 volt system</u>
A Phase	Brown	Black
B Phase	Orange	Red
C Phase	Yellow	Blue
Neutral	Grey	White
Ground	Green	Green

3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.

3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.

3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.

3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.

3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.

3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers' recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

END OF SECTION



**SECTION 26 05 26**

**GROUNDING**

**PART 1 – GENERAL**

- 1.1 Furnish and install grounding and grounding conductors and electrodes as specified herein and as shown on the drawings.
- 1.2 Submit catalog data for all components.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – EXECUTION**

- 2.1 Grounding
  - 2.1.1 All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of CEC Article 250. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in CEC Article 250. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection.
  - 2.1.2 Provide an insulated equipment grounding conductor in all branch circuit and feeder raceway systems, sized in accordance with CEC 250-1122.

- 2.1.3 Provide an additional individual insulated grounding conductor for each circuit which contains an isolated ground receptacle or surge suppression receptacle.
- 2.1.4 Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard, and by means of insulated continuous stranded copper grounding wire extended from the ground bus in the panelboard to the conduit grounding bushings.
- 2.1.5 Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.
- 2.1.6 The following ohmic values shall be test certified for each item listed. A written report signed and witnessed by the project IOR shall be provided to the engineer. If the ohmic value listed cannot be obtained additional grounding shall be installed to reach the value listed.
  - 2.1.6.1 Service. . . . .10 ohms.
  - 2.1.6.2 Step down transformers and non-current carrying metal parts  
. . . . . 25 ohms.
  - 2.1.6.3 Manholes, handholes, etc.  
. . . . . 10 ohms.

END OF SECTION 260526



**SECTION 26 05 33**

**CONDUIT AND FITTINGS**

**PART 1 – GENERAL**

- 1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.
- 1.2 Submit Manufacturer's data on the following:
  - 1.2.1 Conduit.
  - 1.2.2 Fittings
  - 1.2.3 Fire stopping Material.
  - 1.2.4 Surface Raceways.
  - 1.2.5 Type MC or MC-PCS cable, provide construction details and UL "E" number.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

**PART 2 – PRODUCTS**

- 2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.
- 2.2 PVC conduit shall be Carlon or approved equal.

- 2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.
- 2.4 MC type armored cable, when utilized, shall be provided with the following:
  - 2.4.1 Comply with UL 1479 and CEC 330
  - 2.4.2 90°C, copper, THHN conductors.
  - 2.4.3 Minimum #12 insulated grounding conductor.
  - 2.4.4 Conductors sized No. 10 and smaller shall be solid, No. 8 and larger shall be stranded.
  - 2.4.5 Oversized (150%) neutrals or separate neutrals shall be provided.
  - 2.4.6 Increase phase conductors to No. 10 AWG for 120 volt circuits greater than 100 feet from panel to load and for 277 volt circuits greater than 200 feet from panel to load. Where required increase conductor sizes for entire length of circuit.
  - 2.4.7 Interlocked armored aluminum sheath.
  - 2.4.8 AC or BX type armored cable shall **not** be substituted in lieu of MC type cable.
  - 2.4.9 Color code cable according to cable type and configuration.
  - 2.4.10 Acceptable manufacturers are AFC and Alfex.
- 2.5 MC-PCS luminary armored cable , when utilized, shall be provided with the following:
  - 2.5.1 Comply with UL 1479 and CEC 330
  - 2.5.2 90°C, copper, THHN conductors.
  - 2.5.3 Minimum #12 insulated grounding conductor.
  - 2.5.4 Lighting phase conductors sized No. 10 and smaller shall be solid, lighting control conductors shall be sized no. 16 solid.
  - 2.5.5 Interlocked armored aluminum sheath.
  - 2.5.6 AC or BX type armored cable shall **not** be substituted in lieu of MC type cable.

- 2.5.7 Color code phase cable according to cable type and configuration. color code control conductors purple/gray.
- 2.5.8 Acceptable manufacturers are AFC and Alfex.
- 2.6 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTM E 814 and UL 1479. The submittal for this product shall include the UL listed system number and installation requirements for each type of penetration seal required for this project.
- 2.7 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.
- 2.8 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.
- 2.9 Plastic conduit shall be stored on a flat surface, and protected from the direct rays of the sun.
- 2.10 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:

2.10.1 System 'SR'	Hubbell Wiremold Panduit Hellerman-Tyton	WALLTRAK 1 series ECLIPSE PN05series LD5 series TSR2 series
2.10.2 System 'SR2'	Hubbell Wiremold Panduit Hellerman-Tyton	WALTRAK 22 2300D Series D2P10 TSR3 series
2.10.3 System 'SR3'	Hubbell Wiremold Panduit Hellerman-Tyton	BASETRAK series 5400 - series 70 series MCR Infostream" series

Provide with offset boxes, inline boxes may only be used where specifically shown on the drawings.

PART 3 – FITTINGS

- 3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.
- 3.2 Locknuts shall be steel or malleable iron with sharp clean cut threads.
- 3.3 Entrance seals shall be O.Z. type FSK or equivalent.
- 3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.
- 3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.
- 3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.
- 3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).
- 3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.
- 3.9 MC or MC-PCS type armored cable shall be provided with listed clamp type die cast zinc set screw connectors. Anti-short bushings shall be provided at all cable ends.
- 3.10 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to ¾" a screw-in, "Jake type," fitting may be used.
- 3.11 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6" slack for conduits passing through all expansion and seismic joints.

PART 4 - EXECUTION

- 4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.
- 4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than ½" for power wiring and ¾" for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be ¾" minimum trade size, unless otherwise identified.

- 4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.
- 4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.
- 4.5 Rigid steel conduit or IMC shall be used as follows:
  - 4.5.1 Exposed exterior locations.
  - 4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.
  - 4.5.3 In hazardous or classified areas as required by CEC.
- 4.6 EMT conduit shall be used for areas as follows:
  - 4.6.1 All interior communications, signal, and data networking systems.
  - 4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.
- 4.7 Flexible conduit shall be used for areas as follows:
  - 4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.
  - 4.7.2 Flexible conduit shall not be used to replace EMT in other locations where the conduit will be exposed.
  - 4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.
  - 4.7.4 Liquid tight flexible conduit shall be used in conformance with CEC in lengths not to exceed 4'. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.
- 4.8 MC armored cable may be used as follows:

- 4.8.1 All branch circuit wiring for lighting and power circuits where permitted and installed in compliance with UL 1569 and CEC 330.
- 4.9 MC-PCS luminary armored cable may be used as follows:
  - 4.9.1 All Lighting branch circuit wiring for lighting circuits where permitted and installed in compliance with UL 1569 and CEC 300-22(c), 330. This cable permits conductors of control circuits to be placed in a cable with lighting power circuits or class 1 circuits.
  - 4.9.2 It shall not be considered an acceptable option to install lighting control class 1 circuits as an open wire installation.
- 4.10 MC and MC-PCS armored cable shall **not** be used for the following areas:
  - 4.10.1 Any exterior, underground or buried in concrete circuits.
  - 4.10.2 Any circuits feeding HVAC equipment or pumps or any circuit with 30 AMPs or greater overcurrent protection.
  - 4.10.3 Any exposed interior locations except in electrical, communication or mechanical equipment rooms.
  - 4.10.4 Any exposed interior damp/wet locations, kitchens, science classrooms, shop areas, or concealed in science classroom casework, unless provided with approved PVC jacket.
  - 4.10.5 Any hazardous rated area.
- 4.11 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, no plastic conduit shall extend above finished exterior grade, or above interior finished floor level.
- 4.12 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.
- 4.13 All underground conduit depths shall be as detailed on the drawings or a minimum of 30" below finished grade (when not specifically detailed otherwise), for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.14 All underground conduits for power systems (600v and higher), shall be concrete encased and a minimum of 48" below grade or as detailed on the drawings.

Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.

- 4.15 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.
- 4.16 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Architect.
- 4.17 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.
- 4.18 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.
- 4.19 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.
  - 4.19.1 Water and waste piping not less than 3".
  - 4.19.2 Steam and steam condensate lines not less than 12".
  - 4.19.3 Radiation and reheat lines not less than 6".
- 4.20 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.
- 4.21 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.
- 4.22 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.

- 4.23 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.
- 4.23.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.
- 4.23.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.
- 4.24 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. **[No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.]** Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
- 4.25 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.
- 4.26 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.
- 4.27 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits, and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.
- 4.28 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.



- 4.29 All conduits which are part of a paralleled feeder or branch circuit shall be installed underground.
- 4.30 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
  - 4.30.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.
  - 4.30.2 The Contractor shall provide a pull rope in all conduits for these systems.
  - 4.30.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.
- 4.31 In addition to the above requirements, the following requirements shall apply to all data networking conduits:
  - 4.31.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.
  - 4.31.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60" (horizontal).
  - 4.31.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.
  - 4.31.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.
- 4.32 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All raceways and device boxes shall be securely screwed to the finish surface with zinc screw "Auger" anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.
- 4.33 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide each raceway channel with pull strings.

- 4.34 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.
- 4.35 MC or MC-PCS cable shall be cut using a specific metallic sheath armor stripping tool. The use of hacksaws, dikes or any other tools not specifically designed to remove the armor sheath will not be permitted.
- 4.36 MC or MC-PCS cables installed in attic spaces or above lay-in ceilings shall be installed to be protected from physical damage. The cable shall be mounted along the sides or bottom of joists, rafters or studs.
- 4.37 Support wires used for supporting ceilings, lighting fixtures or other equipment items shall not be used to support MC or MC-PCS cables. Conduits, duct work, piping or any other equipment shall not be used to support or mount MC cables.
- 4.38 MC or MC-PCS cable supports, fasteners and clips shall be designed specifically for use with MC cables. Standard conduit supports, fasteners and clips, nails or other items are not permitted for installing MC cables.

END OF SECTION

SECTION 26 05 34

OUTLET AND JUNCTION BOXES

PART 1 – GENERAL

- 1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.
- 2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4" square x 1-½" deep.
- 2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast ferrous and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.
- 2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster.

Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.

- 2.5 All light, switch, receptacle, fire alarm devices and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.
- 2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend  $\frac{3}{4}$ " past boxes all around. Covers for 4" square boxes shall extend  $\frac{1}{4}$ " past box all around.
- 2.7 All terminal cabinets and junction boxes or equipment back boxes which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
  - 2.7.1 The Division 26 Contractor shall coordinate all box requirements with each system supplier prior to bid to determine special cabinet or back box requirements. The Contractor shall also provide stainless steel blank cover plates for all low voltage systems installed for future equipment.
  - 2.7.2 The Contractor shall provide all plywood backboards indicated on walls or inside equipment enclosures. All backboards shall be a minimum of  $\frac{3}{4}$ " thick fire rated type plywood.
  - 2.7.3 The Contractor shall coordinate exact rough in locations and requirements with each system supplier.
- 2.8 In addition to the above requirements, boxes for data networking wiring and equipment shall comply with the following:
  - 2.8.1 All boxes shall be a minimum of 4-11/16" square x 2-1/8" deep.
  - 2.8.2 Where pull boxes are required on individual conduits 1-1/4" or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1-1/4" for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1-1/4" for an angle or a U-pull through installation, provide a minimum distance of six times the conduit trade size between the entering and exiting conduit run for each cable.

- 2.9 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

### PART 3 – EXECUTION

- 3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.
- 3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.
- 3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.
- 3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.
- 3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.
- 3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.
- 3.7 All device boxes and junction boxes for fire alarm system shall be painted red and shall be 4-11/16" square by 2-1/8" deep. No exceptions.

END OF SECTION

**SECTION 26 08 00**

**COMMISSIONING OF ELECTRICAL SYSTEMS**

**PART 1 – GENERAL**

**RELATED DOCUMENTS**

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, 27, 28 Specification Sections, apply to this Section.
- 1.2 Acceptance and start-up testing requirements for electrical power distribution equipment and systems. Contractor shall retain and pay for the services of a recognized, independent testing firm for the purpose of performing inspections and tests as herein specified and as required by code.
  - 1.2.1 The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections.
  - 1.2.2 It is the purpose of these tests to assure that all tested electrical equipment is operational and within industry and manufacturers tolerances, and is installed in accordance with design specifications.
  - 1.2.3 The tests and inspections shall determine suitability for start-up and energization.
  - 1.2.4 The following equipment shall be tested and calibrated:
    - 1.2.4.1 Medium voltage cables
    - 1.2.4.2 Medium voltage interrupter switches, fuses, and circuit breakers.
    - 1.2.4.3 Low voltage switches, fuses, and circuit breakers, 100A frame and larger.
    - 1.2.4.4 Low voltage cables and feeders.
    - 1.2.4.5 Motor Control Centers and adjustable frequency drives.
    - 1.2.4.6 Protective relays, instruments, and metering systems.

**CODES, STANDARDS, AND REFERENCES**

- 1.3 All inspections and tests shall be in accordance with the following codes and standards except as provided otherwise herein.
  - 1.3.1 ANSI/IEEE C2: National Electrical Safety Code (NESC).

- 1.3.2 ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).
- 1.3.3 ANSI/NFPA 70E: Standard for Electrical Safety in the Workplace.
- 1.3.4 ANSI/NFPA 78: Lightning Protection Code.
- 1.3.5 ANSI/NFPA 101: Life Safety Code.
- 1.3.6 American Society for Testing and Materials – ASTM.
- 1.3.7 Applicable State and Local Codes, Ordinances and Standards, including City of San Diego, San Diego Gas & Electric, and San Diego Unified School District.
- 1.3.8 California Code of Regulations (CCR), Title 8, Title 24.
- 1.3.9 Division 1, Section 019113, “General Commissioning Requirements”.
- 1.3.10 Institute of Electrical and Electronic Engineers – IEEE.
- 1.3.11 Insulated Cable Engineers Association – ICEA.
- 1.3.12 International Electrical Testing Association - NETA Accept: The NETA Acceptance Testing Specifications, latest edition.
- 1.3.13 National Electrical Manufacturers Association – NEMA.
- 1.3.14 Occupational Safety and Health Administration (OSHA) – 29 CFR 1910.7: OSHA Occupational Safety and Health Standards.

#### QUALIFICATION OF TESTING FIRM

- 1.4 All Inspections and tests shall utilize the following references:
  - 1.4.1 Project design specifications.
  - 1.4.2 Project design drawings
  - 1.4.3 Project list of equipment to be inspected and tested
  - 1.4.4 Manufacturer’s instruction manuals applicable to each particular equipment.
- 1.5 The testing firm shall be an independent testing organization with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

- 1.6 The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems, with at least five (5) years of documented experience.
- 1.7 The lead, on-site, technical person shall be currently certified by the International Electrical Association (NETA), or National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing.
- 1.8 The testing firm shall utilize engineers and technicians who are regularly employed by the firm for testing services.
- 1.9 The testing firm shall submit proof of the above qualifications with bid documents when requested.
- 1.10 The terms used herein, such as Testing Agency, Testing Contractor, Testing Laboratory, or Contractor Test Company, shall be construed to mean the testing firm.

#### SUBMITTALS

- 1.11 Provide submittals per Division 1, Section 013300, "Submittal Procedures".
- 1.12 Qualifications of testing firm and personnel.
- 1.13 Certified test reports.
- 1.14 Two copies of blank forms for checklists, test reports, and other related forms for Engineer's review and approval.

#### GENERAL REQUIREMENTS

- 1.15 Routine insulation resistance, continuity, and rotation tests for all distribution and utilization equipment shall be performed prior to and in addition to acceptance tests specified herein.
- 1.16 The Testing Firm shall notify the Engineer no fewer than 3 working days prior to commencement of any testing.
- 1.17 Any system, material, or workmanship, which is found defective on the basis of Acceptance Tests shall be reported to the Engineer with recommendations for corrective action.
- 1.18 The Testing Firm shall maintain a written record of all tests, and upon completion of project, shall assemble and certify a final test report.
- 1.19 The final Test Report shall be submitted on conclusion of all required tests and corrective measures.

#### SAFETY AND PRECAUTIONS



- 1.20 Safety practices shall include, but will not be limited to, compliance with the following requirements:
  - 1.20.1 Occupational Safety and Health Act.
  - 1.20.2 Accident Prevention Manual for Industrial Operations, National Safety Council.
  - 1.20.3 Applicable State and Local safety operating procedures.
  - 1.20.4 Owners' Safety Practices.
  - 1.20.5 National Fire Protection Association – NFPA 70E.
  - 1.20.6 American National Standards for Personnel Protection.
- 1.21 All tests shall be performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and adequate safeguards must be devised.
- 1.22 The Testing Firm shall have a designated safety representative on the project site to supervise the testing operations with respect to safety.
- 1.23 Test Report:
  - 1.23.1 The test report shall include the following:
    - 1.23.1.1 Summary of Project.
    - 1.23.1.2 List of testing equipment used.
    - 1.23.1.3 Calibration date of testing equipment and due date of next calibration.
    - 1.23.1.4 Ambient temperature and humidity at time of test.
    - 1.23.1.5 Listing of equipment tested.
    - 1.23.1.6 Test results.
    - 1.23.1.7 Recommendations.
  - 1.23.2 Furnish original and four copies of the complete report to the Architect/District in accordance with requirements of Contract Documents.

#### INSPECTION AND TEST PROCEDURES

- 1.24 Contractor shall provide the Testing Firm, a copy of related contract documents such as drawings, specifications, engineer-reviewed submittals, coordination study report including all relay settings and other necessary information.

- 1.25 Contractor shall supply a suitable source of power to each site and location per testing firm requirements.
- 1.26 Contractor shall notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
- 1.27 Testing Firm shall review and evaluate all received documents and notify the Contractor and Engineer of any discrepancies in the documents and/or any other requirements immediately.
- 1.28 Testing Firm shall provide and comply with the following:
  - 1.28.1 Acceptance test procedures for each individual equipment listed in Part 1 of this section for Engineer review and approval prior to any test and after thorough evaluation of the system. Testing shall conform to the International Electrical Testing Association (NETA) specifications and standards for electrical power distribution equipment and systems and manufacturer's instructions.
  - 1.28.2 Refer to each individual specification section for testing requirements and comply.
  - 1.28.3 Inspect installed equipment and report any discrepancy and/or deficiency with respect to the contract documents and governing codes prior to testing.

#### SYSTEM FUNCTION TEST

- 1.29 Perform system function test upon completion of equipment tests as defined in this section. It is the purpose of system function tests to verify proper interaction of all sensing, processing, and action devices.
- 1.30 Implementation.
- 1.31 Submit manufacturers' data on all items:
  - 1.31.1 Develop test parameters for the purpose of evaluation performance of all integral components and their functioning as a complete unit within design requirements.
  - 1.31.2 Test all interlocking devices.
  - 1.31.3 Record the operation of alarms and indicating devices.
- 1.32 DEFICIENCIES
- 1.33 Submit manufacturers' data on all items.

1.33.1 All deficiencies reported by the Testing Firm shall be corrected by the Contractor and Acceptance and System Function Tests shall be repeated to verify conformance with requirements.

**PART 2 – PRODUCTS**

2.1 Not applicable

**PART 3 - EXECUTION**

**END OF SECTION**

SECTION 26 09 24

TIME CLOCKS

PART 1 – GENERAL

- 1.1 Furnish and install all time clocks that are not specifically called for to be furnished by others.
- 1.2 Submit manufacturer's data.
- 1.3 **Common submittal mistakes which will result in submittals being rejected:**
  - 1.3.1 Not including all items listed in the above itemized description.
  - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Acceptable manufacturers are Tork, Paragon, or Intermatic.
- 2.2 Contacts shall have a minimum rating of 10 amperes at 120V.
- 2.3 Controller is to have two channels. Both channels shall be astronomic with 1 to 99 minutes, plus or minus offset from sunrise or sunset.
- 2.4 Controller shall program in AM/PM or 24-hour format, with one minute resolution, using two buttons for all basic settings.
- 2.5 Controller shall be capable of 48 events per channel per week, and separate scheduling for each day of the week.
- 2.6 Controller shall have the following features:
  - 2.6.1 Scheduling of 16 individual holiday dates, and five holiday blocks.
  - 2.6.2 Automatic leap year compensation, and daylight saving.
- 2.7 Controller shall have 72-hour memory backup with rechargeable backup.

- 2.8 Clock shall be housed in a flush enclosure where supply circuits emanate from a flush mounted panelboard and surface enclosure when supply circuits are from a surface mounted panel.

**PART 3 – EXECUTION**

- 3.1 Furnish and install time clocks as shown on the drawings and herein specified.

**END OF SECTION**

SECTION 26 27 26

SWITCHES AND RECEPTACLES

PART 1 – GENERAL

- 1.1 Furnish and install all wiring devices as shown on drawings and as herein specified. Unless otherwise noted, device and plate numbers shown are Hubbell and shall be considered the minimum standard acceptable. Other acceptable manufacturers are Pass and Seymour, Leviton, General Electric and Bryant.
- 1.2 Submit manufacturers' data on all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
  - 1.3.1 Not correctly indicating ampacity rating of proposed devices.
  - 1.3.2 Not including all items listed in the above itemized description.
  - 1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.4 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 All switches shall be of the quiet mechanical type, Specification Grade, 20 amp, 120/277 volt AC as follows:

	<u>HUBBELL</u>	<u>LEVITON</u>	<u>PASS &amp; SEYMOUR</u>
Single Pole	CS120	CS1202	CS20AC1
Two Pole	CS1222	CS2202	CSB20AC2
Three-way	CS320	CS3202	CS20AC3
Key Switch	HBL1221L	1221-2L	PS20AC1-L

- 2.2 All switches shall have the "on" and the "off" position indicated on the handle. If switches of higher ampere ratings are required, they shall be of similar type and quality as those shown above. Groups of switches shown at one location shall be installed under a single plate up to a maximum of six where more than six switches are shown coordinate arrangement with the Architect.

- 2.3 Dimmer switches for incandescent lamp loads shall be square-law type, slide control dimmer with OFF position, Lutron or Hubbell "Nova-T" Series NT-600 (0-500 watt load), NT-1000 (501-900 watt load), NT-1500 (901-1500 watt load), or equal (no known equal).
- 2.4 All convenience receptacles and special outlets throughout shall be grounding type. Convenience receptacles shall be side wired, parallel slot, two pole, three wire, 20 amp as follows:

	<u>HUBBELL</u>	<u>LEVITON</u>	<u>PASS &amp; SEYMOUR</u>
Duplex	5352	5362	PS5362
GFCI	GFR5362	7899	2097
Isolated Ground	IG5362	5362IG	IG6300
Tamper Proof		8300SG	TR63H

- 2.5 All safety or tamper proof receptacles shall have no exposed external current carrying metal parts, and shall have integral wiring leads suitable for two or three wire installations.
- 2.6 Special receptacles shall be as noted on the drawings.
- 2.7 Weatherproof plates shall be designed to meet CEC Article 410-57, wet location listed with cover "open." Where weatherproof receptacles have been identified to be provided with locking covers, the cover shall be as manufactured by Pass & Seymour #4600-8 or Cole Lighting 310 Series. Rough-in requirements vary between manufacturers. Contractor to field verify requirements prior to installation.
- 2.8 All plates throughout shall be stainless steel. Where wiring devices are installed in concrete block walls, provide oversized 3-1/2" x 5" coverplates.
- 2.9 All devices shall be white unless otherwise noted or a special purpose outlet.
- 2.10 Unless where specifically detailed on the drawings, floor boxes shall be PVC suitable for concrete poured floors of minimum 3-1/2" depth, with a modular design to gang two or three sections together.
  - 2.10.1 Carlon #E976 series or approved equal
  - 2.10.2 Provide brass cover with brass carpet flange unless otherwise detailed.

PART 3 – EXECUTION

- 3.1 Switches for room lighting shall be located no more than 12" center line from door jamb at plus 48" center line above finished floor or +46" to top of devices where located over casework, reference CBC Figure 11B-5D.
- 3.2 All receptacles shall be mounted at plus 18" to center line above finished floor unless noted or shown otherwise. All receptacles shall be installed with the ground pin up, at the top of the receptacle to comply with IEEE 602-1986.

- 3.3 Furnish and install wall plates for all wiring devices, and outlet boxes, including special outlets, sound, communication, signal, and telephone outlets, etc. as required. All cover plates shall be appropriate for type of device.

END OF SECTION



SECTION 26 51 14

LED LIGHTING FIXTURES AND LAMPS

PART 1 – GENERAL

- 1.1 Furnish and install all lighting fixtures with lamps as specified and as shown on the drawings. Fixtures shall be complete including canopies, hanger, diffusers, ballasts, etc.
- 1.2 Submit manufacturer's data for each fixture type including the following:
  - 1.2.1 Lighting fixture catalog data and photometry.
  - 1.2.2 Lamp catalog data for each fixture type.
  - 1.2.3 Driver catalog data for each fixture type.
  - 1.2.4 Fixture warranty.
- 1.3 **Common submittal mistakes which will result in the submittal being rejected:**
  - 1.3.1 Not including lamp and driver information for each fixture type.
  - 1.3.2 Not including all items listed in the above itemized description.
  - 1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.3.4 Not including actual manufacturer's catalog information of proposed products.
  - 1.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PRODUCT SUBSTITUTION

- 1.4 All substitutions or alternate fixtures to those indicated on the project fixture schedule shall be submitted for approval (7) business days prior to the project bid date. Approvals when accepted will be issued in the form of an addendum. No consideration for substitutions will be provided after the award of the contract.
  - 1.4.1 The substitution request must include a statement indicating the difference in price of both the specified and alternate product, both contractor and list price. The substitution request must include a comparison of the total fixture wattage, total fixture lumens, fixture efficiency and warranty comparison.

- 1.4.2 When proposing to substitute lighting fixture and/or fixture retrofit, a point by point photometric calculation of a typical application as used in this project shall be included. A calculation of the specified and the proposed alternate shall be included.

PART 2 – PRODUCTS

- 2.1 All catalog numbers are given for manufacturer's identification and shall not relieve Contractor from responsibility of full conformance to all applicable written description requirements governing material and fabrication, either in the general or specific sections. Where catalog numbers are indicated as modified, no modification will be required if the standard unit fully conforms to descriptive requirements in the Specifications and matches specified ceiling.
- 2.2 All fixtures of the same type shall be of one manufacturer and of identical finish and appearance. All fixtures and component parts shall bear the UL label.
- 2.3 All steel parts shall be phosphate treated in multistage power spray system for corrosion resistance and paint adhesion. Final finish shall be electrostatically applied baked white enamel of not less than 87 pct. reflectance on reflecting surfaces.
- 2.4 Each fixture shall have a continuous light-seal gasket seated in such manner as to prevent any light leak through any portion or around any edge of the trim frame.
- 2.5 Diffusers shall be framed in a hinged, continuous assembly. Diffuser frame latches shall be spring-loaded or cam-operated.
- 2.6 All recessed fixtures shall be provided with frames appropriate for the type of ceiling involved. No fixtures shall be ordered until the ceiling construction has been verified by the Contractor.

MINIMUM LUMINARY REQUIREMENTS

- 2.7 Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for intended location and application.
- 2.8 Recessed Fixtures: Comply with NEMA LE 4.
- 2.9 CRI of **minimum 80 CCT of 4100 K.**
- 2.10 Rated lamp life of 50,000 hours minimum.
- 2.11 Lamps dimmable from 100 percent to 0 percent of maximum light output.
- 2.12 Nominal Operating Voltage: **120 V / 277 V ac**

PART 3 – EXECUTION

- 3.1 All lighting fixtures shall be supported as follows:
  - 3.1.1 From the outlet box by means of a metal strap where its weight is less than five pounds.
  - 3.1.2 From its outlet box by means of a hickey or other threaded connection where its weight is from five to fifty pounds.
  - 3.1.3 Directly from the structural slab or joists where its weight exceeds fifty pounds.
  - 3.1.4 Lighting fixtures shall be supported independent of the ceiling system or additional ceiling support must be added to carry the weight of the lighting fixtures. Recessed lighting fixtures supported from ceiling grid tees shall be furnished with hold down clips in conformance with CEC 410 - 16, spring clips will not be permitted. All fixtures which the manufacturer has not provided UL approved clips, must be attached to the fixture and ceiling grid by metal screws.
- 3.2 Furnish and install supplementary blocking and support as required to support fixture from structural members. Contractor shall submit proposed blocking method for all suspended lighting fixtures for approval prior to rough in.
- 3.3 Suspended and/or pendant mounted fixtures shall be provided with four aircraft safety cables extending in opposite directions, attached to the fixture, and supported from a structural member. The contractor shall submit proposed fixture mounting and aircraft cable attachment methods for approval prior to fixture rough in.
- 3.4 Class 1 wiring to the fixture must be installed either conduit or type MC-PCS cabling no open wiring shall be permitted.
- 3.5 Chain suspension may be used only where specifically permitted on the drawings. Chain shall be heavy duty, nickel or cadmium plated, suitable for weight of specific fixture.
- 3.6 Shop drawings shall be furnished for each fixture type. Catalog cuts, illustrating conformance with specifications, will be acceptable for standard units. Shop drawings shall indicate materials, assembly, finish and dimensions.
- 3.7 Photometric data shall be furnished for any fixture substituted for those listed on the schedule.
- 3.8 Any driver which produces a greater than normal amount of noise shall be replaced by the contractor. Normal will be determined by the level of sound produced by other similar fixtures operating in the area.

END OF SECTION

**SECTION 26 90 90**

**TESTING**

**PART 1 – GENERAL**

- 1.1 Upon completion of the electrical work, the entire installation shall be tested by the Contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer, Inspector and Owner.
- 1.2 All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer, Inspector and Owner.
- 1.3 In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer, Inspector and Owner.

**PART 2 – EXECUTION**

- 2.1 Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from "grounds," "short circuits," and any or all defects.
- 2.2 Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.
- 2.3 Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.
- 2.4 All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.
- 2.5 Test all motor and feeder circuits with a "megger" tester to determine that insulation values conform to Section 110-20, California Electrical Code (CED). Test reports must be submitted and approved by the engineer before final acceptance.
- 2.6 Test all grounding electrode connections to assure a resistance of no more than 10 ohms is achieved. Augment grounding until the ohmic value stated above is achieved. Provide certified test results to the Architect, Engineer and Inspector.

**END OF SECTION**

**SECTION 27 05 00**

**REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provide a standard defining the structured communications cabling systems to be installed within customer facility. The goal is to accomplish this in the most economic and systematic fashion possible, and in a manner compliant with the latest codes, cabling standards and industry best practices.
2. Scope of Work Compliance.
3. Sub-contractor Qualifications.
4. Warranty.
5. Safety.
6. Working Conditions.

**1.02 GENERAL TERMS AND CONDITIONS.**

- A. General Contractor is responsible for all required Division 27 scope of work and shall ensure all communication sub-tier sub-contractors adhere to the qualifications set forth in all project Division 27 specifications including project experience and certifications.
- B. Prices quoted shall be all-inclusive and represent a complete fully-engineered system installation at the Project site as contemplated by and detailed in the drawing package and in accompanying specifications.
- C. Omissions in the specification of any provision herein described shall not be construed as to relieve the sub-contractor of any responsibility or obligation requisite to the complete and satisfactory delivery, installation, operation and support of any and all systems, equipment or services. Correction of any omission on the part of the Sub-contractor, either due to misinterpretation of this specification or any other conditions of the project, shall be the responsibility of the Sub-contractor and shall not result in any contract modification or additional costs to Owner.
- D. Where conflicts and/or irregularities occur between project documents, specifications, drawings, and/or applicable codes, rules, regulations, ordinances, standards, guidelines and practices, the more stringent requirement shall apply as reasonably determined by Owner or government agency inspector.
- E. This specification represents the design intent for the project communicated by way of narrative descriptions of intended functionality and single line or detail drawings indicating likely equipment connectivity to achieve that functionality. The designs in this specification do not represent fully engineered technical solutions. Sub-contractors are required to review the designs presented in the project documents closely, submit any questions and clarifications regarding the design intent through the RFI process and develop their own engineered solutions representing a fully functional turn-key solution in their bid responses.

- F. The scope of this project includes the complete system engineering, procurement, fabrication, installation, programming, testing, training and warranty.
- G. Proposed solutions shall be based on the designs communicated in the specifications, but shall include any additional equipment, materials, software, licenses and/or labor required for the sub-contractor to deliver a fully functional turn-key system solution that meets intended operational performance requirements.
- H. It is the responsibility of the Sub-contractor awarded this project to ensure that all quantities, materials, labor, licenses, permits, sales taxes and any and all other costs to provide a turnkey project are included in their bid.
- I. Floor plans, drawings, elevation drawings, and other drawings received by the Sub-contractor as part of the construction process are hereby incorporated into this document by reference. It is the responsibility of the Sub-contractor to ensure that amounts and lengths of cabling and pathways are correct, and that all materials and labor are included to install the system per the drawings and these specifications.
- J. Permits, licenses, applicable sales taxes, insurance requirements, payment/performance bond costs, and other miscellaneous costs are the responsibility of the Sub-contractor and must be included in the contract price and this scope of work. Such items are to be listed separately on pricing sheets, if provided. Copies of all required permits, licenses, insurance requirements and bond(s) are to be delivered to Owner prior to commencement of any work.
- K. Installation Schedule and Coordination: Sub-contractor must take the fast-track nature of this project and potential requirement for installation/work schedule adjustments and quick turnarounds into consideration in constructing this project as Owner will NOT entertain or agree to added-cost change orders associated with scheduling changes.
- L. Work will need to be closely coordinated with architect, College Personnel, GC, MEP sub-contractors, structural sub-contractor and all low-voltage sub-contractors and each of their respective schedules.
- M. This will be a turnkey Project. Any item of the equipment or material not specifically addressed on the drawings, specifications or elsewhere in Division 27 specifications documents, but required to provide complete and functional systems as contemplated and/or specified herein, shall be provided at no additional charge to owner in a quantity and quality consistent with other specified items.
- N. Coordination with Project Design Team: The build sub-contractor will be responsible for coordinating all communications cabling infrastructure requirements, including review of existing site conditions, review and coordination of electrical power and grounding requirements, conduits and back boxes, structural support requirements, and coordination.
- O. Assembly: The sub-contractor shall procure and assemble all hardware and equipment and any additional materials as required to deliver the completely functioning communications cabling system and/or Audio Visual System.

- P. Installation: The sub-contractor shall install all equipment, inter-rack and intra-rack cable, wiring of equipment, connectors, panels, plates, and other material at the Project site.
- Q. Testing and Adjustment: The sub-contractor shall perform all tests and adjustments, furnish all test equipment necessary and perform all work required to properly configure the systems and to verify their performance in accordance with the information in this document and the design-build integrator's approved engineered designs.
- R. Warranty: The sub-contractor shall warrant the installed system in accordance with the terms of this document and accompanying contractual documents.

#### 1.03 RELATED DOCUMENTS

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings including but not limited to Telecommunication Drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

#### 1.04 REFERENCES

##### A. Abbreviations and Acronyms:

- 1. A/E: Architect / Engineer (designer)
- 2. BICSI: Building Industry Consulting Service International
- 3. EIA: Electronics Industry Alliance
- 4. ELFEXT Equal Level far End Cross Talk
- 5. FTP Foiled Twisted Pair
- 6. IDF: Intermediate Distribution Facility
- 7. ILEC/LEC: Incumbent Local Exchange Carrier
- 8. ISP: Inside Plant
- 9. IT: Information Technology
- 10. MDF: Main Distribution Facility
- 11. MPOE: Minimum Point of Entry
- 12. NEXT Near End Cross Talk
- 13. OSP: Outside Plant
- 14. PSELFEXT: Power Sum Equal Level far End Cross Talk
- 15. PSNEXT: Power Sum Near End Cross Talk
- 16. RCDD: Registered Communications Distribution Designer
- 17. TBD: To Be Determined
- 18. TCIM: Telecommunication Cabling Installation Manual
- 19. TDMM: Telecommunications Distribution Methods Manual
- 20. TIA: Telecommunications Industry Association
- 21. UTP: Unshielded Twisted Pair
- 22. WAP: Wireless Access Point.

1.05 APPLICABLE REGULATORY REFERENCES

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises



- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.

7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

## 1.06 SCOPE OF WORK

### A. General project information:

1. These Specifications and associated drawings are the governing document for the installation of the telecommunications infrastructure and includes project descriptions, specified and recommended products, installation and project management methods, the scope of work and elevation drawing specifications.
2. Through this division specification document, Palomar College will be referred to as the owner.
3. Owner wishes to contract with a General Contractor, who will sub-tier the supplier/sub-contractor ("ICT-Information and Communication Technology and AV-Audio Visual") to provide, install, test and warranty a complete turn-key Cable Infrastructure System and PA System for Owner's new North Education Center (NEC) the "Project" per the scope of work and specifications stated herein. This inquiry implies no obligation on the part of Owner. Sub-contractor shall bear all costs and expenses incurred in preparing a response a Request For Proposal ("RFP") and subsequent award of project, it being understood and agreed that Owner accepts no responsibility for any costs and/or expenses incurred by winning sub-contractor in preparing and submitting such response.
4. The Owner is developing a new multi-building Classroom village located at 35090 Horse Ranch Creek Road, Fallbrook, CA 92028. The NEC will be a newly developed site with 3 phasesn Phase 2, 3 and 4. Phase 2 will include site utilities/systems and parking lots. Phase 3 and 4 will include four (4) banks of multiple modular buildings. The (4) banks includes modulars consisting of the following:
  - a. Phase 3 - Administration modular building with College office space and student shared areas. The Administration Building will house the NEC MPOE/Server Room, supporting the NEC network requirements.
  - b. Phase 3 - General Classroom Modulars which will include one of the two village IDF's.
  - c. Phase 3 – Lecture, Computer Lab, Library and General Classroom modular buildings. These areas will consist of multiple double wide and single wide modular buildings. This area will include the second of the two village IDF's.
  - d. Phase 4 – Science Lab modular buildings with include two science labs and one lab prep room. All cabling from these modular buildings will be ran to IDF located with-in the General Classroom bank of modular buildings. See design drawings for reference.
5. The scope of work will include a complete AFL Dura-Line fiber optic air blown fiber system and category backbone between each of the IDF's and the main server room. Each building will have a Category 6A cable infrastructure and specialized PA cabling as required.

6. Contractor shall build out each MDF, IDF as shown on drawings. Administration Building will consist of a Main Server Room. Total of 3 communication rooms.
7. Station cable pathway will consist of cable J-hook in accessible ceilings areas or conduit to accessible ceiling areas.
8. Communication Outlet (Split delta) =In areas where cable will be installed in non-exposed format, electrical contractor shall provide 5" square deep junction box inside wall with single gang plaster ring and 1.25" conduit routed to accessible ceiling space. Cabling shall be run to the nearest TR. Outlet shall be mounted + 18" AFF (U.N.O.). Each outlet location shall have three (2) Category 6A, 4-pair cables and three (2) Category 6A, RJ-45 jacks (U.N.O.). Jacks shall be housed in a standard angled four port single gang wall faceplate with matching blanks for used ports. Color to match the wall paint color as close as possible. Wall plate color will be approved by architect prior to installation of faceplate.
9. Communication Outlet (Split delta) w/# =In areas where cable will be installed in non-exposed format, electrical contractor shall provide 5" square deep junction box inside wall with single gang plaster ring and 1.25" conduit routed to accessible ceiling space. Cabling shall be run to the nearest TR. Outlet shall be mounted + 18" AFF (U.N.O.) Each outlet shall have a category 6A, 4-pair cables and a category 6, RJ-45 jacks per the number indicated on the drawings. (#6=6 cables/Jacks) Jacks shall be housed in a standard angled four port single gang wall faceplate with matching blanks for used ports. Color to match the wall paint color as close as possible. Wall plate color will be approved by architect prior to installation of faceplate
10. Flush floor mounted outlet (split delta with-in square) = electrical contractor shall provide two 1-1/4" conduit routed to accessible ceiling space Electrical contractor shall provide floor box with cover flush in the floor, fire sealing, conduit pathway and pull string. Communication contractor shall provide all cable and connectivity hardware. Cabling shall be run to the TR location as indicated on the drawings. Each outlet shall have a category 6A, 4-pair cables and a category 6, RJ-45 jacks per the number indicated on the drawings. For conference room, office locations, or any floor boxes not showing a number next to the symbol, Communication contractor shall provide four (2) Category 6A MTP cables and four (2) Category 6A RJ-45 jacks mounted inside the floor box. Blank off all unused ports. Communication contractor is responsible to provide faceplate inside floor box.
11. Installation of Copper UTP Category 6A cabling as indicated on drawings.
12. Provide fiber optic, category patch cables and copper cross connections for both ends of communication link. Patch cable installation will be part of this scope of work.
13. Install 6 strand Single-Mode optical fiber air-blown backbone cabling backbone cable between MDF and each Building IDF room as indicated on drawings. MDF will act as MPOE.
14. Install Category 6 OSP backbone cabling between MDF and each Building IDF room as indicated on drawings.
15. Sub-contractor shall provide proper slack loops in each communication vault, minimum of 50' and a minimum of 15' in pull boxes, slack loops required only if they will meet manufacturer bend radii requirements.
16. Sub-contractor shall provide/install fire caulk in all conduits with cable as required, UL listed rated fire system where applicable.
17. Sub-contractor shall label all new cable at both termination points, within all communication vaults and/or pull boxes. Cable bundles shall be labeled where ever it is accessible including origin/destination and system information.

B. Purpose:

1. This specification defines quality standards and practices common to all network cabling for NEC project. In addition, said project will have Requests for Proposals (RFP), associated drawings and requirements pertaining to their specific environments. Such collateral will be referred to in this document as "Project Specific Documentation" or simply "Construction Documents".
2. Voice and Data Networks encompass a broad spectrum of technologies and are distributed into project internal spaces. Installed cables will be used for Ethernet, high and low speed data applications, used in analog and digital voice, not to exclude other future Voice/Data technologies. This specification will include indoor/outdoor cable installations, and backbone cabling, telecommunications closet and equipment cabling, equipment hardware as well as routing and support infrastructure.
3. It is the responsibility of the installing sub-contractor to evaluate these general recommendations and adapt them effectively to actual projects. Sub-contractor is responsible for identifying and bringing to the attention of any design directions that may be in conflict or otherwise improved. All such conflict resolutions shall be in writing from A/E or owner.
4. Note that while many portions of this global specification are addressed to "The Sub-contractor", these requirements apply equally to anyone doing the network cabling and infrastructure work within, whether those persons are outside sub-contractors or persons directly employed by the owner.
5. Sub-contractor shall be solely responsible for all parts, labor, testing, documentation and all other associated processes and physical apparatus necessary to turn-over the completed system fully warranted and operational for acceptance by A/E.
6. This specification includes structured cabling design considerations, product specifications and installation guidelines for low-voltage network systems and associated infrastructure including, but not limited to:
  - a. Cabling Sub-system 1 – Horizontal
    - 1) Category 6A cable
    - 2) Work area (equipment outlet) appliances and configuration
    - 3) Horizontal Pathways
    - 4) Copper Patching
  - b. Fiber Backbone Cabling
    - 1) Interbuilding backbone
    - 2) Fiber Patching
  - c. Telecommunications Spaces
    - 1) Telecommunications Room Requirements
    - 2) Racks and Cabinets
    - 3) Overhead Pathways
  - d. Communications Grounding Systems
  - e. Communications Labeling and Administration

C. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such

documents shall be available through the General Contractor or Construction Manager.

2. New NEC project schedule will include, but are not limited to, the following task sequence:
  - a. Conduit infrastructure; including vaults/pullbox install and conduit duct banks.
  - b. New MDF, IDF Construction and buildout.
  - c. Service provider cabling and equipment installation.
  - d. Service provider completion and commissioning.
  - e. Individual Building Pathway Installation.
  - f. New backbone fiber optic cabling installations; includes install, termination, labeling, testing, as-built and warranty documentation.
  - g. Building Category and AV Cable installations; includes install, termination, labeling, testing, as-built and warranty documentation.
  - h. Audio Equipment installation.

#### 1.07 SUB-CONTRACTOR QUALIFICATIONS

##### A. General:

1. Sub-contractor shall have at least 5 years of experience installing and testing structured cabling systems.
2. Sub-contractor shall employ at least one BICSI Registered Communication Distribution Designer (RCDD), and the RCDD shall sign-off on all designs offered, including stamping the design with their current BICSI/RCDD stamp.
3. Sub-contractor shall have the responsibility to obtain any of the necessary permits, licenses, and inspections required for the performance of data, voice, and fiber optic cable installations.
4. Contactor shall be a current manufacturer Certified Installer certificate. A copy of corporate certificate must be included with quote.
5. Sub-contractor shall have service facilities within 50 miles of project location.
6. At least 75 percent of the technicians on the job must have a current manufacturer Certified Copper Technicians certificate to install manufacturer Copper Distribution Systems.
7. At least 75 percent of the technicians installing any Fiber Distribution Systems must have a current manufacturer Certified Fiber Technicians certificate to install Fiber Distribution Systems.
8. The Telecommunications sub-contractor must provide a project manager to serve as the single point of contact to manage the installation, speak for the sub-contractor and provide the following functions:
  - a. Initiate and coordinate tasks with the Construction Manager and others as specified by the project schedule.
  - b. Provide day to day direction and on-site supervision of Sub-contractor personnel.
  - c. Ensure conformance with all contract and warranty provisions.
  - d. Participate in weekly site project meetings.
  - e. This individual will remain project manager for the duration of the project. The sub-contractor may change Project Manager only with the written approval of A/E.

##### B. References:

1. Communications Sub-contractor shall provide with bid a list of three reference accounts where similar Data, Voice, Fiber Optic Cable, and related migration/cutover equipment installation work was performed within the last year or twelve-month period.

C. Insurance Requirements:

1. Sub-contractor must be insured and shall provide with bid a Certificate of Indemnification, Certificate of Insurance, and meet all required insurance and licensing policies as specified by A/E Risk Management Division and any Federal, State, and local organization pertaining to data, voice and fiber optic cable installation.
2. Sub-contractor's vehicles brought onto project properties, shall comply with all requirements of all Federal, State, and local agencies. Vehicles shall meet current DOT, state and local, safety inspections where required.

D. Termination of Services:

1. Owner or A/E reserves the right to terminate the Communication Sub-contractor's services if at any time the A/E determines the Communication Sub-contractor is not fulfilling their responsibilities as defined within this document.
2. Sub-contractor's appearance and work ethics shall be of a professional manner, dress shall be commensurate with work being performed.
3. Dress displaying lewd or controversial innuendos will strictly be prohibited.
4. Conduct on project property will be professional in nature.
5. Any person in the Sub-contractor's employ working on a project considered by to be incompetent or disorderly, or for any other reason unsatisfactory or undesirable, such person shall be removed from work on the project.
6. The Communications Sub-contractor shall be restricted from the premises and compensated for the percentage of work completed satisfactorily.

E. Other Sub-Contractor Responsibilities

1. Sub-contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job. All work areas will be cleaned at the conclusion of the workday and no tools or materials shall be left in a manner as to pose a safety hazard.
2. Sub-contractor must remove all abandoned cable per Article 800 of the National Electrical Code and per TIA and BICSI standards, recycling these materials where possible. This is mandatory; Sub-contractors must consider this when placing bids.
3. Sub-contractor shall abide by the regulations set by A/E or Owner Security Department pertaining to access to and conduct while on project property and shall obey speed limits and parking regulations.

1.08 SYSTEM PERFORMANCE WARRANTY

A. General

1. Sub-contractor shall provide a manufacturer System Warranty on all copper and fiber permanent cabling links.
2. This is a system performance warranty guaranteeing for a minimum of 20 years from acceptance that the installed system shall support all data link protocols for which that copper Category or fiber OS designation is engineered to support according to IEEE and TIA standards.

3. The manufacturer System Warranty may be invoked only if the cabling channel links are comprised of manufacturer connectivity and approved by the manufacturer. Patch cords must be same manufacturer of cable.
4. Upon acceptance of Warranty, manufacturer will mail a notification letter to the installer and a notification letter and warranty certificate to A/E.

B. Sub-Contractor Warranty Obligations

1. Installation firm must be a current manufacturer Certified Installer in good standing and shall include a copy of the company certification with the bid.
2. Sub-contractor shall name a supervisor to serve on site as a liaison responsible to inspect and assure all terminations are compliant to factory methods taught in manufacturer Technician Certification Training and according to all Standards cited in the Regulatory References section of this document.
3. Sub-contractor liaison shall have a current, up-to-date manufacturer Certified Technician certificate in both copper and fiber. Copies of the copper and fiber certificates of the manufacturer liaison shall be submitted with the bid.
4. Sub-contractor agrees all components comprising active links shall be of the same copper Category or fiber OS/OM designation as the system being installed. Sub-contractor shall under no circumstances mix different Categories or OS classes of cable or termination devices (connectors) within the same link or system.
5. Sub-contractor shall install all racking and support structures according to cited TIA Standards in such fashion as to maintain both Standards and Manufacturer recommendations for uniform support and protection, segregation of different cable types, maintenance of maximum pulling tensions, minimum bend radius, approved termination methods as well as adhering to industry accepted practices of good workmanship.
6. Sub-contractor is responsible for understanding and submitting to manufacturer all documents required prior to project start to apply for this warranty. These include but are not limited to the project information form and SCS warranty agreement.
7. Sub-contractor is responsible for understanding and submitting to manufacturer all documents required at project end. These include completed warranty forms, passing test reports and drawings of floor plans showing locations of links tested.
8. Test results shall be delivered in the tester native format (not Excel) and represent the full test report. Summaries shall not be accepted. Contact manufacturer for a current list of approved testers, test leads and latest operating systems.
9. The Communications Sub-contractor will correct any problems and malfunctions that are warranty-related issues without additional charge for the entire warranty period. The warranty period shall commence following the acceptance of the project by A/E and written confirmation of Warranty from manufacturer.

1.09 SAFETY

A. General

1. All cabling work being performed on project property or under contract to Technology Department must comply with Rules for safe operations, any state or local safety regulations and meet the requirements of OSHA Safety and Health Standards. The sub-contractor Project Manager will maintain a copy of Rules for Safe Operations for reference. It is the responsibility of the Communications Sub-contractor to immediately correct any unsafe working practices on the part of sub-contractor personnel. Unsafe working environments or conditions created by sub-contractor personnel will be reported immediately to the Construction Manager.

2. Any liability for correction of conditions created by the sub-contractor's personnel rests with the sub-contractor.
3. The Communications Sub-contractor shall be solely and completely responsible for conditions of the job site (as pertaining to the materials and equipment specified), including safety of persons and property during performance of work.
4. No act, service, drawing review or construction observance by any employee, representative or engineer may be construed as a review or approval of the adequacy of the Sub-contractor(s) safety measures, in, on, or near the construction site.

#### 1.10 WORKING CONDITIONS

##### A. Site Access

1. All cable installations must be pre-approved by the Construction Manager to ensure that the necessary arrangements have been made for proper access to project sites.
2. A twenty-four-hour prior notice shall be submitted to the Construction Manager for any work schedule changes.
3. Communications Sub-contractor shall display badges or passes as mandated by project property Security Department Rules and Regulations.

##### B. Scheduling

1. Coordination of site surveys and the issue of project owner owned materials and equipment will be the responsibility of the Construction Manager. Once said equipment and materials are in the Sub-contractor's possession, it is the Sub-contractor's to safeguard the material and equipment from damage or theft.
2. Information required by the Sub-contractor to price and complete a defined scope of work will be furnished to the Communications Sub-contractor by the A/E Project Manager in a Scope of Work document and at the time of the site survey (if necessary) and will be maintained by the Communications Sub-contractor until the completion of the job.
3. It is the Sub-contractor's responsibility to begin work promptly according to the Start Dates and to complete work by the Proposed Completion Date listed on the Cable Run Request Form.
4. The Sub-contractor must notify the Construction Manager in writing of any delays; at that time, they shall come up with a mutually agreeable project schedule.
5. The Communications Sub-contractor will coordinate with the Construction Manager working hours and job site access issues.
6. The Communications Sub-contractor will coordinate with the Construction Manager to minimize outages to the existing systems.
7. Any service interruption required by the Communications Sub-contractor must be requested in writing, and scheduled with the Construction Manager.
8. The Communications Sub-contractor shall not proceed with the requested service interruption until written approval is granted by the Construction Manager.
9. All problems, and questions relating to a particular job, will be referred to the Construction Manager and no changes shall be made without his/her written approval.

##### C. Harmony Clause

1. Sub-contractor shall coordinate and work in harmony with other trades on the project as well as with A/E personnel.



1.11 COORDINATION

- A. Coordinate layout and installation of voice, data, and video communication cabling with other sub-contractors and equipment suppliers.
  - 1. Meet jointly with other sub-contractors, equipment suppliers, and representatives to exchange information and agree on details of equipment arrangements and installation interfaces.
  - 2. Record agreements reached in meetings and distribute to other participants.
  - 3. Adjust arrangements and locations of distribution frames, cross-connect and patch panels in equipment rooms and telecommunications rooms to accommodate and optimize arrangement and space requirements of voice and LAN equipment.
  - 4. When indicated on drawings, sub-contractor shall reuse existing copper and fiber optic backbone cables.
  - 5. Provide weekly progress reports and crew schedules to project representatives by 5:00 PM, Thursday of each project work week.

1.12 ACTION SUBMITTALS

- A. Product Data: For each product indicated.
  - 1. Submit all product data in accordance with general requirements of the construction documents.
  - 2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
  - 4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.13 Information & COmmunication Technology (ICT) components

- A. The Contract Documents generally outline industry standard components to be installed as part of the project ICT installation requirements. Such identification is intended to be general in nature rather than exhaustive. All stated quantities are subject to validation by ICT Sub-contractor. ICT Sub-contractor is reminded that differences between estimated quantities and those reasonably derived based from the Contract Documents (as well as through bid conferences, job walks, addendums, and other distribution of information) shall be the responsibility of the ICT Sub-contractor. There shall be no additional cost incurred by Palomar College NEC project for not complying with the specifications and requirements of the Contract Documents.
- B. Any variance from those components identified on the drawings and/or below shall be submitted to Palomar College NEC project representatives for approval prior to ordering and installation; the risk for all costs incurred by the ICT Sub-contractor for materials ordered prior to such written approval shall be borne entirely by the ICT Sub-contractor. Nonetheless, it is imperative that the ICT Sub-contractor determine the availability of necessary materials and propose equivalent substitutes as necessary to meet all

installation milestones. Delays in ICT installations due to lack of product availability are unacceptable. As catalog numbers change frequently, the ICT Sub-contractor must verify all part numbers prior to ordering materials. Clarifications will be issued in response to written Requests for Information (RFI).

- C. All new fiber optic cabling, will be Air-Blown Fiber indoor/outdoor rated. Any unrated cable (such as filled ASP) shall not be installed within the structure except when placed within IMT, PVC or RGS conduit.
- D. Throughout this specification, Dura-Line, Berk-Tek, Leviton, Chatsworth Products, Inc. and other manufacturers are cited. These citations are for the purpose of establishing quality, performance, warranty certification criteria and are campus standards.

#### 1.14 DELIVERY AND STORAGE

- A. ICT Sub-contractor shall provide a materials schedule prior to the start date of cable installation. Material schedule shall specify all material quantities and their delivery date for this project.
- B. ICT Sub-contractor shall provide protection from weather, moisture, dirt, dust and other contaminants for telecommunications cabling and pathway equipment placed in storage.

#### 1.15 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
  - 1. Submit all shop drawings in accordance with the general requirements of the construction documents.
  - 2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
  - 4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.
- B. Certificates:
  - 1. Submit management and installation team reference documentation verifying:
    - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
    - b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents.
- C. Qualification Statements:
  - 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

#### 1.16 CLOSEOUT SUBMITTALS

- A. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference.
3. Communication sub-contractor to print, frame and mount approved as-built drawings in MPOE. Coordinate location with A/E.

#### 1.17 QUALITY ASSURANCE

##### A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

##### B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.01 EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

##### 3.02 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

##### 3.03 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

SECTION 27 05 26

GROUNDING BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Specifications for grounding and bonding components utilized to provide proper grounding and bonding for telecommunications cabinets, racks, cable tray, ladder tray, cable and equipment.
2. Grounding and bonding components with design criteria.

1.02 RELATED DOCUMENTS

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

1.03 REFERENCES

A. Abbreviations and Acronyms:

1. A/E: Architect / Engineer (designer)
2. AHJ: Authority Having Jurisdiction
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. TDMM: Telecommunications Distribution Methods Manual
6. TIA: Telecommunications Industry Association
7. UL: Underwriters Laboratory

1.04 APPLICABLE REGULATORY REFERENCES

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant

- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
- v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
- w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
- y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
- z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises

- aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
- bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
- 2. ISO/IEC
  - a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
- 3. National Electric Codes
  - a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
- 4. OSHA Standards and Regulations – all applicable
- 5. Local Codes and Standards – all applicable
- 6. BICSI
  - a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
- 7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
- 8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
- 9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

## 1.05 ADMINISTRATIVE REQUIREMENTS

### A. Coordination:

- 1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs

or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
  - b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

#### 1.08 CLOSEOUT SUBMITTALS

##### A. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

#### 1.09 QUALITY ASSURANCE

##### A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

##### B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

### PART 2 - PRODUCTS

#### 2.01 GROUNDING AND BONDING

##### A. Basis-of-Design Product: Subject to compliance with requirements, provide manufacturer or comparable product by one of the following:

1. CPI
2. B-Line
3. Circa
  - a. Part Number 1890ECT1-25
  - b. CAT6 604 Series

##### B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the infrastructure requirement.

##### C. Description:

1. Sub-contractor is responsible for bonding to ground all newly placed equipment and installed racks or cabinets per the TIA 607-B Standard.

### PART 3 - EXECUTION



3.01 EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

3.02 INSTALLATION

A. Process:

1. All newly installed racks and cabinets shall have installed a vertical busbar mounted along one equipment rail to serve as a clean, low-resistance bonding place for any equipment not equipped with a designated grounding pad.
2. Smaller equipment without an integrated grounding pad shall be bonded to the vertical busbar using a thread-forming grounding screw that is anodized green and includes serrations under the head to cut through oxidation or paint on the equipment flange.
3. Larger equipment (chassis switches) with a designated grounding terminal shall be bonded to the vertical busbar with an EBC (equipment bonding conductor) kit built to that purpose.
4. All grounding wire shall be a minimum #6 AWG stranded annealed ground wire, PVC sheathed with nylon. Meets UL83 for THHN or THWN and UL1063.
5. All OSP cabling terminated within new campus MDF shall be terminated to a Building Entrance Terminal with gas fuses.
6. Sub-contractor shall take care to clean (wire brush, scotchbrite pads) any metallic surface to be bonded down to bare metal and apply a film of anti-oxidation paste to the surfaces prior to effecting the bond.
7. All bonding lugs on racks and busbars shall be of two-hole irreversible compression type. Mechanical lugs and single-hole lugs will not be accepted and shall be removed and replaced at Sub-contractor's expense.
8. Every rack or cabinet shall have an individual bonding conductor into the grounding network. Serially connecting (daisy-chaining) of racks is expressly forbidden and will not be accepted.
9. Rack Bonding Conductors (RBC) may tap into an overhead or underfloor aisle ground, or may run to the wall-mounted grounding busbar in smaller Telecommunications rooms containing 5 racks or less.
10. Armored cables shall be properly bonded to the earthing system with a kit built to that purpose.
11. All metallic conduit stub-ups shall be grounded, and where multiple stub-ups are made within an equipment enclosure, they shall be equipped with grounding bushings and bonded together and to the enclosure and the enclosure ground bus.
12. Each metallic raceway, pipe, duct and other metal object entering the buildings shall be bonded together. The Sub-contractor shall use #6 AWG green insulated copper conductors.
13. Each identified telecommunications space within a building shall have a common signal reference ground. The signal reference ground shall conform to the following:
  - a. Within the building, all communication spaces shall be separately bonded to each other and connected to the primary building ground in accordance with the provisions of EIA/TIA 607. The communication ground shall not ground any other equipment or be connected to any potential high voltage source.

All racks, frames, drain wires, and all installed communication equipment shall only be grounded to this common reference ground with a minimum size #6 AWG green insulated copper wire.

- b. The Sub-contractor shall provide, as a minimum, a continuous #3/0 AWG copper electrical conductor connected to a 1/4" x 4" x 12" telecommunications grounding bus bar (TGB) 6" AFF on the plywood backboard of each IDF (or telecommunication space) to terminate chassis and other equipment grounds.
  - c. The ground wires from each individual IDF shall be routed directly to the Building Distribution Frame (BDF), terminated and bonded together via a telecommunications main grounding bus bar (TMGB) of minimum 1/4" x 4" x 20" dimensions. This point of single reference for all closets in a building shall in turn be grounded with a minimum #3/0 AWG ground conductor to the main building ground. If a main building ground is unavailable, the ground wire from the BDF shall be grounded to the nearest electrical panel ground bus bar. The building ground for signal reference shall be the building service entrance ground.
14. Ground Bus Bar Identification.
- a. The master ground bar shall be labeled as such.
  - b. Each subsidiary ground bar shall be labeled as such and have a unique identifier.
  - c. All ground bars shall have a warning label that states, "If this connector or cable is loose or shall be removed, please call the Telecommunications Manager." All ground bars will be connected to the building ground with continuous "3/0" AWG wire.
  - d. Each ground cable shall be labeled with a unique identifier.

### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

### 3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner.

**END OF SECTION**

**SECTION 27 05 28**

**HANGER AND SUPPORTS FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Provides specifications for non-continuous cable support components utilized to provide pathways support to telecommunications cables traveling outside cable trays, conduits, or other continuous cable supports.
  - 2. Non-continuous cable supports.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

**1.03 REFERENCES**

- A. Abbreviations and Acronyms:
  - 1. A/E: Architect / Engineer (designer)
  - 2. AHJ: Authority Having Jurisdiction
  - 3. BICSI: Building Industry Consulting Service International
  - 4. EIA: Electronics Industry Alliance
  - 5. TDMM: Telecommunications Distribution Methods Manual
  - 6. TIA: Telecommunications Industry Association
  - 7. UL: Underwriters Laboratory
- B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)
  - 1. National Electric Safety Code (NEC) – 2017
  - 2. National Fire Protection Association (NFPA)
  - 3. 2017 California Electrical Code
  - 4. 2017 California Building Code
  - 5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.

- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
- y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
- z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
- aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
- bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
- 2. ISO/IEC
  - a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2011 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
- 3. National Electric Codes
  - a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
- 4. OSHA Standards and Regulations – all applicable
- 5. Local Codes and Standards – all applicable
- 6. BICSI
  - a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
- 7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
- 8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
- 9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

1.10 WARRANTY

A. Warranty:

- 1. Sub-contractor shall provide a 25 year System Warranty on all copper and fiber permanent cabling links.
- 2. This is a system performance warranty guaranteeing for 25 years from acceptance that the installed system shall support all data link protocols for which that copper Category or fiber OM/OS designation is engineered to support according to IEEE and TIA standards.
- 3. The System Warranty may be invoked only if the cabling channel links are comprised of approved cable infrastructure connectivity and approved cable. Patch cords must be manufactured by same approved cable and/or connectivity system.
- 4. Upon acceptance of Warranty, manufacturer will mail a notification letter to the installer and a notification letter and warranty certificate to A/E.

PART 2 - PRODUCTS

2.01 NON-CONTINUOUS CABLE SUPPORTS

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. Erico – Caddy CableCat Support System

2. Copper/BLine – Cable Hook System
  3. CEAS Attachments – Stiffy Series
  4. Or Equal
- B. Product Options:
1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirement.
    - a. Stiffy Series 200 with comfort cradle Low Voltage supports
    - b. Four inch (0'4") Cat214z34, two inch (0'2") J-Hook Supports Cat324z34
- C. Description:
1. Non-continuous cable supports shall be available in multiple sizes, styles and materials. Rigid supports shall be equipped with flared edges and pre-configured bend radius controls.
  2. Provide drop wire supports and threaded rod assemblies in areas where structural mounting surfaces are non-functional or inaccessible.
  3. Support assemblies shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance UTP and optical fiber cables.
  4. Non-continuous cable supports sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be reusable.
  5. Select approved non-continuous cable supports suitable for specific installation environments and/or air handling (plenum) spaces.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

### 3.02 INSTALLATION

- A. Process:
1. Follow manufacturer's instructions and recommended industry standards and guidelines.
  2. The installed non-continuous support system must be an independent support structure for the voice/data communication system.
  3. Draping cables over other structures in the ceiling is unacceptable. Water pipes, ceiling grid, sprinkler system, electrical supports, air ducts or any other in-ceiling structure may not be used for cable support.
  4. Sub-contractor installed supports shall be used to supplement the main cable support system when any cabling leaves the main support system or is unsupported for more than three and one half feet (3'-5'-0") feet.
  5. Non-continuous supports shall be installed with rod stock or threaded rod secured to the slab above to support the telecommunications cable infrastructure parallel to the slab throughout the cable plant, unless site conditions dictate a non-parallel installation.
  6. Cable must be routed to follow existing corridors and parallel or 90 degree angles from all walls and the cable tray whenever possible.



7. All pathways shall avoid electromagnetic interference (EMI). Cable that is distributed in partially-enclosed metallic pathways shall be routed with the following minimum clearances:
  - a. Four (4) feet from motors or transformers.
  - b. One (1) foot from conduit and cables used for electrical power and distribution.
  - c. Five (5) inches from fluorescent lighting.

**3.03 RE-INSTALLATION**

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

**3.04 CLOSEOUT ACTIVITIES**

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 05 33**

**CONDUITS AND BOXES FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for conduit pathways, back boxes and pull box enclosures utilized for the distribution and housing of telecommunications cabling and components:
2. Telecom EMT conduit and boxes

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. A/E: Architect / Engineer (designer)
2. ANSI: American National Standards Institute
3. AHJ: Authority Having Jurisdiction
4. BICSI: Building Industry Consulting Service International
5. EIA: Electronics Industry Alliance
6. TDMM: Telecommunications Distribution Methods Manual
7. TIA: Telecommunications Industry Association
8. UL: Underwriters Laboratory

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Safety Code (NESC) – 2017
2. National Fire Protection Association (NFPA)
3. 2017 California Electrical Code
4. 2017 California Building Code
5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.

- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
    - a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
    - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
  3. National Electric Codes
    - a. National Electrical Code (2017)
    - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
    - c. ANSI/IEEE C2-207, National Electrical Safety Code®
    - d. National Electrical Code (NEC) (NFPA 70)
  4. OSHA Standards and Regulations – all applicable
  5. Local Codes and Standards – all applicable
  6. BICSI
    - a. Telecommunications Distribution Methods Manual, 13th Edition
    - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
    - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
    - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
    - e. Network Systems and Commissioning (NSC) reference, 1st Edition
    - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
    - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
    - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
    - i. AV Design Reference Manual, 1st Edition
    - j. Network Design Reference Manual, 7th Edition
    - k. Outside Plant Design Reference Manual, 5th Edition
    - l. Wireless Design Reference Manual, 3rd Edition
    - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
  7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
  8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
  9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of six (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of six (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

PART 2 - PRODUCTS

2.01 CONDUIT AND BACKBOXES

- A. EMT conduit
  - 1. Wheatland Tube
  - 2. Appleton
  - 3. Crouse-Hinds
  - 4. Or equal.
  
- B. PVC conduit
  - 1. JM Eagle
  - 2. Electro Flex
  - 3. Or equal
  
- C. Pull boxes
  - 1. Hoffman Engineering Co,
  - 2. Or equal.
  
- D. Back Boxes
  - 1. Randl Industries – 5 Square Outlet Box- 2.875 Deep with Management
    - a. Part Number T-55017

2.02 TELECOMMUNICATIONS CONDUIT AND BACKBOXES

- A. Electrical Metallic Galvanized Tubing and Fittings with natural finish for all conduits not exposed: ANSI C80.3 with compression-type fittings.
  
- B. Indoor Pull boxes: Galvanized steel, screw cover pull box. Grey polyester powder coat finish inside and out. NEMA Type 1. Pull boxes to be sized per NEC code to accommodate the number of EMT conduits as shown on Telecom drawings with adequate clearances, access and cable management space.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

3.02 INSTALLATION

- A. Pull boxes:
  - 1. Install Pull boxes in easily accessible locations.
  - 2. Install Horizontal cabling boxes immediately above suspended ceilings.
  - 3. A pull box should not be used in lieu of a bend.
  - 4. Conduits that enter the pull box from opposite ends with each other should be aligned.

5. For direct access to a box located above inaccessible ceilings provide a suitable,

Conduit Trade Size	Pull box Width (in.)	Pull box Length (in.)	Pull box Depth (in.)	Pull box Width for Additional Conduit
1	4	16	3	2
1	6	20	3	3
1	8	27	4	4
2	8	36	4	5
2	10	42	5	6
3	12	48	5	6
3	12	54	6	6
4	15	60	8	8

marked, hinged access panel (or equivalent) in the ceiling. This access panel can also serve as the cover for the box.

6. Pull box sizing table:

B. Back Boxes

1. Provide 4-11/16" H X 4-11/16" W X 2-1/8" D outlet back boxes at all telecom outlet locations shown on drawings. Provide (1) 1-1/4" conduit from back box to telecom room or pull box except as otherwise noted. All connectors and couplings shall be zinc-plated steel set screw type. Die cast zinc fittings are not to be used. Provide bushing on ends of all conduits. Provide pull string in all conduits.
2. Provide single gang plaster ring on all communications outlet back boxes, unless indicated otherwise.
3. Provide bonding to cable tray pathways.

C. Conduit support and bracing:

1. Coordinate layout and installation of conduits and pull boxes with other trade conditions to ensure adequate clearances, access and cable management.
2. Install and provide support for EMT conduits and pull boxes in accordance with the latest edition of the NEC code, as well as all state and local codes and requirements. Coordinate installation and location with existing conditions. Notify and get the Owners Representative approval before installing conduits and pull boxes where the location need to deviate from the contract documents.
3. Install conduits above ceilings at height to provide access to pull. Install conduits and pull boxes level and square and at proper elevations. Ensure adequate clearances, access and cable management.
4. Use fittings and support devices compatible with conduits and pull boxes and suitable for use and location. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four.
5. Install individual and multiple trapeze hangers and riser clamps as necessary to support the conduits. Provide U-bolts, clamp attachments and other necessary hardware for hanger assemblies and for securing hanger rods and conduits. Space supports for conduits on maximum 10-foot centers.
6. Provide and install expansion or deflection fittings for conduits runs at all instances at seismic or expansion joints to allow for movement in any direction.

D. Conduit routing, bends and radius guidelines:

1. If the conduit has an internal diameter of 2 inches or less the bend radius must be at least 6 times the internal conduit diameter.

2. If the conduit has an internal diameter of more than 2 inches the bend radius must be at least 10 times the internal conduit diameter.
3. Conduit bends should be smooth, even, and free of kinks or other discontinuities that may have detrimental effects on pulling tension or cable integrity during or after installation.
4. If a conduit run requires more than two 90 degree bends then provide a pull box between sections with two bends or less.
5. If a conduit run requires a reverse bend (between 100 degrees and 180 degrees) then insert a pull point or pull box at each bend having an angle from 100 degrees to 180 degrees.
6. Consider an offset as equivalent to a 90 degree bend.
7. A pullbox shall not be used as a 90 degree bend.
8. Achieve the best direct route with no bend greater than 90 degrees or an aggregate of bends in excess of 180 degrees between pull points or pull boxes.
9. Contain no continuous sections longer than 100 ft.
10. For runs that total more than 100 ft. in length, pull points or pull boxes should be inserted so that no segment between points/boxes exceeds the 100 ft. limit.
11. Withstand the environment to which they will be exposed.
12. Conduits should not be routed through areas in which flammable material may be stored or over or adjacent to boilers, incinerators, hot-water lines and steam lines.
13. Keep conduits at least 6' away from parallel runs of steam, hot water pipes or mechanical ductwork.

E. Conduit Terminations

1. Join conduits with fittings designed and approved for the purpose. Make the joints tight without protruding lips that can snag cable pulling inside the conduits.
2. Where conduits are terminated with locknuts and bushings align the conduit to enter squarely and install the locknuts with dished part against the box. Use two locknuts, one inside and one outside the box.
3. Ream all conduit ends and fit them with an insulated bushing to eliminate sharp edges that can damage cables during installation or service.
4. Conduits that enter a telecom room should terminate near the corners to allow for proper cable racking.
5. Terminate conduits that protrude through the structural floor 3 inches above the surface.
6. Maintain the integrity of all fire stop barriers for all floor or wall penetrations.

F. Provide grounding and bonding for conduits and pull boxes as indicated by NEC code and instructed by manufacturer.

G. Conduits shall be clearly labeled at both ends designating the opposite locations(s) served. The numbering scheme shall be room number plus a suffix to guarantee uniqueness, e.g., 143-1. Labeling must be machine generated.

H. Conduit Protection:

1. Remove burrs, dirt and construction debris from conduits and pull boxes.
2. Conduits should be left capped for protection.
3. Provide final protection and maintain conditions in a manner acceptable to the Owners Representative to ensure that coatings, finishes and pull boxes are without damage or deterioration at completion. Repair damage to galvanized finishes with zinc-rich paint recommended by the manufacturer.



3.03 ACCEPTANCE

- A. All specified conduits and pull boxes indicated on the drawings and specifications shall be complete.
- B. Specified shop drawings and product submittals shall have been submitted for review and all review comments and deficiencies shall have been resolved. Final shop drawings and product submittals shall have been submitted, reviewed and found to meet the requirements of the specifications.
- C. Issues and deficiencies identified in field reports and punch lists shall have been resolved. Final as-built drawings shall have been submitted, reviewed and found to meet the requirements of the specifications.
- D. Sub-contractor shall provide written notice of final completion of the telecom infrastructure. Upon receipt, the Owner's Representative will review/observe the completed installation. Once the Owner's Representative is satisfied that all work is in accordance with the Contract Documents, the Sub-contractor will be notified in writing.

3.04 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work
- B. CLOSEOUT ACTIVITIES
- C. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- D. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 05 53**

**IDENTIFICATION FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Provides specifications information for identification of the various components of the telecommunications infrastructure and pathway system.
  - 2. Labeling and identification.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

**1.03 REFERENCES**

- A. Abbreviations and Acronyms:
  - 1. ANSI American National Standards Institute
  - 2. BICSI: Building Industry Consulting Service International
  - 3. EIA: Electronics Industry Alliance
  - 4. IDF: Intermediate Distribution Facility
  - 5. MDF Main Distribution Facility
  - 6. RCDD: Registered Communications Distribution Designer
  - 7. TCIM: Telecommunication Cabling Installation Manual
  - 8. TDMM: Telecommunications Distribution Methods Manual
  - 9. TIA: Telecommunications Industry Association
- B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)
  - 1. National Electric Safety Code (NESC) – 2017
  - 2. National Fire Protection Association (NFPA)
  - 3. 2017 California Electrical Code
  - 4. 2017 California Building Code
  - 5. Local Municipal Codes.

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.

- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Safety Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents.

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:
- 3. Communication sub-contractor to print, frame and mount approved as-built drawings in MPOE. Coordinate location with A/E.

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 IDENTIFICATION LABELS

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. Leviton – System
- 2. Brady Label System
- 3. Brother Label System
- 4. Or Equal

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

C. Description:

- 1. In new installations (Greenfield), Sub-contractor shall develop and submit for approval a labeling strategy based on the TIA 606-B Circuit Designation and Labeling Standard.
- 2. All labels shall be machine-manufactured by a labeling machine. Handwritten labels will not be accepted for final labeling.
- 3. The intention of the labeling scheme is to be TIA/EIA 606-B compliant.

4. It is the responsibility of the sub-contractor to acquire, understand, and utilize the owner's labeling scheme for all component of the voice data communications system.
  5. It is the responsibility of the sub-contractor to provide labels sized to show the Owner's labeling scheme in readable font size while still matching the specified hardware identification dimensions.
  6. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- D. Indoor Copper and Fiber optic cables and grounding conductors:
1. The cable sheaths shall be labeled with laser-printed polyester self-laminating wrap around labels sized to fit the Owner's labeling scheme in readable font size.
- E. Horizontal cable outlet housings and faceplates:
1. Cable termination connectors at each position on the outlet housing shall be labeled with laser-printed polyester labels inserted into the outlet housing labeling window.
- F. Copper patch panels:
1. The patch panels shall be labeled on the front and rear top left corner with a laser-printed polyester self-laminating label sequentially identifying the patch panel.
- G. Copper patch termination blocks:
1. The termination blocks shall be labeled on the front rows with the termination block designation strip colored per the BICSI requirements identifying the copper cable pairs.
- H. Fiber optic termination panels and housings:
1. The panels and housings shall be labeled on the outside front and rear top left corner with a laser-printed polyester self-laminating label sequentially identifying the panel.
  2. Cable termination identifier and fiber positions inside the termination panels shall be made using the manufacturer's provided label card behind the plastic panel.
- I. Equipment racks:
1. Bakelite plastic label engraved with rack label scheme attached to front and rear facing top angle bracket.
  2. Label shall be adhesive backed for secure placement. Optional mounting with self tapping screws will be at the discretion of owner.
- J. Equipment cabinets:
1. Bakelite plastic label engraved with cabinet label scheme attached to top front and rear facing frame of cabinet.
  2. Label shall be adhesive backed for secure placement. Optional mounting with self tapping screws will be at the discretion of owner.
- K. Indoor Conduits and pullboxes:
1. Each section of conduit shall be labeled on the outside facing and unobstructed view with a laser-printed polyester self-laminating label sequentially identifying the conduit and its origin and termination end (to and from).

2. Each pullbox shall be labeled on the outside door panel facing and unobstructed view with a laser-printed polyester self-laminating label sequentially identifying the pullbox and building location.

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

#### 3.02 INSTALLATION

- A. Process:
  1. The Owner-provided labeling scheme is intended to comply with TIA/EIA 606-B standard for labeling and administration of a cable plant. It is the responsibility of the sub-contractor to acquire, understand, and utilize the owner's labeling scheme for all component of the voice data communications system including, but not limited to:
    2. Indoor Horizontal copper and fiber optic cables (Identify at both ends within 6-inches of termination).
    3. Indoor copper and fiber optic backbone cables (Identify at both ends within 12-inches of the point that the cable enters termination panels/blocks, within 12- of the point that the cable enters or exits pullboxes, wall and floor sleeves.
    4. Workstation outlets, faceplates and individual outlet connectors.
    5. Termination panels.
    6. Termination blocks.
    7. Racks, cabinets, and equipment enclosures. (front and rear).
    8. Indoor conduit pathways and pullboxes.
    9. Grounding conductors and ground bars.
    10. Label each component with a specified label at an unobstructed view location and where it is accessible for administration.

#### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work.

#### 3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner.

**END OF SECTION**



**SECTION 27 08 00**

**COMMISSIONING FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications information for identification of the various components of the telecommunications infrastructure and pathway system.
2. Copper cable test device.
3. Optical fiber test device.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. BICSI: Building Industry Consulting Service International
3. EIA: Electronics Industry Alliance
4. ELFEXT: Equal Level far End Cross Talk
5. FOTP: Fiber Optic Test Procedure
6. IT: Information Technology
7. ISP: Inside Plant
8. LOMMF: Laser Optimized Multimode Fiber
9. MHz: Megahertz
10. NEXT: Near End Cross Talk
11. OSP: Outside Plant
12. OTDR: Optical Time Domain Reflectometer
13. PSELFEXT: Power Sum Equal Level far End Cross Talk
14. PSNEXT: Power Sum Near End Cross Talk
15. RCDD: Registered Communication Distribution Designer
16. TCIM: Telecommunication Cabling Installation Manual
17. TDMM: Telecommunication Distribution Methods Manual
18. TDR: Time Domain Reflectometer
19. TIA: Telecommunications Industry Association
20. UL: Underwriters Laboratory
21. WAP: Wireless Access Point.

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Safety Code (NESC) – 2017
2. National Fire Protection Association (NFPA)

3. 2016 California Electrical Code
4. 2016 California Building Code
5. Local Municipal Codes

#### 1.04 APPLICABLE REGULATORY REFERENCES

A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises

- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.

7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

#### 1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.
- B. Scheduling:
1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

#### 1.06 ACTION SUBMITTALS

- A. Product Data: For each product indicated.
1. Submit all product data in accordance with general requirements of the construction documents.
  2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
  4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

#### 1.07 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
1. Submit all shop drawings in accordance with the general requirements of the construction documents.
  2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
  4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
  - b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

D. Test Instrument Submittals:

1. All copper & fiber optic test instruments used on the site shall be capable of storing test data files and downloading these test results as data files. The copper cable number and fiber optic cable/strand number shall be used as the record identifier for each test.
2. Submit the model number, serial number, manufacturer, last date of calibration/certification as well as a copy of the certificate for each copper & fiber optic test instruments used on the site prior to any testing.

1.08 CLOSEOUT SUBMITTALS

A. Test and Evaluation Reports:

1. A complete set of test results verifying the installed link and channel performance parameter results for all cable types shall be presented to the A/E and the Owner at least one (1) week before the placement of any active electronics in technology rooms and/or spaces. The test result submittal shall contain the following:
  - a. Testing, verification and documentation of all performance specification parameters for voice, data cables in all IT spaces. The trade sub-contractor shall identify the types of cable tester(s) and interface adapters used during testing and certification when presenting the results for each type of cable and each test procedure.
  - b. Verification and test results in both paper and electronic formats printed directly from the testing device software application. Paper results must be neatly presented in a three (3) ring binder and sectioned according to floor and cable type; OSP, ISP, Category-6, Category-3, and optical fiber cables (backbone and workstation fiber) must be divided into separate sections for each floor. Electronic results must be presented on CD-Rom disc(s) in the testing device's native file type with a copy of the electronic software used to generate the test results.
  - c. Documentation indicating the last calibration/service record of each certification tester device.

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

- B. Qualifications – Installer:
  - 1. Seventy Five percent (75%) of the onsite sub-contractor-provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system testing components being used. Proof of certification shall be available on site for review at all times for each field technician.

## PART 2 - PRODUCTS

### 2.01 COPPER CABLE TESTER

- A. Basis-of-Design Product: Subject to compliance with requirements:
  - 1. Fluke
- B. Product Options:
  - 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirement.
    - a. Fluke DTX
- C. Description:
  - 1. Must meet or exceed TIA Level IV compliant network cable-testing device certification by an independent laboratory, such as Intertek, for verification of high speed, TIA/EIA T568 compliant cables.
  - 2. Copper test equipment must be capable of certifying Category-3, Category-5e, Category-6 and Category-6A UTP links or channels independent of termination hardware configuration (RJ 45 port or 110-style) for each level of performance.
  - 3. Provide full 2-way Autotest of Category-3, 5E, 6 and 6A twisted pair links.
  - 4. All test equipment shall be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
- D. Accessory Products:
  - 1. Interface Adapters
  - 2. TIA Category-3, 5E and 6(A): 100 ohm
  - 3. Category/Class E permanent link adapters for TIA Cat 3, 5E, 6 and 6A unshielded and shielded cables.
  - 4. DTX ten (10) Gigabit Kit

### 2.02 OPTICAL FIBER TESTER

- A. Manufacturer List:
  - 1. Fluke
- B. Product Options:
  - 1. Select analyzer to comprehensively certify each optical fiber connection and record results verifying compliance with TIA/EIA performance standards and manufacturer specifications.
    - a. DTX-1800 with Fiber modules
- C. Description:
  - 1. The optical fiber source shall permit full end to end testing of Multimode, Single-mode and LOMMF optical fiber cabling fully compliant with industry standards and manufacturer recommendations.

2. Available source types and wavelengths shall be as follows:
    - a. Multimode - 850nm LED and 1300nm LED.
    - b. Single-mode – 1310nm FP Laser and 1550nm FP Laser.
    - c. LOMMF – 850nm VCSEL and 1310nm FP Laser.
  3. The built in power meter shall be calibrated to read 850, 1310 and 1550nm wavelengths.
  4. All test equipment shall be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
- D. Accessory Products:
1. Interface Adapters
    - a. DTX Fiber Modules including Multimode, Single-mode and LOMMF adapters.

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.
- B. Verify telecommunications cabling is installed and supported, terminated, mounted in an appropriate housing or terminated on the applicable component and labeled prior to certification testing and documentation.
- C. Verify certification tester universal interface adapters and manufacturer patch cords that enable permanent link verification are in new condition not indicating any twisting or kinking resulting from incorrect storage of the tester interface adapters.
- D. Optical fiber patch cords shall be inspected to ensure connector surfaces are clean and free of defects that may affect testing results.

### 3.02 TESTING

- A. Process:
1. Certification test 100% of the installed cabling plant including all backbone and horizontal four (4) pair MTP copper, multi-pair UTP, and optical fiber connections.
  2. Follow manufacturers' instructions and recommended industry standards and guidelines to complete all TIA/EIA 568-C testing procedures to verify performance levels.
  3. All testing will utilize industry standard Method B parameters.
  4. All optical fiber certification testing shall include dual frequency bi-directional reports.
  5. Follow manufacturer requirements for self-calibration procedures.
  6. Update tester software to show specific project information including but not limited to:
    7. Date and time of testing
    8. Project name
    9. Field technicians name
    10. Cable identification number
    11. Cable manufacturer, type and part number

- B. Repair:
  - 1. Any connections failing to meet referenced standards or more stringent performance requirements stated above, must be removed and replaced with connections that prove, in additional testing, to meet or exceed the performance standards set forth.

3.03 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**



**SECTION 27 11 16**

**CABINETS, RACKS, ENCLOSURES FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Provides specifications for network cabinets, racks, and telecommunications enclosure components utilized to house various telecommunications infrastructure components within technology distribution spaces.
  - 2. Equipment Racks

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

**1.03 REFERENCES**

- A. Abbreviations and Acronyms:
  - 1. ANSI: American National Standards Institute
  - 2. A/E: Architect / Engineer (designer)
  - 3. BICSI: Building Industry Consulting Service International
  - 4. EIA: Electronics Industry Alliance
  - 5. IDF: Intermediate Distribution Facility
  - 6. MDF: Main Distribution Facility
  - 7. RCDD: Registered Communications Distribution Designer
  - 8. TCIM: Telecommunication Cabling Installation Manual
  - 9. TDMM: Telecommunications Distribution Methods Manual
  - 10. TIA: Telecommunications Industry Association
- B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)
  - 1. National Electric Code (2017)
  - 2. National Fire Protection Association (NFPA)
  - 3. 2017 California Electrical Code
  - 4. 2017 California Building Code
  - 5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have

been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

- w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
    - a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
    - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
  3. National Electric Codes
    - a. National Electrical Code (2017)
    - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
    - c. ANSI/IEEE C2-207, National Electrical Safety Code®
    - d. National Electrical Code (NEC) (NFPA 70)
  4. OSHA Standards and Regulations – all applicable
  5. Local Codes and Standards – all applicable
  6. BICSI
    - a. Telecommunications Distribution Methods Manual, 13th Edition
    - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
    - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
    - d. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
    - e. Network Systems and Commissioning (NSC) reference, 1st Edition
    - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
    - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
    - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
    - i. AV Design Reference Manual, 1st Edition
    - j. Network Design Reference Manual, 7th Edition
    - k. Outside Plant Design Reference Manual, 5th Edition
    - l. Wireless Design Reference Manual, 3rd Edition
    - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
  7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
  8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
  9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

## 1.05 ADMINISTRATIVE REQUIREMENTS

### A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

### B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

## 1.06 ACTION SUBMITTALS

### A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

## 1.07 INFORMATIONAL SUBMITTALS

### A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

### B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 CABINETS, RACKS, ENCLOSURES

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. Owner Furnished / Contractor Installed (OFCI)

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

2.02 EQUIPMENT RACKS

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. CPI
  - a. Part # 55053-703

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

C. Description:

1. Equipment racks and rack components shall be black in color. Finish shall be powder coat.
2. Universal Free Standing Relay Racks shall be Aluminum 2-Post racks able to support and organize electronic equipment, cross-connection and/or termination hardware for fiber optic cabling, station cabling, riser cabling, or building entrance cabling as may be required by design.
3. The assembled rack will measure 84"H x 20.3"W x 15"D. The sides of the equipment- mounting channels will be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
4. Racks shall be manufactured from aluminum and/or steel extrusions.
5. Each rack will have two L-shaped top angles, two L-shaped base angles and two C- shaped equipment-mounting channels. The rack will assemble with bolt hardware. Equipment-mounting channels will be threaded for easy assembly. The base angles will be pre-punched for attachment to the floor.
6. Equipment mounting channels will be 3" deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern to provide 45 rack-mount spaces for equipment. Each mounting space will be marked and numbered on the mounting channel.
7. The rack will be UL Listed.
8. Network equipment will mount on to a network equipment suited cabinet 45u rack units tall.
9. Floor mounted racks shall be permanently attached to the floor using lag bolt and lag shields for masonry type floors or appropriate fastening hardware for other types of flooring as approved by the owner. Racks installed adjacent to each other will be fastened together using proper bolt, nut, and washer combinations.
10. Rated load for equipment cabinets shall be no less than 1000 pounds, equipment evenly distributed along height of rack.
11. Ladder rack shall be fastened using the proper hanging and connecting hardware, secured in a manner consistent with recommended weight load spacing recommendations.
12. Patch panels, wire cable management hardware, and other related passive equipment will be attached to racks and mounting rails with at least two screws per mounting bracket and located in accordance with the Rack Equipment Elevation Form contained in project documentation on a per job basis.
13. All equipment shall be free from imperfections and defects.
14. All racks shall be grounded and bonded to specification of BICSI, Telecommunications Methods Manual and ANSI/TIA 607-B Bonding and Grounding Standard. See grounding section in this document for details.
15. Active equipment shall be positioned in racks to work in accordance of the "hot aisle/cold aisle" configuration of that room.
16. Equipment with intake/exhaust patterns other than front-to-back should be remediated with appropriate passive ducts to correct airflow to front-to-back pattern wherever possible.
17. Any rack/cabinet spaces not used should be filled with blank panels to minimize rogue backflow of air within the facility.
18. All racks and cabinets shall have a minimum of 3 feet clearance in the front, with 4 feet being preferable for the movement and installation of equipment. Some equipment may require more clearance. See project documentation or equipment manufacturer's guidelines for details.
19. All racks shall have a minimum of 2 feet clearance in the rear, with 3 feet being preferable for the movement and installation of equipment.

20. Equipment Mounting Rails shall be spaced horizontally to support 19" wide EIA-310- D compliant rack-mount equipment. Each RMU will be marked and numbered on the front mounting rails.
21. Attachment points will be threaded with 12-24 roll-formed threads. The rack will include assembly and equipment-mounting hardware. Each rack will include (50) each combination pan head, pilot point mounting screws
22. The cabinet shall be UL Listed. UL Listing will be stated in the manufacturer's product literature.

#### 2.03 POWER REQUIREMENTS

- A. Minimum power configuration should be no less than 20 A, 120 Vac power, with 250 Vac where needed. All circuits shall be on the same phase of power. Consult project documentation for details on power needs of specific racks and cabinets.
- B. Power circuits should have dedicated neutral and ground conductors and no exposed on/off switch or breaker controls that might cause accidental shut-off.

#### 2.04 SUSPENDED CEILING WIRELESS ACCESS POINT ENCLOSURES

- A. Basis-of-Design Product: Subject to compliance with requirements:
  1. Oberon suspended ceiling mount
    - a. Part Number - Model 1046-CC0AP3800
- B. Product Options:
  1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.
- C. Description:
  1. Economical locking ceiling mount designed specifically for aesthetic, secure mounting of the CISCO 3800i devices wireless access point.
  2. Performance: Designed to meet NEC300-22 and 300-23 for plenum installations. OSHPD approved OPA No. 1638.
  3. Construction: 18 ga. textured white powder coated steel flange, 16 ga. aluminum back box. Patent pending locking mechanism, keyed alike, secures AP into the ceiling mount.
  4. Size: 24 inches by 24 inches by 2-1/4 inches deep (610 mm by 610 mm by 57 mm).
  5. Includes (1) Dual Cable Egress Firestop Kit (1" trade size conduit connector, and firestop grommet)

#### 2.05 OUTDOOR WIRELESS ACCESS POINT ENCLOSURES

- A. Basis-of-Design Product: Subject to compliance with requirements:
  1. Ventev/TerraWave Wall Mounted Enclosure
    - a. Part Number - CV12106KO-ODO4T
    - b. UPC Number - 729198536725
- B. Product Options:
  1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

C. Description:

1. Assembled 12" x 10" x 6" NEMA 4X polycarbonate enclosure with a solid door and Key Lock includes mounting feet and 4- RPTNC leads with an integrated outdoor Omni Antenna attached at the bottom of the enclosure. The enclosure also comes with mounting feet for easy installation. Constructed from polycarbonate plastic, this enclosure is durable, extremely affordable and is the lightest weight enclosure solution TerraWave offers.
2. RoHS compliant
3. Back panel for CISCO device.
4. Provide all required attachments for wall mounting on exterior of modular buildings.

**PART 3 - EXECUTION**

3.01 EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

3.02 INSTALLATION

A. Process:

1. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
  - a. Electrical requirements (conduit installation and capacity).
  - b. The telecommunications rooms are the size indicated in the project drawings.
  - c. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  - d. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.
2. Assemble cabinets according to manufacturer's instructions. Verify that equipment mounting rails are sized properly for rack-mount equipment before attaching the rack to the floor.
3. Anchor all racks and cabinets to the concrete floor per the structural requirements and cross brace to the cable runway system above.
4. Racks shall be grounded to the TGB using appropriate hardware provided by the sub-contractor. The ground will meet local code requirements and will be approved by the Authority Having Jurisdiction (AHJ).
5. Ladder rack may be attached to the top of the rack to deliver cables to the rack. The rack should not be drilled to attach ladder rack. Use appropriate hardware from the ladder rack manufacturer.



**3.03 RE-INSTALLATION**

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work.

**3.04 CLOSEOUT ACTIVITIES**

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner.

**END OF SECTION**

**SECTION 27 11 19**

**TERMINATION BLOCKS AND PATCH PANELS FOR COMMUNICATIONS SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Provides specifications for wall and rack/cabinet-mounted blocks, termination panels and patch panel components utilized to terminate various telecommunications infrastructure cabling and connectivity.
  - 2. Optical Fiber Termination panels.
  - 3. Copper horizontal cabling Patch Panels.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

- A. Abbreviations and Acronyms:
  - 1. ANSI: American National Standards Institute
  - 2. A/E: Architect / Engineer (designer)
  - 3. BICSI: Building Industry Consulting Service International
  - 4. EIA: Electronics Industry Alliance
  - 5. IDF: Intermediate Distribution Facility
  - 6. MDF: Main Distribution Facility
  - 7. RCDD: Registered Communications Distribution Designer
  - 8. TCIM: Telecommunication Cabling Installation Manual
  - 9. TDMM: Telecommunications Distribution Methods Manual
  - 10. TIA: Telecommunications Industry Association
- B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)
  - 1. National Electric Code (2017)
  - 2. National Fire Protection Association (NFPA)
  - 3. 2016 California Electrical Code
  - 4. 2016 California Building Code
  - 5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.
  - 1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
- v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
- w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.

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- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.
- B. Scheduling:
  - 1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

- A. Product Data: For each product indicated.
  - 1. Submit all product data in accordance with general requirements of the construction documents.
  - 2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
  - 4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
  - 1. Submit all shop drawings in accordance with the general requirements of the construction documents.
  - 2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
  - 4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.
- B. Certificates:
  - 1. Submit management and installation team reference documentation verifying:
    - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 OPTICAL FIBER TERMINATION PANELS

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. AFL / Dura-Line

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

C. Description:

- 1. 19-inch Rack mountable fiber optic termination shelf with maximum 144-positions with integrated splicing for termination inside Telecom rooms.
- 2. Minimum 2U rack units' height.
- 3. Optical fiber termination panel housings shall be provided for cross-connecting or inter-connecting purposes between OSP, Indoor riser backbone, and/or distribution cables and the active network electronic switches, as noted in drawings.

4. Single mode termination: Fusion splice both ends of each single mode fiber optic strand onto factory connectorized single mode pigtailed mounted in connector housings assembled by the manufacturer of the single mode fiber optic cable.
    - a. Single-Mode splice-on Connector is acceptable.
  5. All optical fiber housings shall be complete factory-provided assemblies that contain all components including LC duplex connector adapter panels and internal/external bend radius, strain relief and cable clamp components that are provided in a housing which includes an accessible rear access hatch.
  6. All optical fiber patch panel trays and associated bulkhead inserts shall have factory numerical labeling included in the design and presentation to the user side of the panel.
  7. The optical fiber patch panel bulkheads that house the terminating modules for the fiber backbone cabling and any horizontal optical fiber cabling shall accept TIA 568-C standard-compliant LC-connectors compatible with the optical fiber strands being terminated.
- D. Accessory Products:
1. Provide any accessory products related to the optical fiber termination panels to provide a complete and functional infrastructure system.

## 2.02 COPPER HORIZONTAL CABLING PATCH PANELS

### A. Manufacturer List:

1. Leviton
  - a. Angled Category 6A 48 Port
    - 1) Part Number 6A587-U48

### B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

### C. Description:

1. All angled patch panels are to be rack/cabinet mountable within industry standard TIA/EIA 19" mounting rails unless otherwise noted.
2. All angled patch panels are to provide adequate space for individual port labeling on the front and cable/connector labeling on the back.
3. All installed station cable patch panels shall be Category 6A twenty-four (24) or forty-eight (48) port flat patch panels
4. All multi-pair backbone OSP cables terminated in a TR will be terminated on a BEC protection block. Reference Division 270526 specification.
5. The performance criteria for the patch panels must meet or exceed the performance parameters for frequency, attenuation, near end cross-talk (NEXT), attenuation to cross-talk ratio (ACR), power sum NEXT (PS-NEXT), power sum ACR (PS-ACR), equal level far end cross-talk (ELFEXT), power sum far end cross-talk (PS-FEXT), and return loss (RL) as set forth in TIA/EIA 568-C category standards.

### D. Accessory Products:

1. Provide any accessory products related to the patch panels to provide a complete and functional infrastructure system.

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2. Port RJ-45 jack block out device to safely secure access to unused ports and deter vandalism to jacks.
3. Provide complete with all required mounting hardware and fittings and cables needed.

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
  1. Electrical requirements (conduit installation and capacity)
  2. The telecommunications rooms are the size shown on the project drawings.
  3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

### 3.02 INSTALLATION

- A. Process:
  1. Install all optical fiber and category copper termination panels/panels under the guidelines of the manufacturer's recommended instructions and per all TIA/EIA 568-C standards and manufacturer-approved industry practices as shown in the drawings.
  2. The installation and performance parameters of all installed cable termination panels shall be verified by the sub-contractor through TIA/EIA 568-C testing procedures.
  3. Label all cable termination panels to identify each port and each specific panel in accordance with the TIA/EIA 606 labeling scheme approved by the Owner.
- B. Installation description:
  1. Sub-contractor shall use existing cabling management pathways and take care to place cable like with like, maintaining original segregation strategies for separating fiber and copper cables as well as any separation necessary between different types of copper cables.
  2. Cables shall be dressed neatly within patch management pathways with care taken to maintain minimum bend radius of not less than 1 times the cord outer diameter for copper and not less than a 1" bend radius for fiber jumpers as per ANSI/TIA 568-C.0
  3. The installation and performance parameters of all installed cable termination panels shall be verified by the sub-contractor through TIA/EIA 568-C testing procedures.
  4. Label all cable termination panels to identify each port and each specific panel in accordance with the TIA/EIA 606 labeling scheme approved by the Owner.

### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components due to

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manufacturer defects or sub-contractor poor performance. Scheduling for re-installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work.

**3.04 CLOSEOUT ACTIVITIES**

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 11 23**

**COMMUNICATIONS CABLE MANAGEMENT AND CABLE RUNWAY**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for cable management components utilized inside each telecommunications distribution space to support the management of horizontal workstation cabling, backbone cabling, and patch cords.
2. Vertical Cable Management
3. Cable Runway System

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.
- C. Refer to Structural Seismic Requirement design documents Specifications, if available, for Non-Structural Components for all structural bracing and support of telecommunications equipment.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. MDF: Main Distribution Facility
7. RCDD: Registered Communications Distribution Designer
8. TCIM: Telecommunication Cabling Installation Manual
9. TDMM: Telecommunications Distribution Methods Manual
10. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Code (2017)
2. National Fire Protection Association (NFPA)
3. 2017 California Electrical Code
4. 2017 California Building Code
5. Local Municipal Codes

1.04 APPLICABLE REGULATORY REFERENCES

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum

- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
    - a. ISO 11801 (November 2010)- Generic Cabling for Customer Premises
    - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
  3. National Electric Codes
    - a. National Electrical Code (2017)
    - b. ANSI/NFPA 70-2017, National Electrical Code© (NEC©)
    - c. ANSI/IEEE C2-207, National Electrical Safety Code®
    - d. National Electrical Code (NEC) (NFPA 70)
  4. OSHA Standards and Regulations – all applicable
  5. Local Codes and Standards – all applicable
  6. BICSI
    - a. Telecommunications Distribution Methods Manual, 13th Edition
    - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
    - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
    - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
    - e. Network Systems and Commissioning (NSC) reference, 1st Edition
    - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
    - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
    - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
    - i. AV Design Reference Manual, 1st Edition
    - j. Network Design Reference Manual, 7th Edition
    - k. Outside Plant Design Reference Manual, 5th Edition
    - l. Wireless Design Reference Manual, 3rd Edition
    - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
  7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

#### 1.05 ADMINISTRATIVE REQUIREMENTS

##### A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

##### B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

#### 1.06 ACTION SUBMITTALS

##### A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

#### 1.07 INFORMATIONAL SUBMITTALS

##### A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

##### B. Certificates:

1. Submit management and installation team reference documentation verifying:

- a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 VERTICAL CABLE MANAGEMENT

A. Basis-of-Design Product: Subject to compliance with requirements:

1. CPI
  - a. MCS-EFX 2-Post Cable Manager 6"
    - 1) 6" Part Number 40095-703 (Double Sided Locking Swing-gate doors)
    - 2) Requires 2 managers per rack. (when there are multiple racks in an MDF/IDF, a manager cannot be shared between racks)

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

C. Description:

1. All new MDF/IDF cabinets/Racks shall include vertical cable management as noted in the drawings.

2. All vertical cable management on cabinets/Racks shall be full height of available rack units unless otherwise noted in the LV-series drawings.
3. Vertical cable management shall be placed on left and right side of racks.
4. All components of the cable management system shall be black in color.

D. Accessory Products:

1. Provide any accessory products related to the wire management components to provide a complete and functional infrastructure system.

2.02 LADDER RACK

A. Manufacturer List:

1. CPI
  - a. Ladder Rack
    - 1) 12" Part Number 11275-712 (Black)
  - b. Ground Cable Support
    - 1) Part Number 11268-001

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

C. Description:

1. The ladder rack routing system shall consist of pathway sections, splice connectors, sidewalls, waterfalls, supports, end caps, mounting brackets, and accessories designed to route and manage copper, fiber optic, grounding or power cables.
2. The pathway sections shall be provided in widths: 12" (305 mm).
3. Ladder rack shall be fastened using the proper hanging and connecting hardware, secured in a manner consistent with recommended weight load spacing recommendations.
4. All ladder rack will be connected and supported by ladder rack manufactures splice, junction, wall angle and tri-angle type braces per industry standard and authority having jurisdiction to meet local seismic codes.
5. All overhead ladder tray will be grounded and bonded per TIA standards.
6. Ladder rack sections will be supported every 4 feet, ladder rack spanning over areas that will not attach to a cabinet, rack or wall will be supported by threaded rods ceiling mount kits provided by ladder rack manufacturer.

PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:

1. Electrical requirements (conduit installation and capacity)
2. The telecommunications rooms are the size shown on the project drawings.
3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.

4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

### 3.02 INSTALLATION

#### A. Process:

1. Inside telecom spaces the primary cable transport system shall be the overhead cable runway system, as shown in the drawings. Sub-contractor-installed cable runway system shall include all components to complete the installation whether indicated in the contract documents or implied by the design.
2. Install all vertical and horizontal cable management per the manufacturer's recommended installation instructions, as indicated in the drawings.
3. All cable bundles inside the telecommunications rooms shall be secured with Velcro™ cable wraps; plastic wire ties are not acceptable.
4. Cable ties and Velcro™ wraps shall not be pulled tight enough to kink the cable jacket.
5. Coordinate the cable runway rungs with the vertical cable manager locations to provide for an unobstructed opening above the vertical cable managers or cabinet top openings.
6. Install radius runway drop-out fittings at all instances of cable runway grids where cable bundles enter or exit the cable runway system. Multiple drop-out fittings need to be placed next to each other to accommodate large cable bundles. Install drop-out wing sections at the ends of the waterfall drop-out fittings to ensure cable radius requirements are met where cables exit or enter the cable runway grid from the sides of the runway stringers.
7. Install radius runway drop-out fittings at all instances on both sides above front end of vertical cable managers of cable runway to accommodate patch cord routing in both directions.
8. Install ground cable support fittings to the underside of the upper level cable runway grids to provide a separate pathway for all #6AWG telecom ground cables routed to the telecom ground bars. Neatly bundle ground cables together with Velcro strips and lay inside the ground cable support fitting pathway. Lash ground cable bundles to every second fitting with Velcro strips.
9. Open ended cable runway sections shall be closed with runway termination kits.
10. Support vertical cable runway sections (if required) to the plywood backboards with runway hold down clamp kits.
11. Install all components of the cable runway system under the codes, standards, guidelines, and manufacturer recommendations.
12. Vertical support to the slab above shall be provided if a cable runway section spans a distance greater than four (4) feet.
13. Diagonal braces and threaded rod stiffeners shall be installed as additional structural support assembly as required by the Seismic Requirements for Non-Structural Components for all structural bracing and support of telecommunications equipment.

### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for



re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

**3.04 CLOSEOUT ACTIVITIES**

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 13 13**

**COPPER BACKBONE CABLING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for high pair count UTP copper backbone cabling to distribute network signals between telecommunications distribution spaces.
2. Category 6 UTP Cable.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. LOMMF: Laser Optimized Multi-Mode Fiber
7. MDF: Main Distribution Facility
8. NEXT: Near End Cross Talk
9. PSELFEXT: Power Sum Equal Level Far End Cross Talk
10. PSNEXT: Power Sum Near End Cross Talk
11. RCDD: Registered Communications Distribution Designer
12. SMF: Single-Mode Fiber
13. TCIM: Telecommunication Cabling Installation Manual
14. TDMM: Telecommunications Distribution Methods Manual
15. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Safety Code (NESC) – 2017
2. National Fire Protection Association (NFPA)
3. 2016 California Electrical Code
4. 2016 California Building Code
5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have

been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
- v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

- w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010)- Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code© (NEC©)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
  - b. The field supervisor is a BICSI trained technician that is qualified to perform

and oversee the work described in the contract documents

- C. Qualification Statements:
  - 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

#### 1.08 CLOSEOUT SUBMITTALS

- A. Warranty Documentation:
  - 1. Submit manufacturers extended warranty certification documentation one (1) week after the warranty acceptance by the manufacturer. It shall be the sub-contractor's responsibility to facilitate the manufacturer-specific warranty requirements
- B. As-Built Drawings:
  - 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
  - 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

#### 1.09 QUALITY ASSURANCE

- A. Qualifications – Manufacturer
  - 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.
- B. Qualifications – Installer:
  - 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

### PART 2 - PRODUCTS

#### 2.01 BACKBONE MULTI-PAIR CABLING

- A. Basis-of-Design Product: Subject to compliance with requirements:
  - 1. Berk-Tek – 4 pair-OSP Category 6
- B. Product Options:
  - 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.
- C. Description:
  - 1. All voice and data ISP and OSP copper backbone cable is to be rated per the constructed conditions and verified by the sub-contractor prior to installation. Per code, plenum cable is to be installed at all times when a communications cable is exposed in a plenum air space. It is the responsibility of the sub-contractor to bid, purchase, install, and verify the rating of the ISP and OSP cable for the specific

- construction conditions.
2. Backbone cables that are exposed to moisture shall contain moisture-blocking materials to prevent moisture damage to cable performance.
  3. Backbone multi-pair UTP cable shall be Category-3 copper UTP, twenty-four (24) AWG cable. The total pair count of each category-3 cable shall be relocated as noted in the project drawings.
  4. The performance criteria for the UTP backbone cable shall be in accordance with the specific standards for the particular cable's rating. A category-3 rated cable must perform up to, or beyond the current specification parameters for the published category-3 rating by TIA/EIA 568-C.2.
  5. Select an appropriate cable construction, including external jacket properties, when installing cables in aerial, outdoor, underground and corrosive environments.

D. Accessory Products:

1. Provide any accessory products related to the UTP copper backbone cabling required to provide a complete and functional infrastructure system.

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
1. Electrical requirements (conduit installation and capacity)
  2. The telecommunications rooms are the size shown on the project drawings.
  3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

### 3.02 INSTALLATION

A. Process:

1. Install/relocate all copper backbone/station cable per the manufacturer's recommended installation instructions, under the guidelines of TIA/EIA 568 C and BICSI, and in quantities indicated in the LV series drawings.
2. Install all cables with proper attention paid to bend radii, pulling method, attachment method, and pulling forces. The cable manufacturer's specifications for each particular cable type shall be followed exactly.
3. Backbone cable shall be visually inspected for insufficient bend radius during and after pulling. Damaged cables, or those installed under questionable methods and/or circumstances shall be replaced at no additional cost to the owner.
4. All cable shall be pulled using an appropriate measuring device to ensure that the specified force is not exceeded as noted in BICSI guidelines.
5. Install backbone cables with attention paid to aesthetic means and methods when routing cabling within IT spaces.
6. No backbone cable shall be left unsupported for more than three (3) feet vertically or horizontally at any time.
7. All backbone cables shall be clearly labeled on both ends and in an accessible

location no more than one (1) foot from each cable end.

**3.03 RE-INSTALLATION**

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

**3.04 CLOSEOUT ACTIVITIES**

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**



**SECTION 27 13 23**

**OPTICAL FIBER BACKBONE CABLING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for optical fiber backbone cabling to distribute optical network signals between telecommunications distribution spaces
2. Backbone Air-Blown Single-mode Optical Fiber Cable

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. MDF: Main Distribution Facility
7. RCDD: Registered Communications Distribution Designer
8. SMF: Single-Mode Fiber
9. MM: Multi-Mode Fiber
10. TCIM: Telecommunication Cabling Installation Manual
11. TDMM: Telecommunications Distribution Methods Manual
12. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Code (2017)
2. National Fire Protection Association (NFPA)
3. 2016 California Electrical Code
4. 2016 California Building Code
5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.

- x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010)- Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.
- B. Scheduling:
  - 1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

- A. Product Data: For each product indicated.
  - 1. Submit all product data in accordance with general requirements of the construction documents.
  - 2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
  - 4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

1.07 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
  - 1. Submit all shop drawings in accordance with the general requirements of the construction documents.
  - 2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
  - 3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
  - 4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.
- B. Certificates:
  - 1. Submit management and installation team reference documentation verifying:
    - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
    - b. The field supervisor is a BICSI trained technician that is qualified to perform

and oversee the work described in the contract documents

C. Qualification Statements:

1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

1. Submit all as-built documentation in accordance with the general requirements of the construction documents.
2. Cabling as-built drawings must contain detailed location and identification information coordinated with the as-built cable schedules.
3. All cabling must meet or exceed applicable TIA/EIA testing requirements and any additional parameters outlined in the Commissioning of Communications specification section 27 08 00.
4. Test results must be submitted for owner review and approval adhering to the General Contractor schedule milestones related to the projects active systems integration.

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 BACKBONE SINGLE-MODE OPTICAL CABLING

A. Basis-of-Design Product: Subject to compliance with requirements:

1. AFL/Dura-Line - Air-Blown Fiber (MDF to IDF)
2. Berk-Tek – Conventional Single Mode Fiber (Phase 2 Remote Cameras and Emergency Phones)

B. Product Options:

1. The manufacturers noted above shall be the only manufacturers acceptable to the Owner and A/E. Cable construction shall be a hybrid multi-mode and single-mode fiber stands combined in a single protection jacket as indicated on the project drawings.

C. Description:

1. All backbone single-mode optical fiber cable shall be capable of 10 Gb/s Ethernet

signal transmission to 10,000 meters in the 1310nm operating window. Maximum attenuation for a single-mode cable shall be no greater than 0.4dB per kilometer using 1310nm and 0.3dB per kilometer using 1550nm wavelengths respectively.

2. Each optical fiber strand shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification and all EIA/TIA 568-C.3 and 568-C.3-1 performance parameters.
3. All optical fibers inside each individual cable shall be provided in counts indicated in the drawings and usable to the fullest capacity specified by the manufacturer and meet required specifications at all times.
4. Air-Blown backbone single-mode optical fiber cables shall be:
  - a. Individual jacketed, tight buffered fiber type.
  - b. Cable construction shall be a single-mode in a single protective outer sheath.
  - c. The individual fibers are grouped in jacketed subunits color coded per TIA-598.
5. The optical fiber cables shall be rated per the installation environment as required by the local Authority Having Jurisdiction and/or National Fire Codes. Select an appropriate cable construction, including external jacket properties, when installing optical fiber cables in aerial, outdoor, underground and corrosive environments.
6. All SMF shall meet or exceed TIA compliant network cable-testing device certification by an independent laboratory, such as ETL, for verification of high speed, TIA/EIA T568C-compliant performance.

D. Cable sizes defined in Contract Documents.

1. 6-strand Single-mode – AFL/Dura-Line eABF (IDF Locations)
2. 6-strand Single-mode – Conventional Indoor/Outdoor (Pole Cameras and Emergency Phone Locations)

E. Accessory Products:

1. Provide any accessory products related to the optical fiber backbone cabling required to provide a complete and functional infrastructure system.

## 2.2 EXTERIOR TUBE-CELL SYSTEMS

A. Description:

1. All tube cable sheath openings that are created for connecting tube cable cells in underground manholes or pull boxes shall be encased in an outside plant splice case designed for copper cables.
2. The water-proof splice enclosure must be approved by the manufacturer for connecting tube cables.
3. All tube cables shall have the proper end plate adapter to provide the necessary watertight seal in the splice enclosure.
4. Tube cable sizes shall be 4- or 2-cell depending on the design on the drawings. The standard tube in conduit shall be eABF DuraLine.
5. All unterminated or unoccupied tubes shall be plugged / capped on both ends with manufacturer specific tube sealing components.
6. All MDF tube cable will transition to 5mm OD clear tubing for routing to the FTU.

- B. Products:
  - 1. AFL/Dura-Line
    - a. OSP 4-Cell eABF Futurepath Enterprise
      - Part Number 10004655

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
  - 1. Electrical requirements (conduit installation and capacity)
  - 2. The telecommunications rooms are the size shown on the project drawings.
  - 3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  - 4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

### 3.02 INSTALLATION

- A. Process:
  - 1. Install all backbone cable per the manufacturer's recommended installation instructions, under the guidelines of TIA/EIA 568C and BICSI, and in quantities indicated in the drawings.
  - 2. Install all cables with proper attention paid to bend radii, pulling method, attachment method, and pulling forces. The cable manufacturer's specifications for each particular cable type shall be followed exactly.
  - 3. Backbone cable shall be visually inspected for insufficient bend radius during and after pulling. Damaged cables, or those installed under questionable methods and/or circumstances shall be replaced at no additional cost to the owner.
  - 4. All cable shall be pulled using an appropriate measuring device to ensure that the specified force is not exceeded as noted in BICSI guidelines.
  - 5. Install backbone cables with attention paid to aesthetic means and methods when routing cabling within IT spaces. No backbone cable shall be left unsupported for more than three (3) feet vertically or horizontally at any time.
  - 6. Fiber optic cables shall be placed in neat bundles separated from other communications cabling. Fiber optic cables shall be neatly placed and lashed with Velcro ties to the horizontal and vertical cable management and runways at minimum 4-foot intervals, not to exceed every 4th rung, plus all locations where the cables change direction.
  - 7. Provide radius drop out fittings at all locations where fiber optic cables transition from vertical to horizontal cable management systems.
  - 8. All backbone cable shall be securely fastened to the termination shelf with a manufacturers strain relief bracket and termination panel cable clamp in a way that does not damage the optical fiber strands or impede the performance of the media. This secure fastening method shall also serve to insure a secure termination environment.
  - 9. A minimum of three feet (3'-0") of each optical fiber strand shall be left protected within the termination shelf for any future re-termination of a particular optical fiber strand.

10. All backbone cables shall be clearly labeled on both ends and in an accessible location no more than one (1) foot from each cable end.

3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**



**SECTION 27 15 13**

**COPPER HORIZONTAL CABLING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for four-pair UTP copper horizontal workstation cabling to distribute network signals from telecommunications distribution spaces to work area outlet locations.
2. Category 6A CMP rated, Four-Pair Copper Cabling.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. LOMMF: Laser Optimized Multi-Mode Fiber
7. MDF: Main Distribution Facility
8. NEXT: Near End Cross Talk
9. OSP: Outside Plant
10. PSELFEXT: Power Sum Equal Level Far End Cross Talk
11. PSNEXT: Power Sum Near End Cross Talk
12. RCDD: Registered Communications Distribution Designer
13. TCIM: Telecommunication Cabling Installation Manual
14. TDMM: Telecommunications Distribution Methods Manual
15. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Code (2017)
2. National Fire Protection Association (NFPA)
3. 2017 California Electrical Code
4. 2017 California Building Code
5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all

applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:
  - a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
  - c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
  - d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
  - e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
  - f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
  - g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
  - h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
  - i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
  - j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
  - k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
  - l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
  - m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
  - n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
  - o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
  - p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
  - q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
  - r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
  - s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
  - t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
  - u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard

- v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Safety Code (NESC) (IEEE C2-2012)
  - b. ANSI/NFPA 70-2014, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.

9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

#### 1.05 ADMINISTRATIVE REQUIREMENTS

##### A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

##### B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

#### 1.06 ACTION SUBMITTALS

##### A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

#### 1.07 INFORMATIONAL SUBMITTALS

##### A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

##### B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents

and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:
- 3. All cabling must meet or exceed applicable TIA/EIA testing requirements and any additional parameters outlined in the Commissioning of Communications specification section 27 08 00.
- 4. Test results must be submitted for owner review and approval adhering to the General Contractor schedule milestones related to the projects active systems integration.

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 FOUR PAIR CATEGORY 6A CABLING

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. Berk-Tek
  - a. LANMark-XTP Category 6A CMR Rated
    - 1) Part Number 11082062

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

C. Description:

1. All category-6A performance four (4) pair cable shall consist of eight (8) twenty-four (23) gauge, or greater, thermoplastic insulated solid twisted conductors that utilize the industry standard color code designations.
2. The performance criteria for four (4) pair cable shall be above and beyond specific EIA/TIA 568-C.2 standards for the particular cable's rating and shall show stable performance with documented electrical characterization out to 500 MHz.
3. Four (4) pair cables must perform over and above each of the current specification parameters for the latest published twisted pair, 10Gb performance cable solution.
4. Cables shall be rated per the installation environment as required by the local AHJ and local codes.
5. Select an appropriate cable construction, including external jacket properties, when installing cables in aerial, outdoor, underground and corrosive environments.
6. Cable to be run continuous without splices.

D. Accessory Products:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.

**PART 3 - EXECUTION EXAMINATION**

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
1. Electrical requirements (conduit installation and capacity)
  2. The telecommunications rooms are the size shown on the project drawings.
  3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

**3.02 INSTALLATION**

A. Process:

1. Install all horizontal station cabling per the manufacturer's recommended installation instructions, under the guidelines of TIA/EIA 568C and BICSI, and in quantities indicated in the drawings.
2. Locations requiring horizontal cable shall be, but not limited to, CCTV, work area outlet and WiFi.
3. Install all cables with proper attention paid to bend radii, pulling method, attachment method, and pulling forces. All cable shall be pulled using an appropriate measuring device to ensure that the specified force is not exceeded as noted in BICSI guidelines. Also refer to the cable manufacturer's specifications for exact cable requirements per the particular cable type.
4. All cables shall be visually inspected for insufficient bend radius during and after pulling. Damaged cables, or those installed under questionable methods and/or circumstances shall be replaced at no additional cost to the owner.

5. Sub-contractor shall ensure that all TIA/EIA and industry standards are met with special regards to maximum stripping length of cable jackets. No four (4) pair UTP cables shall have more than three-eighth inch (3/8") of cable jacket removed beyond the termination points.
6. Install the horizontal cabling with attention paid to aesthetic means and methods when routing cabling within IT spaces. All horizontal cabling should terminate in their respective floor serving technology space; specifically cables from floor outlets need to terminate in their corresponding floor telecom room.
7. All cabling distributed horizontally through metal stud framing shall have plastic protective bushings inserted to protect cables prior to installation.
8. All cables shall be clearly labeled on both ends and in an accessible location no more than six inches (0'-6") from the cable ends.
9. The owner reserves the right to specify a new location for any outlet or equipment without increasing sub-contractor unit cost – providing that the new location is specified prior to roughing-in of technology cable and is not farther than ten (10) feet away from the original location specified.

### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

### 3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 15 43**

**FACEPLATES AND CONNECTORS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for horizontal workstation cable termination components and outlet housing component. Includes wall-mount, floor-mount, and ceiling-mount components to support the various workstation outlets throughout the cabling plant.
2. Copper Category 6A Connectors
3. Single-Mode Optical Fiber Pigtail Connector Assemblies/Splice-On Connectors
4. Outlet Housing Components (faceplates etc.)

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. LOMMF: Laser Optimized Multi-Mode Fiber
7. MDF: Main Distribution Facility
8. NEXT: Near End Cross Talk
9. PSELFEXT: Power Sum Equal Level Far End Cross Talk
10. PSNEXT: Power Sum Near End Cross Talk
11. RCDD: Registered Communications Distribution Designer
12. SMF: Single-Mode Fiber
13. TCIM: Telecommunication Cabling Installation Manual
14. TDMM: Telecommunications Distribution Methods Manual
15. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Safety Code (2017)
2. National Fire Protection Association (NFPA)
3. 2017 California Electrical Code
4. 2017 California Building Code
5. Local Municipal Codes



1.04 APPLICABLE REGULATORY REFERENCES

A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum

- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
  - v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  - w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
- a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
  - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
3. National Electric Codes
- a. National Electrical Code (2017)
  - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
  - c. ANSI/IEEE C2-207, National Electrical Safety Code®
  - d. National Electrical Code (NEC) (NFPA 70)
4. OSHA Standards and Regulations – all applicable
5. Local Codes and Standards – all applicable
6. BICSI
- a. Telecommunications Distribution Methods Manual, 13th Edition
  - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
  - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
  - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
  - e. Network Systems and Commissioning (NSC) reference, 1st Edition
  - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
  - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
  - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
  - i. AV Design Reference Manual, 1st Edition
  - j. Network Design Reference Manual, 7th Edition
  - k. Outside Plant Design Reference Manual, 5th Edition
  - l. Wireless Design Reference Manual, 3rd Edition
  - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
7. Anywhere cabling Standards conflict with electrical or safety Codes, Contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

#### 1.05 ADMINISTRATIVE REQUIREMENTS

##### A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

##### B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

#### 1.06 ACTION SUBMITTALS

##### A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

#### 1.07 INFORMATIONAL SUBMITTALS

##### A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of two (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

##### B. Certificates:

1. Submit management and installation team reference documentation verifying:

- a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 COPPER UTP CONNECTORS

A. Basis-of-Design Product: Subject to compliance with requirements:

1. Leviton: Category UTP Category 6A Connectors.

B. Product Options:

1. The manufacturers noted above shall be the only manufacturers acceptable to the Owner and A/E.

C. Description:

1. All UTP connectors shall be rated to perform at or above current TIA/EIA performance parameters of the UTP cabling it is terminating within the communications system.
2. All UTP connectors shall have an eight (8) position, eight (8)-conductor module that accepts RJ-45 plugs.
3. When utilized as part of a channel or permanent link, all high performance

modular outlet connectors shall not decrease the horizontal cable elevated performance transmission requirements before and after installation as specified in ANSI/TIA/EIA 568-C Commercial Building Telecommunications Cabling Standard (horizontal cable section) in all noted performance parameters.

- D. Accessory Products:
1. Provide any accessory products related to the UTP connectors required to provide a complete and functional infrastructure system.
  2. Port RJ-45 jack block out device to safely secure access to unused ports and deter vandalism to jacks.
  3. Provide complete with all required mounting hardware and fittings and cables needed.

## 2.02 SINGLE MODE OPTICAL FIBER PIGTAIL CONNECTORS ASSEMBLIES

- A. Manufacturer List:
1. AFL
- B. Product Options:
1. The manufacturers noted above shall be the only manufacturers acceptable to the Owner and A/E.
- C. Description:
1. Singlemode Optical fiber pigtail connector assemblies housed in manufacturers connector panels.
  2. AFL FUSEConnect Splice On Connector is acceptable.
  3. Duplex LC style connectors.
  4. Maximum insertion loss across mated pair shall be less than 0.3 dB, tested per FOTP-171 Method A. Typical Insertion loss should be maximum of 0.15 dB. Minimum return loss shall be less than 60.5 dB, tested per FOTP-171. Typical return loss should be 60 dB.
  5. Pigtails shall have minimum 2 meters of attached cordage.
  6. Pigtails shall be assembled and tested by the connector manufacturer.
- D. Accessory Products:
1. Provide any accessory products and tool kits related to the termination of the optical fiber connectors to provide a complete and functional infrastructure system.

## 2.03 OUTLET HOUSING COMPONENTS

- A. Manufacturer List:
1. Leviton
    - a. Cat6A Connectors Atlas-X1
      - 1) Part Number 6AUJK-RL6 (L=Blue)
    - b. Wall Plates 4-Port Angled Single Gang
      - 1) Part Number 42081-4Xs (x-Color)
- B. Product Options:
1. The manufacturers noted above shall be the only manufacturers acceptable to the Owner and A/E.

C. Description:

1. All outlet housings at the various technology outlet locations shall provide the designated number modular insert ports as indicated in the drawings.
2. All flush-mounted faceplates shall be provided per the port configurations shown on the telecom drawings.
3. Faceplates for wall-mounted phones shall be one (1) port single gang faceplates that have wall-mount lugs allowing vertical phone mounting.
4. Faceplates for flush floor mounted outlets shall be coordinated with the floor box or poke thru device that will be selected and installed outside the scope of this section.
5. System furniture faceplates shall be capable of fitting in the furniture system selected by the Owner. Furniture faceplates shall be provided per the port configurations shown on the telecom drawings. Furniture faceplate extenders shall be used (if required) to maintain proper bend radii within the furniture raceway/pathway.
6. Surface mounted boxes shall be capable of the quantity of outlet jack requirements at each outlet locations indicated in the drawings.
7. All outlet-housings shall provide a clear TIA/EIA 606-A labeling location for both the individual outlet port and the entire outlet housing location, unless otherwise indicated in the project drawings.

D. Accessory Products:

1. Provide any accessory products related to the workstation outlet housing components required to provide a complete and functional infrastructure system.

PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
1. Electrical requirements (conduit installation and capacity)
  2. The telecommunications rooms are the size shown on the project drawings.
  3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

3.02 INSTALLATION

A. Process:

1. Install all connectors and couplers under the guidelines of the manufacturers' recommended instructions and per all TIA/EIA 568C standards, BICSI guidelines, and manufacturer approved industry practices.
2. The installation and performance parameters of all installed couplers and connectors shall be verified by the trade sub-contractor through TIA/EIA 568C testing procedures.
3. Color of all outlet housing components shall be coordinated with the Owner before purchase and installation.
4. All technology outlets located on walls shall be flush mounted, level and plumb.

5. All technology outlets shall be mounted at right angles and parallel to the floor, unless installation requirements or design dictate otherwise.
6. Install blank inserts in outlet housing spaces that are not being filled with cable termination modules. Blank inserts shall match the workstation housing color, unless otherwise indicated in the drawings.
7. All outlets located in systems furniture may be served from a wall adjacent to the furniture cluster or a floor box. If the cable is exposed prior to entering furniture raceway, install spiral wrap tubing to protect the cable per the manufacturer's recommendations.
8. All outlet housings as well as each individual utilized port must be labeled in accordance with the Owner-approved labeling scheme.

3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work

3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner

**END OF SECTION**

**SECTION 27 16 19**

**COMMUNICATION PATCH CORDS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

**A. Section Includes:**

1. Provides specifications for Category 6 and optical fiber horizontal cable patching to distribute network signals.
2. Copper Category 6A Patch Cords.
3. Optical Fiber Patch Cords.

**1.02 RELATED DOCUMENTS**

- A. All divisions of the specification and general provisions of the Construction Documents.
- B. Architectural, mechanical, electrical, and all technology drawings.

**1.03 REFERENCES**

**A. Abbreviations and Acronyms:**

1. ANSI: American National Standards Institute
2. A/E: Architect / Engineer (designer)
3. BICSI: Building Industry Consulting Service International
4. EIA: Electronics Industry Alliance
5. IDF: Intermediate Distribution Facility
6. LOMMF: Laser Optimized Multi-Mode Fiber
7. MDF: Main Distribution Facility
8. NEXT: Near End Cross Talk
9. RCDD: Registered Communications Distribution Designer
10. SMF: Single-Mode Fiber
11. TCIM: Telecommunication Cabling Installation Manual
12. TDMM: Telecommunications Distribution Methods Manual
13. TIA: Telecommunications Industry Association

**B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)**

1. National Electric Safety Code (NESC) – 2017
2. National Fire Protection Association (NFPA)
3. 2016 California Electrical Code
4. 2016 California Building Code
5. Local Municipal Codes

**1.04 APPLICABLE REGULATORY REFERENCES**

- A. Sub-contractor is responsible for knowledge and application of current versions of all applicable Standards and Codes. In cases where listed Standards and Codes have



been updated, Sub-contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

1. ANSI/TIA:

- a. TIA-526-7 (OFSTP-7) (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
- b. TIA-526-14-B (April 2015) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- c. ANSI/TIA/EIA-598-C (July 2014) Optical Fiber Cable Color Coding
- d. ANSI/TIA-568-C.0 (December 2015) Generic Telecommunications Cabling for Customer Premises
- e. TIA-568-C.0-1 (September 2012) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling
- f. ANSI/TIA-568-C.1 (February 2012) Commercial Building Telecommunications Cabling Standards
- g. TIA-568-C.1-2 (November 2014) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates
- h. ANSI/TIA-568-C.2 (June 2016) Balanced Twisted Pair Communications Cabling and Components Standards
- i. ANSI/TIA-568-C.3 (June 2011) Optical Fiber Cabling Components Standard
- j. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors
- k. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
- l. ANSI/TIA-1183-1 (January 2016) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Addendum 1 – Extending Frequency Capabilities to 2 GHz.
- m. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard
- n. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers
- o. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics
- p. TIA-569-D (April 2015) Telecommunications Pathways and Spaces
- q. TIA-569-D-1 (October 2016) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces
- r. ANSI/TIA-606-B (December 2015) Administration Standard for Telecommunications Infrastructure
- s. TIA-607-B (November 2015) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- t. TIA-607-B-1 (January 2017) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum
- u. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
- v. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

- w. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems.
  - x. TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
  - y. TIA-1005-A (June 2012) Industrial Telecommunications Infrastructure Standard for Manufacturing, Process & Refining
  - z. ANSI/TIA-1005 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises
  - aa. TIA-1005-1 (May 2012) Telecommunications Infrastructure Standard for Industrial Premises; Addendum 1 - Industrial Pathways and Spaces
  - bb. TIA-1179 (July 2010) Healthcare Facility Telecommunications Infrastructure Standard.
2. ISO/IEC
    - a. ISO 11801 (November 2010) - Generic Cabling for Customer Premises
    - b. ISO/IEC TR 14763-2-1:2012 - Information technology -- Implementation and operation of customer premises cabling -- Part 2-1: Planning and installation - Identifiers within administration system.
  3. National Electric Codes
    - a. National Electrical Safety Code (2017)
    - b. ANSI/NFPA 70-2017, National Electrical Code® (NEC®)
    - c. ANSI/IEEE C2-207, National Electrical Safety Code®
    - d. National Electrical Code (NEC) (NFPA 70)
  4. OSHA Standards and Regulations – all applicable
  5. Local Codes and Standards – all applicable
  6. BICSI
    - a. Telecommunications Distribution Methods Manual, 13th Edition
    - b. BICSI 004-2012, Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
    - c. Information Technology Systems Installation Methods Manual (ITSIMM), 6th Edition
    - d. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
    - e. Network Systems and Commissioning (NSC) reference, 1st Edition
    - f. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
    - g. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
    - h. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
    - i. AV Design Reference Manual, 1st Edition
    - j. Network Design Reference Manual, 7th Edition
    - k. Outside Plant Design Reference Manual, 5th Edition
    - l. Wireless Design Reference Manual, 3rd Edition
    - m. Electronic Safety and Security Design Reference Manual, 3rd Edition.
  7. Anywhere cabling Standards conflict with electrical or safety Codes, Sub-contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
  8. Knowledge and execution of applicable codes is the sole responsibility of the Sub-contractor.
  9. Any code violations committed at the time of installation shall be remedied at the Sub-contractor's expense.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the architect. Any repairs or changes made necessary in the contract work, caused by the sub-contractor's neglect, shall be made by the sub-contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work. All such documents shall be available through the General Contractor or Construction Manager.

1.06 ACTION SUBMITTALS

A. Product Data: For each product indicated.

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of six (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the A/E prior to installation. The sub-contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original Product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

B. Samples:

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of six (2) weeks prior to commencement of Division-27 work for A/E review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual, drawn component for review and action by the A/E prior to installation.

B. Certificates:

1. Submit management and installation team reference documentation verifying:
  - a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents

and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

- b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents

C. Qualification Statements:

- 1. The sub-contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.08 CLOSEOUT SUBMITTALS

A. As-Built Drawings:

- 1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
- 2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division- 27 work for A/E and Owner reference:

1.09 QUALITY ASSURANCE

A. Qualifications – Manufacturer

- 1. Component manufacturers shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

- 1. At a minimum, seventy-five percent (75%) of the onsite sub-contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.01 COPPER UTP PATCH CORDS

A. Basis-of-Design Product: Subject to compliance with requirements:

- 1. Leviton:
  - a. TR Patch Cords - Atlas-X1 Cat6A Slimline Black
    - 1) Part Number 6AS10-05E (5') (E=Black)
    - 2) Part Number 6AS10-07E (7') (E=Black)
  - b. Station Patch Cords - Atlas-X1 Cat6A Slimline Blue
    - 1) Part Number 6AS10-xxL (xx=3,5,7,10,15,20 Feet) (L=Black)

B. Product Options:

- 1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

C. Description:

- 1. Category UTP Copper patch cords for equipment patching (RJ-45 to RJ-45 Cords): Modular RJ45 male plug connector's equipped with (8) eight gold anodized pins shall be factory terminated at each end of the patch cords.

- Modular plug connectors will be snag free in design or will utilize a molded plastic boot to cover the modular plug tab. Category 6A UTP cords shall be 26 AWG.
2. All patch cords shall conform to the requirements of the EIA/TIA 568C.2 standard performance parameters and shall also guarantee headroom margin above the minimum EIA/TIA 568C standard NEXT and PSNEXT requirements; and shall provide positive ACR to 5000 MHz-km as part of the connectivity system.
  3. All copper UTP patch cords shall have stranded conductors that match the EIA/TIA 568-C performance characteristics of the category cable specified.
  4. Patch cord performance levels shall be equal to or greater than the performance level of the installed UTP cabling system.
  5. All copper patch cord lengths for patching inside the telecom rooms are to be provided appropriate to patching from network equipment ports to the copper patch panels ports within the Data Center and IDF.

D. Accessory Products:

1. Provide any accessory products related to the UTP connectors required to provide a complete and functional infrastructure system.
2. Port RJ-45 patch cord lock-in device to safely secure access to patched cords and deter accidental removal to network connection.
3. Provide complete with all required mounting hardware and fittings and cables needed.

## 2.02 OPTICAL FIBER PATCH CORDS

A. Basis-of-Design Product: Subject to compliance with requirements:

1. AFL/Dura-Line

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

C. Description:

1. All optical fiber patch cords shall conform to the requirements of the EIA/TIA 568C.3- 1 standard performance parameters for the multimode or single-mode optical fiber and shall have the same manufacturer, cable type, connector and polish as noted for the backbone fiber.
2. All optical patch cords shall have push-pull strain relief boot and duplex clip.
3. All optical fiber patch cord lengths are to be provided appropriate to patching from network equipment ports to the optical fiber patch panels ports within the MDF and IDF.
4. It is the responsibility of the Sub-contractor to verify lengths and counts of optical fiber patch cords with the owner prior to purchase.
5. All single-mode patch cord colors are to be industry standard yellow and provided in a duplex configuration.
6. All multi-mode patch cord colors are to be industry standard aqua and provided in a duplex configuration.
7. Any optical fiber patch cords purchased without written authorization by the Owner are purchased at the sub-contractors own risk.

D. Accessory Products:

1. Provide any accessory products related to the optical fiber connectors required to provide a complete and functional infrastructure system.

### PART 3 - EXECUTION EXAMINATION

- A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:
  1. Electrical requirements (conduit installation and capacity)
  2. The telecommunications rooms are the size shown on the project drawings.
  3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
  4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the A/E and obtain written instructions for changes or revisions.

#### 3.02 INSTALLATION

- A. Process:
  1. Install all horizontal cable per the manufacturer's recommended installation instructions, under the guidelines of TIA/EIA 568 C and BICSI.
  2. Category 6A equipment Patch cords: Provide (2) copper patch cords (one for each end of the cable termination) for every Category cable installed.
  3. Fiber Optic equipment Patch cords: Provide (2) fiber optic LC duplex patch cords (one for each end of fiber termination) for every pair of fiber strands installed.
  4. All patch cord lengths are to be provided appropriate to patch from rack mounted network equipment ports to the rack mounted horizontal station outlet patch panel ports within the Data Center/IDF and from the workstation outlet to the computer/or other IP end device NIC card/RJ45 port.
  5. Provide new, sealed patch cords in lengths, colors and counts approved in writing by the owner.
  6. It will be the responsibility of the communication sub-contractor to provide install all Category 6A and Fiber patch cords per direction and coordination of owner IT dept.

#### 3.03 RE-INSTALLATION

- A. No additional burden to the owner regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re- installation work shall be coordinated, in writing, with the owner prior to beginning any re- installation work.

#### 3.04 CLOSEOUT ACTIVITIES

- A. Sub-contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the Owner and A/E team.
- B. Sub-contractor to submit all as-built drawings and any test documentation required prior to acceptance by the Owner.

**END OF SECTION**

**SECTION 27 51 13**

**PAGING SYSTEMS**

**PART 1 - GENERAL**

**1.01 SCOPE OF WORK**

- A. The work under this section includes all final design, all labor, material, equipment, supplies, network, control and audio system programming, Speaker Alignment, testing, transportation and accessories required to furnish and install a complete-seamless, integrated Paging System as indicated on the drawings and as specified herein. The AVS shall be defined as all cables, equipment, products, etc, as indicated on the drawings, and mentioned in these specifications.
- B. It is the intent of the Drawings and Specifications, which are presented in a "design-build" format, for the Contractor to design, provide and install a complete, fully operational, and tested system.
- C. All miscellaneous system components including, but not limited to, plenum cables, speakers, signal converters, interface panels and components, termination equipment, patch panels, backboards, converters, controllers, digital signal processors, amplifiers, pre-amps, custom faceplates, mounting hardware, fasteners, racks, cabinets, and any other related items shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.
- D. Schedule is paramount to the project's success. With this, the Contractor will have to be a team player, continually working with the team to facilitate expeditious design, procurement, and construction processes.
- E. This project will be performed in a phased construction format. Each phase of construction will be completely installed, labeled and tested, to the greatest extent physically possible, before moving to the next phase.

**1.02 RELATED WORK, STANDARDS, DOCUMENTS AND PUBLICATIONS**

- A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of all Divisions of these specifications.
- B. All applicable portions shall apply to this section as though written herein completely.
- C. Contractor is responsible to reference all Architectural, Mechanical, Electrical, and Structural Drawings for additional information about pathways and or obstructions.

**1.03 GENERAL REQUIREMENTS**

- A. Manufacturer: The term "manufacturer" shall be defined as the company, or group of companies, that produces the products meeting the requirements of Section 2 of this



document. The manufacturer shall have a minimum of ten (10) year's experience in manufacturing products of this type and shall be ISO 9001 Certified.

- B. Contractor: The term "contractor" shall be defined as the company, or group of companies, that installs the products per Section 3 of this document. The contractor selected to provide the installation of this system shall be certified by the manufacturer in all aspects of design, installation and testing of the products described herein.
1. The Contractor shall hold a valid State of California C-7 Low-Voltage license, shall have completed at least ten (10) projects of equal scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least two (2) years, and capable of being bonded to assure the Owner's Project Manager of performance and satisfactory service during the guarantee period.
  2. The Contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.
  3. All work shall be performed under the supervision of a company accredited by the manufacturer and such accreditation must be presented.
  4. The Contractor shall be a manufacturer's authorized distributor and warrantee station for the equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Contractor must be certified by the manufacturer a minimum of 180 days prior to bid opening.
  5. The Contractor selected for this Project must adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
  6. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of fiber optic cable and Category 6A metallic premise distribution systems and have personnel who are adequately trained in the used of such tools and equipment.
  7. Personnel: Use adequate numbers of skilled workers who are thoroughly trained and experienced with the specified requirements and the methods needed for proper performance of the AV systems installation work specified herein.
  8. Designated Project Engineer: Provide a designated Project Engineer in responsible charge of the Design, CAD, In-House testing and on the on-site commissioning of the Project during all phases of the work of this specification. This Project Engineer shall hold a current InfoComm CTS-D and Biamp Vocia certifications minimum, and shall be the same individual through the execution of the work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the Contractor intervene.
  9. Technicians: shall have at least three (3) years direct experience in similar work. The AVS technicians assigned to this project shall be fully trained, qualified and carry valid and current industry certifications regarding the, installation, operation and testing of audiovisual systems. At least one InfoComm CTS / CTS-I and Biamp Vocia certifications shall be assigned as Lead Technician to the project.
  10. Custom Control System Programmer: Provide at least one (1) full time programmer on staff, capable of on-site custom programming of the custom remote-control system specified herein. Control System Programmer to hold the following certifications: InfoComm CTS, and Biamp Vocia certifications. A programming Sub-Contractor may be used if the Programmer has the certifications as listed above.
  11. Designated Project Manager: Provide a designated Project Manager in responsible charge of the fabrication shop and on the Project Site during all phases

of installation and testing of the work of this specification. The Project Manager shall hold current InfoComm CTS and shall be the same individual through the execution of the work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the Contractor intervene.

#### 1.04 QUALITY ASSURANCE

- A. To maintain a high degree of quality assurance, the Contractor shall, without exception, use the parts and supplies as specified on the drawings and in this specification.
- B. For any proposed product substitution or when the Contractor intends to include an "or equal" product in the bid pricing, provide a substitution request submittal to the Owner's Project Manager for review no later than fifteen (15) calendar days prior to Bid submittal. This report shall include:
  - 1. Description of how the proposed product(s) will impact meeting the project completion date, indicate item(s) with lead times and expected delivery date(s).
  - 2. Itemized cost comparisons between the proposed product(s) and the listed product(s).
  - 3. Detailed technical analysis of the electrical and mechanical specification differences between the proposed product(s) and the listed product(s).
  - 4. ETL "Verified" or UL "Verified" test lab documentation for the proposed product(s), component(s) and assemblies.
  - 5. Proposed product identification, manufacturer literature (specifications and cut sheets).
  - 6. Name, address and contact information of several similar projects where the proposed product(s) have been used.
  - 7. Name, address and contact information of the proposed product(s) manufacturer's local representative.
  - 8. Sample proposed product(s) manufacturer's warranty.
- C. The Owner's Design Team/Project Manager must approve any proposed product(s) substitution item in writing. The Owner's Design Team/Project Manager reserves the right to require a complete sample of any proposed product(s) and may request a sample tested by an independent testing consultant to prove equality. The decision of the Owner's Design Team/Project Manager regarding equality of proposed product(s) items will be final.
- D. If a proposed product(s) is given final acceptance by the Owner's Project Manager, the Contractor shall reimburse the Owner's Design Team/Project Manager for the costs to review the proposed product(s) substitution(s), and for any additional engineering charges, and shall pay all charges of other trades resulting from this product(s) use, at no cost to the Owner.
- E. It is a mandatory requirement that a single Contractor perform the work described in this specification.

#### 1.05 BID SUBMITTAL REQUIREMENTS

- A. Pre-Qualification Certificates: Provide current training certificates for design, engineering, installation and testing of the proposed products.

- B. **Manufacturer Tests:** Contractor shall submit all manufacturer test information prior to installation. If equivalent product(s) are substituted, the equivalent product(s) must show demonstrated and documented equivalence to the product(s) specified.
- C. **Bid Forms:** Contractor shall submit completed the detailed bid forms provided with this specification. Lump sum bids will not be accepted.
- D. **Project Narrative:** Contractor shall submit a summary of the scope of work, in Contractor's own words, illustrating a complete and thorough understanding of the project. The narrative shall include, but not be limited to room by room scope of work, project staffing and duration, quality assurance procedures and methodology, problem escalation procedures, and project schedule.
- E. **Proposed Solution:** The Contractor shall provide manufacturers cut-sheets for all the proposed materials that meet the requirements listed / described in Section 2 of this specification. On each cut sheet, provide an indicating arrow next to each part number of proposed material.
- F. A resume of qualification shall be submitted with the Contractor's bid indicating the following:
  - 1. The Contractor shall hold a valid State of California C-7 Low-Voltage license, shall have completed at least ten (10) projects of equal scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least five (5) years, and capable of being bonded to assure the Owner's Project Manager of performance and satisfactory service during the guarantee period.
  - 2. The Contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.
  - 3. A technical resume of experience for the Contractor's Project Manager who will be assigned to this project. This individual will remain as Project Manager for the duration of the project. The Contractor may change Project Managers only with the Owner's Project Manager's written approval.
  - 4. All personnel performing work on this project must have successfully completed the manufacturer's installation training course prior to performance of any work on this project. Accreditation will consist of individual employee certifications issued by the manufacturer. Copies of certification of such training must be presented prior to any work performed on this project. A list of technical product installation training attended by the Contractor's personnel within the past two (2) years that will install the Contractor shall be submitted with the response.
- G. The Contractor shall furnish a letter from the manufacturer, which certifies that the contractor is the Authorized Distributor and that the equipment shall be installed according to manufacturer intended practices. The Contractor shall also furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.
- H. The Contractor shall submit a detailed Bill of Materials developed for the project. The Bill of Materials shall contain a complete list of every component, part or device by part description, manufacturer and manufacturer's part number, quantity and unit of measure. See example format below. Product cut sheets shall be organized to match the order listed in the bill of materials. All cut sheets shall be numbered sequentially with matching page numbers indicated on the Bill of Materials. If more than one-part number appears

on a cut sheet, Contractor shall identify the proposed part with a RED arrow or RED circle.

Description	MFG & Part #	Quantity	Unit of Measure	Price
Speaker	QSC Audio	1	Each	\$

- I. This information may be used by the Owner to evaluate the Contractor's general understanding of the project scope during the bid evaluation. Errors/Omissions from this bill of material do not relieve the AVS contractor from providing all material, components, labor, etc., as outlined in this specification and on the drawings to provide a complete and useable AVS system.
  - J. Provide 3 copies of the above information at bid time.
- 1.06 POST AWARD SUBMITTALS: SUBMIT WITHIN THIRTY (30) DAYS OF AWARD.
- A. Submittals shall be in two (2) deliverables, the first submittal shall be equipment cut sheets and equipment index in PDF format. The second submittal shall be electronic reproducible shop drawings including single line block drawings, equipment locations, and mounting details (as pdf).
    - 1. A statement of sub-contractors, franchises, distributorship, dealerships, arrangements and agreements with manufacturers of equipment to be used for this work.
    - 2. Complete bill of quantities, including all material, components, devices and equipment required for this work. The bill of quantities shall be tabulated respective of each system as specified, in the order of the specification section 2 below, and shall contain the following information for each item listed:
      - a. Quantity
      - b. Description
      - c. Manufacturer's name and model number
      - d. Manufacturer's specification sheet
  - B. Samples approved by the architect, of all finishes/materials which will be visible to the public. Including at least receptacles and controls with associates trim plate and each type of loudspeaker baffle and/or grille.
  - C. Functional Diagrams: single-line block diagram showing interconnection of all components, receptacles, terminal blocks, controls, transformers and loudspeakers in addition to the active elements. Include terminal and cable numbers, all system and component labels. Show detailed system component information including but not limited to manufacturer's name, model number, any specialized part number option and all input and output connection information, for each piece of equipment. No drawing codes shall be permitted. Provide one (1) full-scale original or photograph (not blueprint) copy for each system. All shop drawing shall follow The InfoComm standard ANSI-J-STD-710 for audio, video, and control.
  - D. Equipment rack elevation drawings scaled (1-1/2" = 1'-0" or larger):
    - 1. Front Elevations: include equipment designation, manufacturer's name, model number, rack location and rack designation.
    - 2. Rear Elevations: include AC power wire-ways and route of wiring harnesses.

- E. Samples for approval by the architect of all finishes/materials that will be visible to the public including at least receptacles and controls with associated trim plate and each type of loudspeaker baffle and/or grille.
  - F. AV contractor fabricated items, detailed drawings showing all components, devices and equipment, including dimensions, component values, terminal designations, types, locations, manufacturer's name and model number.
- 1.07 GENERAL SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY
- A. Prior to Owner acceptance, the Contractor shall provide to the Owner's Project Manager, a manufacturers product and performance warranty. This will require a submittal of the required pre-job certification registration forms as well as the required project closing information. The Owner will only acknowledge acceptance upon submittal of a valid manufacturer's warranty.
  - B. Manufacturer's Site Certifications will not be accepted.
  - C. The warranty shall commence from the date of the Owners final written acceptance of the completed project.
  - D. All conditions for obtaining the manufacturers warranty shall be the sole responsibility of the Contractor.
  - E. The Contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the Owner after the end of the guarantee period.
  - F. A typewritten notice shall be posted at the equipment rack that shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.
- 1.08 SPECIFIC SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY
- A. Prior to Owner acceptance, the Contractor shall provide to the Owner's Project Manager, a manufacturers product and performance warranty. This will require a submittal of the required pre-job certification registration forms as well as the required project closing information. The Owner will only acknowledge acceptance upon submittal of a valid manufacturer's warranty.
  - B. The warranty shall commence from the date of the Owners final written acceptance of the completed project.
  - C. All conditions for obtaining the manufacturer's warranty shall be the sole responsibility of the Contractor.

- D. The Contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the Owner after the end of the guarantee period.
- E. A typewritten notice shall be posted at the equipment rack that shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

## PART 2 - PRODUCTS AND AUDIOVISUAL SYSTEM SCOPE OF WORK

### 2.01 ACCEPTABLE MANUFACTURERS

- A. All equipment listed herein will be by:
  - 1. Biamp, Extron, Belden, West Penn, or Equal.
- B. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications and the equipment's technical data sheets.
- C. The functions and features specified are vital to the operation of this facility. Therefore, inclusion of a component's manufacturer in the list of acceptable manufacturers does not release the Contractor from strict compliance with the requirements of this specification.

### 2.02 SYSTEM FUNCTIONS AND CAPABILITIES:

- A. The sound equipment will be housed in shared racks. The sound system shall be controlled by an Control System for the system functionality and volume control panels for manual control of the distributed speaker system zones.
- B. The AVS shall provide clear, natural sound uniformly distributed throughout the designated areas. The system shall utilize speakers as shown on the plans. These quantities shall be considered as the minimum quantity required. If additional speakers are needed to meet the requirements of section 2.02 sections C thru G below, the AVS Contractor shall include all costs for added speakers in the base bid.
- C. The system shall have adequate dynamic range without audible clipping or distortion to accommodate all types of program material. Audio, Digital Signal Processing shall be employed in the designated rooms to insure smooth frequency response, high acoustical gain before feedback. When at maximum level, the system shall operate without audible distortion, rattles and buzzes. All switching shall be silent and without pops and or transients.
- D. The system frequency response shall be within +/- 2dB from a curve which is flat from 80Hz to 4kHz and decreasing 3dB per octave from a relative level of 0 dB from 4kHz to 10kHz. There shall be a minimum 12dB roll-off above 10 kHz and below 63 Hz. Uniformity of coverage of the system at seated ear height (42") shall be within +/- 3dB in the 4kHz 1/3 octave band at any seat location using pink noise as a test signal.

- E. System noise shall not exceed an equivalent input noise of -120dB based on a 20KHz-noise bandwidth. The predominant noise component in the system output under any operating condition shall be that of the input stage.
- F. The system shall provide clear audio to all areas covered by the system. Each zone shall be wired discretely to the correct zone on the AMP. See AVS drawings for exact location.

## 2.03 SCOPE OF WORK

- A. The emergency paging system shall be networked based. Input source to the system shall be with a network to analog audio interface and a desk top microphone control station. Campus wide paging software used is Informacast by Singlewire and networked desk station microphone. Main paging processor will reside in the MDF Room A06, with processor/amplifier combo unit in IDF's H01 & K03. Speakers have been design in multiple zones however, the paging will take place as one combined zone.

## 2.04 AUDIOVISUAL SYSTEM PRODUCTS

- A. The system shall utilize AV products as shown on the Plans and listed below. These products shall be the minimum quantity, performance, functionality and quality levels. If additional and/or upgraded components are needed to meet the performance requirements of this specification, the AVS Contractor shall include all costs for such added and/or upgraded components in the base bid.

### B. Paging Systems Equipment

- 1. Audio
  - a. SPK1-1 to SPK1-x
    - 1) 45-Each, QSC ADS-8T, Speaker, YMS8T Yoke Mount kit, and all mounting hardware.
  - b. DSP1-1
    - 1) 1-Each, Biamp Vocia VI-8 Paging Digital Signal Processor.
  - c. DSP2-1 & DSP2-2
    - 1) 2-Each, Biamp Vocia VA43000CV, Paging DSP and Power Amplifier.
  - d. INT1-1
    - 1) 1-Each, Atlas IED ZCM-V2+, IP to Analog Audio Interface.
  - e. MIC1-1
    - 1) 1-Each, Biamp Vocia DS-4, Desktop Paging Station.

## 2.05 GENERAL PRODUCTS FOR SYSTEMS

### A. CABLE – ALL SPACES

- 1. Data Network CAT-6, plenum rated, see Section 271000 specifications.
- 2. Distributed Loudspeaker 16-2, 16 AWG, 2-conductor Outside Plant Rated (OSP): Belden, or equal.
- 3. Analog Microphone/Line Level cable, 2-22 (22 AWG conductor, jacketed, shielded, twisted-pair) plenum rated: Extron, Belden or equal.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. The installation, configuration, and wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the Contractor shall notify the Owner's Project Manager before making any changes. It shall be the responsibility of the manufacturer-authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.
- B. Furnish all conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.
- C. The cables within the rack or cabinets shall be labeled/numbered for identification following the InfoComm F51.01:2015 standard unless otherwise directed.
- D. Splices of cables in underground pull boxes are not permitted unless otherwise noted on the drawings.
- E. The labor employed by the Contractor shall be regularly employed in the installation and repair of audiovisual systems and shall be acceptable to the Owner's Project Manager to engage in the installation and service of this system.
- F. The Contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc. The Contractor shall remove all debris and rubbish created while this project. The Contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., caused by the performance of this work.
- G. The system must meet all local and other prevailing codes.
- H. All cabling installations shall be performed by qualified technicians.
- I. All cabling shall be splice free unless otherwise noted on drawings.
- J. To ensure the least amount of cable untwisting, it is required that all cables shall be stripped using a special tool.
- K. The use of lubricants (i.e. Yellow 77) to facilitate the installation of cables in conduits is highly discouraged. If such a lubricant must be used, the AVS Contractor shall verify the acceptability of the lubricant to be used with the cable manufacturer, prior to using such a lubricant. Lubricants that harden after installation are not allowed.
- L. Under no circumstance are "channel locks" or other pliers to be used.
- M. Cables may be run exposed above ceilings, provided the cabling is supported independent of other utilities such as conduits, pipes, and the ceiling support systems. The Contractor shall include all costs in base bid for any additional supports/seismic bracing required by the Local Authority having Jurisdiction. The cables shall not be laid



directly on the ceiling panels. The use of hook and loop ties shall be done in accordance with the cable manufacturer's requirements. The cable jacket composition must meet local and all other prevailing fire and safety codes – "Plenum Rated" cable shall be used.

- N. All firewalls penetrated by AVS shall be sealed by use of a non-permanent fire blanket or other method in compliance with the current edition of NFPA and the NEC or other prevailing code and must be a system listed by UL. The Contractor must not use concrete or other non-removable substance for fire stopping on cable trays, wire ways or conduits. Contractors who use this method will be required to replace all cables affected and provide the original specified access to each effected area. This requirement also applies to maintaining fire ratings of all floors penetrated by conduits or devices designated for use by voice and data cabling.
- O. All equipment racks shall be bolted to the floor by the Contractor in the location shown on drawings. The earthquake mounting brackets that come with each rack kit shall be screwed to studs, not drywall.
- P. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor before final acceptance at no cost to the Owner.
- Q. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- R. Cable raceways, when required, shall not be filled greater than 40% of cross sectional area.

### 3.02 SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

- A. All Audiovisual cabling used throughout this project shall comply with the requirements as outlined in the NEC Articles 725, 760, 770, and 800 and the appropriate local codes. All copper cabling shall bear UL listed type CMP (Plenum Rated). All fiber optic cabling shall bear OFNP (Plenum Rated). AVS contractor is responsible for installing appropriately rated cable for the environment in which it is installed. For cables run outside of a building to outdoor speakers, the cable shall be Outdoor Plant Rated or Direct Burial cable and must be run in conduit point to point. For longer cable runs between buildings fiber optic cable shall be used, the fiber cable shall be run in conduits.
- B. Cable Pathways:
  - 1. In suspended ceiling and raised floor areas where duct, cable trays or conduit are not available, the Contractor shall bundle cabling with half inch hook and loop strips, but not deforming the cable geometry. Cable bundles shall be supported via "J" hooks attached to the existing building structure and framework at a maximum of five (5) foot intervals. Plenum rated hook and loop ties will be used in all appropriate areas. The Contractor shall adhere to the manufacturers' requirements for bending radius and pulling tension of all cables.
  - 2. Cables or J hooks shall not be attached to lift out ceiling grid supports or laid directly on the ceiling grid.
  - 3. Cables or J hooks shall not be attached to or supported by fire sprinkler heads or delivery systems or any environmental sensor located in the ceiling air space.
  - 4. Where additional conduit(s)/sleeve(s) are required, but not provided by the electrical contractor, the Contractor shall be responsible to provide such

conduit(s)/sleeve(s). Conduit(s) and sleeve(s) shall be of suitable material, sized, installed, fire-stopped, and grounded as required by the NEC, ANSI/TIA/EIA standards and all other applicable codes and standards. Any conduit(s) and sleeve(s) added by the Contractor shall be approved by the Owner's Project Manager prior to rough-in.

- C. The Contractor shall be responsible for damage to any surfaces or work disrupted because of his work. Repair of surfaces, including painting, shall be included as necessary.
- D. Rack mounted equipment shall be grounded via the chassis, in accordance with manufacturer's instructions. The equipment chassis shall be bonded to the rack/cabinet using one of the following methods:
  - 1. If the equipment has a separate grounding hole or stud, use a # 6 AWG ground wire from the chassis ground hole/stud to the rack grounding bus if required.
  - 2. If the manufacturer suggests grounding via the chassis mounting flanges, use tri-lobular thread-forming screws (not self-tapping or sheet metal screws) to attach the equipment to the rack/cabinet rails. If the equipment mounting flanges are painted, remove the paint and apply an anti-oxidant, or use tri-lobular thread-forming screws and two (2) "Type B" internal-external tooth lock washers to safely ground equipment to the rack.
  - 3. All equipment racks shall be grounded to the AC outlet box or building ground by a # 6 AWG Green ground wire attached to the Grounding lug in the rack.

### 3.03 GENERAL INSTALLATION DESCRIPTION

- A. The labor employed by the AVS Contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.
- B. The Contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The Contractor shall remove all debris and rubbish occasioned by the work from the site. The Contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., Caused by the performance of this work.
- C. Labeling
  - 1. Wiring Labels: At all connection points for all types of cable & wiring, a label strip shall be attached at both ends of the cable following the InfoComm F51.01:2015 standard unless otherwise directed, indicating the name/number of that cable or wire as follows:
    - a. At internal locations (inside racks, cabinets, or boxes), a pressure sensitive label shall be used.
    - b. At external locations, a printed label covered with clear shrink wrap or approved labeling system shall be used.
  - 2. Equipment Labels: All active components shall have labels at the front and rear.
    - a. Labels shall be applied plumb and neat and shall not cover any equipment lights, recessed controls, or control labels.
    - b. Front labels shall indicate functional use of equipment.
    - c. Rear labels shall indicate system schematic reference designation.

3. AVS Contractor Label: Contractor name plate shall be attached to a blank panel inside each equipment rack or group of racks.
  - a. Name plate shall be printed, self-adhesive type and shall be no larger than 1-3/4" high by 6" wide. Alternatively, name plate may be preprinted onto a 1RU blank panel.
  - b. Name plate shall contain Consultant's name & city/state address and AVS Contractor's name, city/state address and phone number.
  
- D. Equipment Rack and Equipment Testing and Adjusting Procedures: Conduct procedures in fabrication shop following the ANSI/InfoComm 10:2013 Audiovisual Systems Performance Verification procedure. Verify safe and proper operation of all components, devices, or equipment, establish nominal signal levels within the systems and verify the absence of extraneous or degrading signals. Make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable. Submit test report with color photographs of each equipment rack, front and back. Perform at least the following procedures:
  1. Preliminary: Verify:
    - a. Grounding of devices and equipment. Integrity of signal and electrical system ground connections.
    - b. Proper provision of power to devices and equipment.
    - c. Integrity of all insulation, shield terminations and connections.
    - d. Integrity of soldered connections. Absence of solder splatter, solder bridges.
    - e. Absence of debris of any kind, tools, etc.
    - f. Routing and dressing of wire and cable.
    - g. All wiring, including polarity and continuity, including conformance with wire designations on running sheets, field and shop drawings.
    - h. Mechanical integrity of all support provisions.
    - i. All wiring in racks on horizontal lacing bars and vertical cable paths shall have Velcro cable wraps, no Zip Ties shall be allowed. If Zip Ties are used they shall be replaced at the Contractor's expense.
  2. Rig temporary power and grounding: Comply with all applicable Codes, regulations and ordinances.
  3. All equipment racks shall be bolted to the floor by the Contractor (unless noted) once the Owner determines the exact location for each rack. The earthquake mounting brackets that come with each rack kit shall be screwed to studs, not drywall. All equipment shall be serviceable in the racks final location – the need to unbolt racking equipment to access or service equipment is not acceptable.

### 3.04 PROJECT DIRECTION

- A. Single Point of Contact: Contractor will provide an English proficient, single point of contact, i.e., Project Manager, to speak for the Contractor and to provide the following functions:
  1. Initiate and coordinate tasks with Owner's Project Manager, and others as specified by Owner's Project Manager.
  2. Provide day-to-day direction and on-site supervision of Contractor personnel.
  3. Ensure conformance with all Contract provisions.
  4. Participate in weekly site project meetings.

5. This individual will remain as Project Manager for the duration of the project. The Contractor may change Project Managers only with the Owner's Project Manager's written approval.

### 3.05 PLANNING, ENGINEERING AND SUBMITTALS

- A. Planning meetings and schedule: Within thirty (30) calendar days after the date of award of the Contract, an initial planning meeting will be held with the successful bidder to clarify all requirements (systems, services, distribution methods, etc.), identify responsibilities, and schedule the events that will transpire during the implementation of the project. Within one (1) week of this initial meeting, the contractor shall provide a written report and project schedule to clearly document the events and responsibilities associated with the project.
- B. Within Thirty (30) calendar days after the date of award of the Contract, the Contractor shall submit three copies of the complete submission to the Owner's Project Manager for review. The submission shall consist of four major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.
  1. The first section shall be the "index" which shall include the project title and address, name of the firm submitting the bid and name of the Owner.
  2. The second section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all the specified equipment's features and functions as stated in the specifications and data sheets.
  3. The third section shall contain an original manufacturer data sheet for every component listed in the drawings or specifications.
  4. The fourth section shall contain a designation schedule for each system component location and complete "E" size (30" x 42"), unless otherwise specified, bond drawings, showing system wiring plans. The drawings shall be professionally drafted, generated on AutoDesk AutoCAD 2010 computer design software. These drawings shall also include:
- C. As-Built/Closeout Documentation: Within fifteen (15) days after the completion of work (signed off by Owner), the Contractor shall provide a complete Contractor-provided set of professionally drafted "E" size (30" x 42"), unless otherwise noted, reproducible bond as-built drawings, generated on AutoDesk AutoCAD 2014 computer design software. Contractor will supply to Owner one set of CDs containing all as-builts.
- D. As-Built Documentation Display in each equipment rack location: Within fifteen (15) days after the completion of work, the Contractor shall install a complete Contractor-provided, professionally drafted as-built floor plan in color in each equipment rack room mounting frame. Each floor plan, generated on AutoDesk AutoCAD 2014 computer design software and printed in black and white, shall depict all audiovisual jack locations in each room with an audiovisual system and all other areas. The Contractor will provide to Owner one set of CDs containing all as-built.
- E. Controls: Adjust all controls to achieve the specified performance. Provide security covers for all level controls, as appropriate to prevent unauthorized gain changes. Contractor will confirm that all control system operations are properly programmed and repeatable.

- F. Testing Report: Provide a letter/report documenting the results of these preliminary tests, including amplifier gain/level settings, crossover filter settings, and AV equalization curves for review by the Owner and the AV Design Consultant.
- G. Qualification for Acceptance: After completing preliminary testing, the Contractor shall furnish the Construction Manager with the letter/report documenting the results of the preliminary tests and five (5) copies of "as-built" wiring diagrams of the entire system including the connection numbers, and their locations. The receipt of this documentation will constitute the Contractor's acknowledgment that the installation is complete and conforms to this specification, and is ready to be reviewed and tested by the Owner and the AV Design Consultant.
- H. Acceptance Test: The Consultant, Owner's Representative and/or Construction Manager will be present during the acceptance testing and require the assistance and cooperation of the Contractor. Provide personnel who participated in the actual installation and preliminary testing and adjustment of the audiovisual systems.
  - 1. Equipment cabinet keys and any tamper-proof fastener tools must be available to the Owner and the AV Design Consultant. Delays associated with failure to access the equipment will be back-charged to the Contractor at the AV Design Consultant's current hourly rates.
  - 2. Each major component shall be demonstrated to function, as specified.
  - 3. Measurements: Further electrical and acoustical measurements may be performed at the discretion of the Owner and/or Owner's Representatives. Acoustical test equipment will be supplied by the Contractor. Such measurements may include sound pressure levels, uniformity of coverage, distortion, or other pertinent characteristics.
  - 4. The Contractor shall provide a laptop with all manufacturer supplied configuration software necessary for communicating with DSP Audio Matrix Mixers. A review of system settings may be required for either of the programmable units at the Owner and the AV Design Consultant's request, and settings may be adjusted if necessary.
- I. Such tests may be performed on any piece of equipment or system. If any test shows the equipment or system is defective or does not comply with the specifications, the Contractor shall perform any remedies at his expense and pay the subsequent expenses of any retesting required.
- J. Delays: If the acceptance of the system is delayed because it does not meet the specification requirements, the Contractor shall reimburse the Owner for all expenses of consultants retained to represent the Owner during the final acceptance testing. This will include costs associated with travel to the site, and include reimbursable business travel expenses.

### 3.06 INSTALLATION

- A. All installation shall be done in conformance with ANSI/TIA/EIA and InfoComm standards and manufacturers installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines will require the Contractor to provide, in a timely fashion, any additional material and labor necessary to properly rectify the situation to the satisfaction

and written approval of the Owner's Project Manager. This shall also apply to all damages sustained to the cables by the Contractor during the implementation.

1. **Bonding and Grounding:** The Contractor shall be responsible for providing an approved ground at all racks. The Contractor shall also be responsible for ensuring ground continuity by properly bonding all appropriate cabling, closures, cabinets, service boxes, and racks. All grounds shall consist of #6 AWG copper wire and shall be supplied from an approved building ground and bonded to the main electrical ground. Grounding must be in accordance with the NEC, NFPA, ANSI-J-STD-607-A and all local codes and practices.
2. **Power Separation:** The Contractor shall not place any low voltage and speaker cabling alongside power lines, or share the same conduit, channel or sleeve with in racks.
3. **Miscellaneous Equipment:** The Contractor shall provide any necessary screws, anchors, clamps, hook & loop ties, distribution rings, wire molding, miscellaneous grounding and support hardware, etc., necessary to facilitate the installation of the System.
4. **Special Equipment and Tools:** It shall be the responsibility of the Contractor to furnish any special installation equipment or tools necessary to properly complete the System. This may include, but is not limited to, tools for terminating cables, testing and splicing equipment for copper/fiber cables, communication devices, jack stands for cable reels, or cable winches.
5. **Labeling:** The Contractor shall be responsible for printed labels for all cables and cords, distribution frames, and outlet locations, according to the specifications. No labels are to be written by hand. The labeling shall follow the InfoComm F51.01:2015 standard unless otherwise directed.

### 3.07 DAMAGES

- A. The Contractor will be held responsible for all damages to portions of the building caused by it, its employees or subcontractors; including but not limited to:
  1. Damage to any portion of the building caused by the movement of tools, materials or equipment.
  2. Damage to any component of the construction of spaces.
  3. Damage to the electrical distribution system.
  4. Damage to the electrical, mechanical and/or life safety or other systems caused by inappropriate operation or connections made by the Contractor or other actions of Contractor.
  5. Damage to the materials, tools and / or equipment of the Owner, its consultants, agents and leases tenants.

### 3.08 PENETRATIONS OF WALLS FLOORS AND CEILINGS

- A. Unless specifically shown on the drawings, the Contractor shall make no penetration of floors, walls or ceiling without the prior written approval of the Owner's Project Manager.
- B. Any penetrations through acoustical walls or other walls for cable pathways shall be sleeved by the Contractor. Sleeves shall consist of metallic conduit deburred and grommetted on both ends, with flanges or other means to prevent the sleeve from slipping or falling out of the partition. Sleeves shall extend a minimum of 6" on both sides of the partition. Outside perimeter of sleeves shall be sealed against sound, air, heat, or as required by partition design. Inside of sleeve shall be sealed similarly after installation

of all cabling. Cables shall be independently supported on either side of the sleeve. Sleeves shall not be used as cable supports. Additional requirements in compliance with applicable code shall apply.

- C. Any penetrations through fire-rated walls for cable pathways/cables shall be sealed by the Contractor as required by code and as directed by Owner's Project Manager. The Contractor shall be required to work together with the General Contractor and the Electrical Contractor to coordinate and develop all fire stopping methods prior to any cable installation. The Contractor shall also, prior to the commencement of on-site activities, submit to Owner's Project Manager, details of any special systems to be used.

### 3.09 TESTING/WARRANTY

- A. The Contractor shall provide competent, factory-trained engineers and/or technicians, authorized by the manufacturer of the AVS, to technically supervise and participate during all tests for the systems. All performance testing shall follow the ANSI/InfoComm 10:2013 Audiovisual Systems Performance Verification procedure.

### 3.10 COMPLETION OF WORK

- A. At the completion of the System, the Contractor shall restore to its former condition, all aspects of the project site and daily, shall remove all waste and excess materials, rubbish debris, tools and equipment resulting from or used in the services provided under this Contract. All clean up, restoration, and removal noted above shall be by the Contractor and at no cost to Owner. If the Contractor fails in its duties under this paragraph, Owner may upon notice to the Contractor perform the necessary clean up and deduct the costs thereof from any amounts due or to become due to the Contractor. It shall be the Contractor's responsibility to remove trash from the areas it is working in and bring trash and debris to the Contractor provided dumpster.

### 3.11 INSPECTION

- A. On-going inspections shall be performed during construction by the Owner's Project Manager. All work shall be performed in a quality manner and the overall appearance shall be clean, neat and orderly.

### 3.12 MISCELLANEOUS PROJECT REQUIREMENTS SYSTEM DOCUMENTATION, TRAINING, AND FIELD SUPPORT

- A. Operation and Maintenance Manuals: As part of the "Close Out" documents, for each system, provide five (5) copies of system manuals per system. Manuals shall be in adequately sized three-ring binders, clearly labeled on spine. Manuals shall contain the following:
  1. Service Reference Cover Sheet: Provide a cover sheet with Audiovisual AVS Contractor name, address, Email, WEB Address, telephone and Fax numbers.
  2. System Operation Instructions: Step-by-step operating instructions based on the control system touch panel (if applicable) for the basic day-to-day use of the system including power activation, connection of source devices, adjustment of volume levels, selection of sources, etc. Include illustrations and references to individual equipment manuals as necessary.

3. Equipment Manuals: Include copies of individual equipment operation manuals separated by tabbed dividers. Order the manuals in nominal signal path order (i.e. sources first, amplifiers/loudspeakers last), followed by control system manuals, followed by miscellaneous manuals.
  4. Equipment List: List all system equipment including, connectors and specialty hardware, by manufacturer and model and serial number.
    - a. As-built Drawings: Provide reduced 11"x17" foldout "as built" functional diagrams in clear plastic binder sleeves. Fold and insert drawings so that drawing title is clearly visible at the front of the sleeve. Five (5) half or full-size drawing sets are also to be provided for clearer system reference.
    - b. Provide software programmable device configuration files to the Owner for all control system interfaces and computer-based files, and the DSP Audio Matrix Mixer. Store files on site in the system documentation binders in disk sleeves. Provide the files on CD-ROM.
- B. Training: Provide as needed system training to operator(s) designated by the Owner. Training time is to be non-contiguous, in multiple separate sessions. Training sessions are to be videotaped upon Owner request.
- 3.13 MISCELLANEOUS SUPPORT REQUIREMENTS
- A. Upon approval of shop drawings and equipment submittals, Contractor shall immediately place orders for all required materials, components, and supplies especially long lead items. In addition, Contractor shall secure and forward written confirmations (including orders and shipping dates) direct from each manufacturer/vendor to the Owner's Project Manager.
  - B. Contractor shall expedite shipment of all materials, components and supplies, as necessary to ensure the successful completion of the Project by the date required. All costs for expediting shall be included within Contractor's pricing as provided below.
  - C. The system/network cost herein shall include administration/maintenance training for at least ten Owner's representatives with a minimum allotment of sixteen hours. All training shall include written and/or video materials that shall remain the property of Owner. If materials are written, they shall be provided in quantities sufficient for each person trained; if materials are video, one copy of each will be required. The administration/maintenance training shall include, but not be limited to, the following:
    1. Review of as-built documentation, including a site demonstration.
    2. All warranty information.
- 3.14 AV SYSTEM AND/OR NETWORK TESTING
- A. Upon completion of installation, Contractor shall execute all the required tests as summarized in this specification. When all such tests have been completed to Owner's satisfaction and Manufacturer's specifications, Contractor shall give the Owner written notice thereof.
  - B. Contractor must assume responsibility of assuring that the AV system and/or network installed operates properly, including any required coordination with other suppliers.



3.15 FINAL ACCEPTANCE

- A. The Owner or Owner's representative may visit the site during the installation of the system to ensure that correct installation practices are being followed.
- B. The Owner or Owner's representative will conduct a final job review once the Contractor has finished the job. This review will take place within one week after the Contractor notifies the owner.
- C. Two copies of all certification data and drawings for all identifications shall be provided to the Owner before the owner's review.
- D. The Owner or Owner's representative will review the installation and certification data prior to the system acceptance.
- E. The Owner or Owner's representative may test some of the systems features to ensure that the certification data is correct. If a substantial discrepancy is found, the Owner reserves the right to have an independent consultant perform a certification of the entire system. If such a procedure is undertaken, the cost of the testing will be billed back to the Contractor.
- F. If repairs or adjustments are necessary, the AVS Contractor shall make these repairs at his own expense. All repairs shall be completed within 5 days from the time they are discovered.
- G. The Contractor shall hand to the owner a copy of any applicable installation specific software configurations in CD format.

**END OF SECTION**

SECTION 27 51 26

ASSISTIVE LISTENING SYSTEM (ALS)

PART 1 GENERAL

1.01 SUMMARY

- A. The work includes the provision of Assistive Listening Systems (ALS) as part of the building project.
- B. In the absence of fixed ALS, portable ALS shall be provided and installed by the Campus, where specified.
- C. Scope of Work: The work shall consist of the design, provision, termination, testing, and documentation of a complete and fully functional ALS. The instructions in this section are specific to the ALS installations and should be read in conjunction with other contract documents as applicable.

PART 2 PRODUCTS

2.01 ASSISTIVE LISTENING SYSTEM

- A. Furnish an FM wireless assistive listening system for use by the hearing-impaired. There will an installed portable RF system to utilize in the smaller systems. The assistive listening system (ALS) shall be capable of broadcasting on 57 channels and be frequency agile. The ALS system shall have 80dB SNR or greater, end-to-end. Receivers shall be frequency agile and frequency set with a "seek" button. The receiver will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset and listen to audio normally. The portable receivers and transmitters shall incorporate automatic battery charging circuitry for recharging of Ni-MH batteries. Listen Technologies Corporation products are specified. Provide Portable ALS systems per specifications.
- B. Portable RF ALS System – Furnish and install the following:
  - 1. Listen Technologies LT-700-072 Portable Transmitter (Qty: 1 ea.)
  - 2. Listen Technologies LA-278 Behind-the-Head Microphone (Qty: 1 ea.)
  - 3. Listen Technologies LR-400-072 Portable Display receiver (Qty: 6 ea.)
  - 4. Listen Technologies LA-164 Ear Speaker (Qty: 6 ea.)
  - 5. Listen Technologies LA-166 Neck Loop. (Qty: 6 ea.)
  - 6. Listen Technologies LA-362 NiMH rechargeable batteries. (Qty: 7 ea.)
  - 7. Listen Technologies LA-321-01 8-Unit Charging/Carrying Case (Qty 1 ea.)

8. Listen Technologies LA-304 ADA Access/Compliance signage kit. (Qty 1 each per room.)

## PART 3 EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. Assistive Listening transmitters shall be provided by the Campus in the following rooms:
  1. Provide portable transmitters per AV Specifications and Major Equipment and Approved Manufacturer List for each phase.
  2. Each room with a sound reinforcement system and 50 seats or more shall receive a fixed and installed ALS transmitter system.
  3. If multiple transmitters are specified within a facility, it is recommended that the adjacent transmitter channels be at least 300MHz apart. If no interference, the following channels are recommended; A, C, E, I, J and H.
- B. Assistive Listening receivers shall be provided by the Owner as follows:
  1. Provide headset receivers shall have receivers available for checkout per the campus assigned personnel.
  2. Each portable system will be provided with 6 receivers
- C. Portable ALS transmitters and receivers will be given by the owner for distribution.
- D. Equipment to be installed in accordance with manufacturer's instructions.

### 3.02 TESTING

- A. Following the installation of transmitters and antenna, each transmitter and receiver will be tested.
- B. Transmitters shall support signal distribution at all specified channels at any position in the instructional room to which its use is dedicated.
- C. Receivers shall be tested to verify function as specified by manufacturer.

#### Assistive-listening Systems

- Assistive-listening systems shall be provided in accordance with **CBC Section 11B-219** and shall comply with **CBC Section 11B-706**.
- The minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25 % minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with **CBC Section 11B-706.3**.
- If the system provided is limited to specific areas or seats, then such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of, the stage or playing area. **CBC Section 11B-219.4**

**SECTION 27 51 27**

**EMERGENCY COMMUNICATION STATIONS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

**A. Work Included:**

1. Under this Section, the Contractor is to provide Wall Mounted Emergency Communications Stations (ECS), including procuring, installing, and rendering fully operational all necessary hardware, software, firmware, conduits, wiring, and any other related or required appurtenance or device, as required for a complete and workable installation which meets or exceeds the project performance specifications, whether or not any such component, conduit, wiring, or other related or required appurtenance or device is specifically listed or called out.
2. Equipment to be provided and installed includes, but is not limited to:
  - a. Wall Mounted Emergency Communication Stations
  - b. Any required or associated device, component, hardware, software, or firmware
  - c. Power and Data Cabling, Conduit, and Infrastructure as required for a completely operable system which meets or exceeds all performance specifications
3. The work includes providing all labor, materials, tools, equipment, and documentation required for a complete and working Emergency Communications System as specified in this document.

**B. Abbreviations and Acronyms**

1. ADA = Americans with Disabilities Act
2. ECS = Emergency Communications Station
3. EEPROM = Electrically Erasable Read Only Memory
4. PBX = Private Branch Exchange
5. LED = Light Emitting Diode
6. UPS = Uninterruptable Power Supply
7. PVT = Performance Verification Testing

**C. Definitions**

1. Emergency Communications System – Panic button type emergency phones, which allow for rapid establishment of emergency communications with responding authorities.

**1.02 RELATED DOCUMENTS**

**A. Section 27 05 00 – Common Work Results for Communications**

- B. The Specifications and Drawings are intended to be complementary. A specific section, paragraph or heading in a Division may not describe all details concerning work to be done and materials to be furnished. The Drawings are diagrammatic and may not show all of the work required or all construction details. Dimensions are shown for critical areas only; all dimensions and actual placements are to be verified in the field. It is to be**

understood that the best trade practices of the Division will prevail. It remains the responsibility of the Contractor or Subcontractor to provide all items, equipment, construction, and services required to the proper execution and completion of the Work.

- C. Reference listings are provided as a convenience to the Contractor or Subcontractor providing the Work of this Section and may not contain all the requirements affecting this Section. It remains the responsibility of the Contractor or Subcontractor to locate and comply with all requirements of the Contract Documents.
- D. All related specification sections shall be used in conjunction with this section.

### 1.03 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** The manufacturer of all equipment installed as a part of this contract shall meet the following criteria:
  - 1. Shall be regularly engaged in the manufacture and assembly of similar type equipment for a minimum of five (5) continuous years preceding the date of this document.
  - 2. Shall have an office staffed with factory trained technicians, fully capable of engineering, supervising installation, system start-up, providing Owner training and supervising of both hardware and software for the all systems installed as a part of this project.
- B. **Contractor Qualifications:** The Contractor shall meet the following qualifications at a minimum:
  - 1. Shall be an authorized factory trained and certified reseller of all system components installed or interfaced with as a part of this contract.
  - 2. Contractor shall be regularly engaged in installing similar equipment, and shall have successfully completed 3 systems of a similar size and scope within the preceding 3 years of the date of this document. These systems must be currently in operation, and the contractor shall supply the following reference information with their proposal:
    - a. Name of Client
    - b. Type of Facility
    - c. System Installed
    - d. Date of Substantial Completion
    - e. Names of Contractor's Key Personnel on Project
    - f. Contact Name, Title, Phone, and Email
  - 3. It is expected by the Owner that the same key personnel will execute this project as completed the referenced work. This would include the Project Manager, the Project Engineer, and the Lead Installer. Resumes will be provided for these personnel. If different key personnel are executing this project than executed the reference projects, resumes for these personnel shall be provided for the Owner's approval with the Contractor's bid package.
  - 4. Sub-contractors shall provide resumes showing qualification for the specific system that the sub-contractor will be installing / configuring.
  - 5. Contractor shall be certified with BerkTek Cabling Solutions, and project installation staff shall be similarly and independently certified

1.04 SUBMITTALS

A. General:

1. Prior to installing any material related to or required by this section, submit the following information for review.
  - a. Block diagrams of the proposed system and interconnection wiring diagrams showing all connections required between system components.
  - b. A materials list with names of manufacturers, model numbers, and technical information on all equipment proposed. Product technical information sheets for each principal component in the proposed system. Include wire/cable specifications and wire/cable marking material. Where the data sheet covers a range of material, the specific part number shall be highlighted
  - c. 6 complete sets of operations and maintenance manual for the system products being supplied, provided in 3-ring binders, and 1 complete set submitted in electronic format on DVD. Include complete sets of the equipment operating instructions, installation instructions, and troubleshooting guides.

B. Testing:

1. PVT Plan to be submitted a minimum of 20 working days prior to planned start of PVT procedure.

C. Close Out:

1. Within 10 working days of substantial completion and prior to project closeout, the Contractor shall provide to the Owner a complete set of As-Built drawings, showing any deviation from the original plans and specifications, in mounting location, infrastructure pathway, or any other substantive change.

1.05 WARRANTY

A. General:

1. All equipment and system shall be warranted against defects in material and workmanship for a period of one (1) year from the date of startup. Warranty coverage shall include parts, labor, travel, expenses, and labor to remove/reinstall all products. The warranty document shall be submitted with the Contractor's submittals and shall include details on inclusions and exclusions, deductibles, and availability of extended coverage options, priced for extended coverage in years 2, 3, and 4 past expiration of the original warranty period.
2. Warranty service shall be separated into 2 classes of service, critical item service and non-critical item service.
3. Critical items shall be described as any part or device which if fails would cause spaces to be inaccessible to any authorized person, for example, card reader failure. Critical failures are to be corrected within 24 hours of notification to the Contractor, 7 days per week. Non-critical failures are to be corrected within 7 days of notification to the Contractor.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND MODEL NUMBERS

- A. Cabling shall be CAT 6A as manufactured by BerkTek in order to provide a 20-Year Warranty.
- B. Emergency Phones: Talk-a-Phone, Niles Illinois  
Model ETP-400 / ETP-WM with no equivalent

2.02 PERFORMANCE SPECIFICATIONS

- A. The Emergency Communications Stations shall have the following features and functionally at a minimum:
  - 1. General Description – The Emergency Communications Station shall consist of a vandal-resistant, hands-free speakerphone communications device with a stainless-steel faceplate and metal button.
  - 2. The ECS shall have one anodized aluminum tactile button labeled “EMERGENCY”, and one 0.375” diameter red LED labeled “LIGHT ON INDICATES PHONE CALL RECEIVED”.
  - 3. The ECS shall be mounted in the appropriate wall mount enclosure, vandal resistant with a lighted faceplate and a blue strobe which provides a minimum light output of 209 Lumens.
  - 4. The ECS shall be programmable from a remote location and have a two-number dialing capability, reverting to the second number if the first is busy, or does not answer. The unit shall be totally hands-free on both sides after initial activation either on site or by responding authorities. The unit shall be phone-line powered, and shall require external power only for the strobe light.

PART 3 - EXECUTION

- 3.01 General Intent – It is the intent of the owner to have a qualified contractor install a complete and fully operational Emergency Communications System, as shown on the project drawings which provides the means for personnel transiting the campus to summon help or assistance.
- 3.02 The contractor shall procure, provide, install, and make fully operational the system as described in this specification and shown on the project drawings. Specific scope items include, but are not limited to:
  - A. Provision and installation of Emergency Communications Station components as shown on project drawings
  - B. Provision and installation of Emergency Communications System headend controllers and software (Owner to provide workstations and servers)
- 3.03 DELIVERY, STORAGE AND HANDLING:
  - A. Intent – It is the intent of the Owner to have a qualified contractor procure, provide, install, and render fully operational ECS components as shown on the project drawings, in order

to provide an Emergency Communications System which allows personnel on the campus to have a ready means of contacting responding authorities in times of emergency.

B. Product Acceptance, Storage, and Handling Requirements

1. Acceptance – Upon delivery to the project site, Contractor shall inspect all products and materials to assure that all products and material have been received in a new and undamaged state. Acceptance of the shipment, by the Contractor, shall constitute acknowledgement that the Contractor has reviewed the products and material and has found no discrepancies in quantity or condition, and that any products or materials subsequently found to be missing or damaged will be the sole responsibility of the Contractor.
2. Storage and Handling - Store products and materials in the original manufacturer's sealed packaging, in an environmentally controlled area per the manufacturer's specifications.

C. Before Beginning Work

1. Site Verification of Conditions – Contractor shall be responsible for examining the pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions which would affect the project execution. Any such unsatisfactory pathways shall be reported to the Owner.
2. Proceed with installation only after all unsatisfactory issues have been corrected or resolved.

D. General Installation Requirements:

1. ECS locations as shown on drawings are conceptual in nature, and Contractor shall verify final placement with the Owner before beginning any work.
2. Maintain strict site security throughout the course of the project. Rooms housing the equipment and workstations shall be locked up and secure during periods when Contractor personnel are not present.
3. Utilize protective cover, fenders, and barriers to ensure all equipment remains in an undamaged and new condition until notice of substantial completion.
4. Install system per the manufacturer's instructions.
5. The installed system must meet all local, state, and federal codes.
6. Contractor shall verify that all power feeds for powering the system strobe lights are connected to the buildings emergency power UPS.
7. Contractor shall be responsible for providing all conduit, junction boxes, conductors, equipment plugs, terminal strips and labor to install a complete and operational system.
8. Equipment racks shall be seismically bolted to the floor by the Contractor once the Owner determines the final location for each rack. Any mounting brackets attached to walls shall be screwed to studs, not drywall. All rack-mounted equipment shall be able to be serviced within the rack and in the rack's final location. The need to unbolt racking equipment to access or service equipment shall not be acceptable.
9. Cables shall not be spliced in underground enclosures.
10. Splices must be kept to a minimum. Any field splices must be secured in a NEMA box appropriate to the conditions.
11. The use of wire lubricants is highly discouraged. If usage of such lubricant cannot be avoided, Contractor shall procure verification, in writing, from the cable



manufacturer stating that the specific lubricant used is acceptable and will not damage or degrade the cable.

Cable tray pathways designated for telecom shall not be utilized for support of conduit, conductors, or control wiring of any type, except as specified in this section. No Access Control, Surveillance, or Intrusion Detection cabling which is not Category 5 or 6 shall be intermingled with such Category 5 or 6 cabling. Non-telecom low voltage cabling shall be segregated to one side of the cable pathway and kept separated from telecom cabling through utilization of cable management.

12. All firewalls penetrated by Access Control, Surveillance, or Intrusion Detection cabling shall be sealed by the Contractor. A non-permanent method of sealing shall be utilized, such as fire blanketing or other approved method in compliance with the current edition of National Fire Protection Association (NFPA), the National Electric Code (NEC), and any other applicable code. Method and material utilized must be a system listed by Underwriter's Laboratory (UL) for that purpose. The Contractor shall not utilize concrete or other non-removable substance for fire stopping on cable trays, raceways, or conduit. If the Contractor uses permanent substances, the Contractor will be required to replace all cables and pathways affected as to provide the original specified access to each area at the Contractor's own expense.

E. Coordination

1. Contractor shall coordinate all work with any other trades present on the project which will be directly affected by the execution of this contract.
2. Contractor shall coordinate all work with the Owner as to avoid impacting any student activities or classes to the greatest extent possible.

F. Testing and Commissioning:

1. The Contractor shall be responsible for final system hardware hook up and checkout prior to performance verification testing being conducted with the Owner. The Contractor shall pre-test all cabling to assure cabling is free from interference, opens, grounds, or short circuits.
2. The Contractor shall develop a Performance Verification Testing (PVT) plan. The PVT plan shall identify each new system component included in the project, the intent of testing it, methods and tools required for the testing, and expected result. Each component shall be individually listed with space for noting PASS or FAIL, Contractor / Owner Sign-off, time and date of test, and related comments. The PVT plan shall be submitted to the Owner a minimum of 20 (TWENTY) working days prior to the scheduled beginning of PVT. No testing shall take place until Owner has approved the PVT.
3. As a part of the final system commissioning, Contractor shall submit a listing of all enabled passwords within the system, and shall provide instruction specific to changing the password after the Contractor's departure from the site.
4. Following satisfactory completion of PVT plan, the system shall be operated at normal facility load for a period of 30 calendar days as a burn-in period. If any item or system fails during the burn-in period, the burn-in period shall be suspended until such item or system has been corrected, at which time the test period will recommence. Notice of final System Acceptance will be withheld until burn-in period has been successfully completed.
5. Notice of Final System Completion will not be issued until the following requirements have all been met:
  - a. All required submittals accepted.

- b. Delivery of final documentation, including but not limited to As-Built drawings.
  - c. Successful PVT & burn-in period
  - d. Completion of all required training activities.
  - e. Purging of all Contractor passwords and removal of all Contractor access to the systems.
- G. Training and Instruction:
- 1. Before the system is turned over to the owner, the manufacturer shall provide 16 hours of system operations and maintenance training at the project site using the customer's equipment for up to 10 of the owner's representatives. The Owner shall determine hours to be allocated to each training type.
  - 2. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
  - 3. This training shall be conducted by a manufacturer certified trainer.
  - 4. Training materials shall not be generic, and shall be specific to the project.
- H. Warranty:
- 1. The system shall be warrantied for a period of 1 year from date of acceptance. Written notification shall be sent to the owner stating the date this warranty period has started.
  - 2. The equipment manufacturer shall provide with their bid package to the owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.
  - 3. The Contractor shall provide with their bid package to the Owner a proposal for an extended parts and labor warranty service, priced for the 1st, 2nd, and 3rd years of post-warranty period operation.
- I. Site Clean-up
- 1. Upon completion of the contract, Contractor shall be responsible for project site cleanup. All installed materials shall be clean, enclosures free of dust and debris, and surfaces wiped free of smudges and fingerprints. The Contractor shall remove all project associated debris and rubbish occasioned by the work from the site. The contractor shall clean all interior spaces dirtied by the work. Remove all temporary protective covers and shrouds from all equipment.

**END OF SECTION**

**SECTION 28 01 00**

**ELECTRONIC SAFETY AND SECURITY  
GENERAL PROVISIONS**

**ARTICLE 1 - SUMMARY**

- 1.1 This Division of the specifications outlines the provisions of the contract work to be performed as a sub contract under the Division 26 scope of work. Reference the Division 26 Electrical General Provisions for scope of work and general requirements.
- 1.2 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under Division 1 requirements.

**END OF SECTION**

**SECTION 28 10 00**

**ACCESS CONTROL – SECURITY ALARM SYSTEM**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

**A. Work Included:**

1. Under this Section, the Contractor is to provide an Access Control and Intrusion System, including procuring, installing, and rendering fully operational all necessary components as required for a complete and workable installation which meets or exceeds the project performance specifications.
2. Equipment to be provided and installed includes, but is not limited to:
  - a. Access Control Software.
  - b. Access Control Hardware.
  - c. Intrusion Detection Control Panel.
  - d. Intrusion Detection Keypad / Control Station.
  - e. Access Control Card Readers, REX Sensors, and supporting equipment.
  - f. Intrusion Sensors.
  - g. System specific cabling other than data / telecom
  - h. Any other hardware, firmware, or software required for a fully operational system.
3. Access Control and Intrusion Control panels shall be capable of being connected to an Owner provided security TCP/IP V-LAN network. Coordinate with Communications Contractor
4. The work includes providing all labor, materials, tools, equipment, and documentation required for a complete and working access control security alarm system as specified in this document.

**B. Related Work Provided by Owner:**

1. The Contractor shall coordinate the work with the related work provided by the Owner including but not limited to the following:
  - a. Network
  - b. Data/Telecom Cabling
  - c. Conduit, boxes, fittings

**C. Abbreviations and Acronyms**

1. ACS = Access Control System
2. CCTV = Closed Circuit Television
3. DVD = Digital Video Disc
4. EACS = Embedded Access Control System
5. LAN = Local Area Network
6. LED = Light Emitting Diode
7. TCP/IP = Transport Control Protocol / Internet Protocol
8. UPS = Uninterruptable power Supply
9. PVT = Performance Verification Testing
10. V-LAN = Virtual Local Area Network

**D. Definitions**

1. 24-Hour Zone – A function in which a given IDS point will cause activation of notification appliances and central station reporting whether or not the IDS is in an armed state
2. Access Control System – Electronic system which controls physical access to the premise through credentialed identification of authorized system users.
3. Access Groups – Segregating PACS users into groupings of users with similar characteristics such as authorized spaces and times.
4. Anti-Passback – The ability of a PACS to deny entry to a credential, after the credential has previously logged in to the facility and has not yet logged back out.
5. Door Left Ajar – The ability of a PACS to notify the system operator(s) that a credential authorized entry point was not secured after the entry transaction.
6. Duress Code – A means for an authorized user who is entering a disarming code to indicate that they are being forced to disarm the system and help should be sent. There shall be no audible nor visible indication that a duress code has been entered.
7. Entry / Exit Zone – Doorways which trigger a time-delay before activating the Intrusion Detection System (IDS) in order to allow authorized personnel to enter the disarming code on a keypad.
8. Forced Door – The ability of the PACS to send an alert to the system operator(s) that a door has been forced open without a credential being presented. PACS controlled doors are 24-Hour type points on the IDS, and this shall cause audible / visual appliances to activate, and the system to notify the central station.
9. Intrusion Detection System (IDS) – Electronic system monitoring various sensors to detect unauthorized entry into building spaces
10. Lockdown Activation – The capability of a door's locking mechanism to be engaged and locked down against standard credential access with an activation switch, either via a control point(s) in authorized locations or on the locking mechanism itself.
11. Pass-Through – An authorization added to a ACS user's credential which allows that user to open a door even while it is in a lock-down state.
12. Perimeter Zone – Any door, window, motion detector, or other device which, when triggered, instantly activates the IDS audible / visual appliances and causes the system to report to the central station.
13. Proximity Card Readers / Card – Reader and card designed to validate when an authorized card is presented to the reader.
14. Smart Card – Contact or Contactless Credential having additional memory and capabilities for 2-way communications between card and reader.
15. Strong Authentication – The ability to enable one or more secondary means of identifying a credential holder before granting access, typically a Personal Identification Number (PIN) or a biometric component such as fingerprints.
16. Two-Man Rule – The ability of a PACS to deny a single credential from entering access controlled spaces unless a second credential is present.

## 1.02 RELATED DOCUMENTS

- A. Section 27 05 00 – Common Work Results for Communications
- B. The Specifications and Drawings are intended to be complementary. A specific section, paragraph or heading in a Division may not describe all details concerning work to be done and materials to be furnished. The Drawings are diagrammatic and may not show all of the work required or all construction details. Dimensions are shown for critical areas

only; all dimensions and actual placements are to be verified in the field. It is to be understood that the best trade practices of the Division will prevail. It remains the responsibility of the Contractor or Subcontractor to provide all items, equipment, construction, and services required to the proper execution and completion of the Work.

- C. Reference listings are provided as a convenience to the Contractor or Subcontractor providing the Work of this Section and may not contain all the requirements affecting this Section. It remains the responsibility of the Contractor or Subcontractor to locate and comply with all requirements of the Contract Documents.
- D. All related specification sections shall be used in conjunction with this section.

#### 1.03 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** The manufacturer of all equipment installed as a part of this contract shall meet the following criteria:
  - 1. Shall be regularly engaged in the manufacture and assembly of similar type equipment for a minimum of five (5) continuous years preceding the date of this document.
  - 2. Shall have an office staffed with factory trained technicians, fully capable of engineering, supervising installation, system start-up, providing Owner training and supervising of both hardware and software for the all systems installed as a part of this project.
- B. **Contractor Qualifications:** The Contractor shall meet the following qualifications at a minimum:
  - 1. Shall be an authorized factory trained and certified reseller of all system components installed or interfaced with as a part of this contract.
  - 2. Contractor shall be regularly engaged in installing similar equipment, and shall have successfully completed 3 systems of a similar size and scope within the preceding 3 years of the date of this document. These systems must be currently in operation, and the contractor shall supply the following reference information with their proposal:
    - a. Name of Client
    - b. Type of Facility
    - c. System Installed
    - d. Date of Substantial Completion
    - e. Names of Contractor's Key Personnel on Project
    - f. Contact Name, Title, Phone, and Email
  - 3. It is expected by the Owner that the same key personnel will execute this project as completed the referenced work. This would include the Project Manager, the Project Engineer, and the Lead Installer. Resumes will be provided for these personnel. If different key personnel are executing this project than executed the reference projects, resumes for these personnel shall be provided for the Owner's approval with the Contractor's bid package.
  - 4. Sub-contractors shall provide resumes showing qualification for the specific system that the sub-contractor will be installing / configuring.

#### 1.04 SUBMITTALS

- A. General:

1. Prior to installing any material related to or required by this section, submit the following information for review.
  - a. Block diagrams of the proposed system and interconnection wiring diagrams showing all connections required between system components.
  - b. A materials list with names of manufacturers, model numbers, and technical information on all equipment proposed. Product technical information sheets for each principal component in the proposed system. Include wire/cable specifications and wire/cable marking material. Where the data sheet covers a range of material, the specific part number shall be highlighted
  - c. 6 complete sets of operations and maintenance manual for the system products being supplied, provided in 3-ring binders, and 1 complete set submitted in electronic format on DVD. Include complete sets of the equipment operating instructions, installation instructions, and troubleshooting guides.

B. Testing:

1. PVT Plan to be submitted a minimum of 20 working days prior to planned start of PVT procedure.

C. Close Out:

1. Within 10 working days of substantial completion and prior to project closeout, the Contractor shall provide to the Owner a complete set of As-Built drawings, showing any deviation from the original drawings and specifications, in mounting location, infrastructure pathway, and / or any other substantive change.

## 1.05 WARRANTY

A. General:

1. All equipment and system shall be warranted against defects in material and workmanship for a period of one (1) year from the date of startup. Warranty coverage shall include parts, labor, travel, expenses, and labor to remove/reinstall all products. The warranty document shall be submitted with the Contractor's submittals and shall include details on inclusions and exclusions, deductibles, and availability of extended coverage options, priced for extended coverage in years 2, 3, and 4 past expiration of the original warranty period.
2. Warranty service shall be separated into 2 classes of service, critical item service and non-critical item service.
3. Critical items shall be described as any part or device which if fails would cause spaces to be inaccessible to any authorized person, for example, card reader failure. Critical failures are to be corrected within 24 hours of notification to the Contractor, 7 days per week. Non-critical failures are to be corrected within 7 days of notification to the Contractor.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. PC's, Servers, Workstations

1. Shall be provided by the Owner.

B. Access Control System Hardware:

1. SMS software as manufactured by Vanderbilt with no equivalent.
2. SPRE-SVR-5 Premier 5 Client Software and PC Server as manufactured by Schlage Electronics with no equivalent.
3. SRCNX-R Reader Controller as manufactured by Schlage Electronics with no equivalent.
4. SRINX Reader Interface Module as manufactured by Schlage Electronics with no equivalent.
5. SIONX-8 Expansion Board w/8 single pole double throw (SPDT) relay outputs as manufactured by Schlage Electronics with no equivalent.
6. MT15 Multi-Technology Card Reader as manufactured by Schlage Electronics with no equivalent.
7. SXF7510 Proximity Card as manufactured by Schlage Electronics with no equivalent.
8. SXF7610 Proximity Keyfob as manufactured by Schlage Electronics with no equivalent.
9. Scan 2 Request-to-Exit sensor as manufactured by Schlage Electronics with no equivalent.
10. PS-900 Series Power Supplies as manufactured by Schlage Electronics with no equivalent.
11. 1076C-W 3/4" Wide Gap Door Position Sensor as manufactured by GE with no equivalent.
12. 1277-W 3/8" Winged Door Position Sensor as manufactured by Interlogix with no equivalent.
13. 1078C-W 1" Wide Gap Door Position Sensor as manufactured by Interlogix with no equivalent.
14. Interlogix 1078C-W Wide Gap Door Position Switch with 1835 Magnet as manufactured by Interlogix with no equivalent.
15. Any other door position switch required which is not listed above shall be submitted to the Owner for approval before installation takes place.

C. Access Control Door Locks

1. Per Division 8

D. Security Alarm System Hardware

1. B9512G Series Intrusion Control Panel as manufactured by Bosch Security Systems with no equivalent. Contractor shall select panel which accommodates all system alarm points with capacity to accommodate a doubling of system alarm points.
2. Keypad / Control Station which is fully compatible with the selected control panel, as manufactured by Bosch Security Systems with no equivalent. Note: Contractor shall verify Keypad / Control Station color with Architect before installation.
3. D8125 Addressable Expansion Module as manufactured by Bosch Security Systems with no equivalent.
4. 9127 Popex point Identification Device as manufactured by Bosch Security Systems with no equivalent.
5. DS 9370 Ceiling Mount Motion Detectors as manufactured by Bosch with no equivalent.

E. Cables & Conductors



1. Non-telecom cabling shall be provided and installed by the Security Contractor
2. Security Contractor shall coordinate cabling installation and pathway with the Communications Contractor
3. Security system specific non-data / telecom cabling shall be Belden

### PART 3 - EXECUTION

- 3.01 General Intent – It is the intent of the owner to have a qualified contractor install a complete and fully operational Physical Access Control and Intrusion System, as shown on the project drawings which controls access to the building while also alerting responsible personnel to security violations and breaches.
- 3.02 The contractor shall procure, provide, install, and make fully operational the system as described in this specification and shown on the project drawings. Specific scope items include, but are not limited to:
- A. Provision and installation of PACS components as shown on project drawings
  - B. Provision and installation of PACS headend controllers and software (Owner to provide workstations and servers)
  - C. Provision and installation of IDS detection components as shown on project drawings
  - D. Provision and installation of IDS headend and keypads as shown on project drawings
  - E. Provision and installation of all required cabling, connectors, and any other required or associated appurtenance needed for a fully functional system, whether or not such appurtenance is specifically called out
  - F. PACS shall be integrated with IDS in such a fashion as to allow arming and disarming of the IDS with an authorized credential
- 3.03 DELIVERY, STORAGE AND HANDLING:
- A. Product Acceptance, Storage, and Handling Requirements
    1. Acceptance – Upon delivery to the project site, Contractor shall inspect all products and materials to assure that all products and material have been received in a new and undamaged state. Acceptance of the shipment, by the Contractor, shall constitute acknowledgement that the Contractor has reviewed the products and material and has found no discrepancies in quantity or condition, and that any products or materials subsequently found to be missing or damaged will be the sole responsibility of the Contractor.
    2. Storage and Handling - Store products and materials in the original manufacturer's sealed packaging, in an environmentally controlled area per the manufacturer's specifications.
  - B. Before Beginning Work
    1. Site Verification of Conditions – Contractor shall be responsible for examining the pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to

- cable installation, and other conditions which would affect the project execution. Any such unsatisfactory pathways shall be reported to the Owner.
2. Proceed with installation only after all unsatisfactory issues have been corrected or resolved.

C. General Installation Requirements:

1. Maintain strict site security throughout the course of the project. Rooms housing the equipment and workstations shall be locked up and secure during periods when Contractor personnel are not present.
2. Utilize protective cover, fenders, and barriers to ensure all equipment remains in an undamaged and new condition until notice of substantial completion.
3. Contractor shall repair / replace all fire-stopping / fire-proofing materials damaged by construction activities.
4. Contractor shall Install system per the manufacturer's instructions.
5. The installed system must meet all local, state, and federal codes, including but not limited to California State Fire Marshal (CSFM) and local Authority Having Jurisdiction (AHJ) requirements concerning FACP / PACS integration requirements.
6. If required by the Access Control manufacturer, the locking devices supplier shall include electronic suppression and be rated for continuous duty operation.
7. All locking device wiring shall be run separate from all other system wiring except wire specifically permitted by the Access Control supplier.
8. Contractor shall verify that all IDF outlets used for powering Access Control / Security System components are connected to the buildings emergency power UPS.
9. Contractor shall be responsible for providing all conduit, junction boxes, conductors, equipment plugs, terminal strips and labor to install a complete and operational system.
10. Any backboards required shall be provided by the contractor and shall be fireproof.
11. All cables within racks and cabinets shall be carefully emplaced and bound or laced with Velcro. All cables shall be identified by wire markers. Wire markers shall be machine printed polyolefin wire markers utilizing heat shrink (Brady Type B-321 or Equivalent). The markings shall clearly indicate the function, source, or destination of all cables and wiring. All cabinets and panels shall be provided with permanently attached lamicoid labels with 1" high white lettering on black background. Labels must contain the text name and alpha-numeric identifier as called out on the single line.
12. Equipment racks shall be seismically bolted to the floor by the Contractor once the Owner determines the final location for each rack. Any mounting brackets attached to walls shall be screwed to studs, not drywall. All rack-mounted equipment shall be able to be serviced within the rack and in the rack's final location. The need to unbolt racking equipment to access or service equipment shall not be acceptable.
13. Cables shall not be spliced in underground enclosures.
14. Splices must be kept to a minimum. Any field splices must be secured in a NEMA box appropriate to the conditions.
15. The use of wire lubricants is highly discouraged. If usage of such lubricant cannot be avoided, Contractor shall procure verification, in writing, from the cable manufacturer stating that the specific lubricant used is acceptable and will not damage or degrade the cable.
16. Cable tray pathways designated for telecom shall not be utilized for support of conduit, conductors, or control wiring of any type. No Access Control, Surveillance,

or Intrusion Detection cabling which is not Category 6A shall be intermingled with such 6A cabling.

D. Coordination

1. Contractor shall coordinate all door work with Division 8 Door Hardware. This section shall specify specific hardware to be installed by the Division 8 contractor on each type of door.
2. Contractor shall coordinate all work with any other trades present on the project which will be directly affected by the execution of this contract.
3. Contractor shall coordinate all work with the Owner as to avoid impacting any student activities or classes to the greatest extent possible.
4. Contractor shall coordinate with the Owner the gathering of all personnel information to be input into the new system, including, but not limited to:
  - a. Personnel / Staff information.
  - b. Access Groups for all personnel / staff.
  - c. Holiday Definition
  - d. Special Access Privileges
  - e. Lockdown / Pass-through Authorizations

E. Testing and Commissioning:

1. The Contractor shall be responsible for final system hardware hook up and checkout prior to performance verification testing being conducted with the Owner. The Contractor shall pre-test all cabling to assure cabling is free from interference, opens, grounds, or short circuits.
2. The Contractor shall develop a Performance Verification Testing (PVT) plan. The PVT plan shall identify each new system component included in the project, the intent of testing it, methods and tools required for the testing, and expected result. Each component shall be individually listed with space for noting PASS or FAIL, Contractor / Owner Sign-off, time and date of test, and related comments. The PVT plan shall be submitted to the Owner a minimum of 20 (TWENTY) working days prior to the scheduled beginning of PVT. No testing shall take place until Owner has approved the PVT.
3. As a part of the final system commissioning, Contractor shall submit a listing of all enabled passwords within the system, and shall provide instruction specific to changing the password after the Contractor's departure from the site.
4. Following satisfactory completion of PVT plan, the system shall be operated at normal facility load for a period of 30 calendar days as a burn-in period. If any item or system fails during the burn-in period, the burn-in period shall be suspended until such item or system has been corrected, at which time the test period will recommence. Notice of final System Acceptance will be withheld until burn-in period has been successfully completed.
5. Notice of Final System Completion will not be issued until the following requirements have all been met:
  - a. All required submittals accepted.
  - b. Delivery of final documentation, including but not limited to As-Builts drawings.
  - c. Successful PVT & burn-in period
  - d. Completion of all required training activities.
  - e. Purging of all Contractor passwords and removal of all Contractor access to the systems.

F. Training and Instruction:

1. Before the system is turned over to the owner, the manufacturer shall provide 16 hours of system operations and maintenance training at the project site using the customer's equipment for up to 10 of the owner's representatives. The Owner shall determine hours to be allocated to each training type.
2. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
3. This training shall be conducted by a manufacturer certified trainer.
4. Training materials shall not be generic, and shall be specific to the project.
5. Training for the Access Control System shall be equivalent to Schlage Part Number SEUADMIN, and shall be performed on-site by a factory trained instructor.

G. Warranty:

1. The system shall be warrantied for a period of 1 year from date of acceptance. Written notification shall be sent to the owner stating the date this warranty period has started.
2. The equipment manufacturer shall provide with their bid package to the owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.
3. The Contractor shall provide with their bid package to the Owner a proposal for an extended parts and labor warranty service, priced for the 1st, 2nd, and 3rd years of post-warranty period operation.
4. Warranty service shall be separated into 2 classes of service, critical item service and non-critical item service.
5. Critical items shall be described as any part or device, included as a part of this contract which if fails would cause major parts of the system (more than 30% of the cameras) to be inoperable. Critical failures are to be corrected within 24 hours of notification to the Contractor, 7 days per week. Non-critical failures are to be corrected within 7 days of notification to the Contractor.

H. Site Clean-up

1. Upon completion of the contract, Contractor shall be responsible for project site cleanup. All installed materials shall be clean, enclosures free of dust and debris, and surfaces wiped free of smudges and fingerprints. The Contractor shall remove all project associated debris and rubbish occasioned by the work from the site. The contractor shall clean all interior spaces dirtied by the work. Remove all temporary protective covers and shrouds from all equipment.

**END OF SECTION**

**SECTION 28 20 00**

**VIDEO SURVEILLANCE SYSTEM**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

**A. Work Included:**

1. Under this Section, the Contractor is to provide Video Surveillance System, including procuring, installing, and rendering fully operational all necessary surveillance system components required for a complete and workable installation which meets or exceeds the project performance specifications.
2. Equipment to be provided and installed includes, but is not limited to:
  - a. Fixed Pole Mount Mini-dome Type Megapixel Cameras
  - b. Fixed Pole Mount ALPR Cameras
  - c. Power and Data Cabling, Conduit, and Infrastructure to be provided, installed and terminated by the communications contractor
3. The work includes providing all labor, materials, tools, equipment, and documentation required for a complete and working surveillance system as specified in this document, unless some portion is specifically noted otherwise.

**B. Related Work Provided by Owner:**

1. The Contractor shall coordinate the work with the related work provided by the Owner including but not limited to the following:
  - a. Network from local patch panel / switch serving as termination point for the cameras back to the VMS server
  - b. All cabling, cabling terminations, and conduit/boxes/fittings

**C. Abbreviations and Acronyms**

1. ACS = Access Control System
2. ALPR = Automatic License Plate Reader
3. CCD = Charge Coupled Device
4. CMOS = Complimentary Metal-Oxide Semi-Conductor
5. CPU = Central Processing Unit
6. DSP = Digital Signal Processor
7. DVD = Digital Video Disc
8. DVRMS = Digital Video Recording and Management System
9. GB = Gigabyte
10. GUI = Graphical User Interface
11. HDD = Hard Disk Drive
12. IR = Infrared
13. IPS = Images per Second
14. JPEG = Joint Photographic Experts Group
15. MB = Megabyte
16. MPEG = Moving Pictures Experts Group
17. NAS = Network Attached Storage
18. LAN = Local Area Network
19. LED = Light Emitting Diode
20. RAID = Redundant Array of Independent Disks

21. RAM = Random Access Memory
22. TCP/IP = Transport Control Protocol / Internet Protocol
23. UPS = Uninterruptable Power Supply
24. POE = Power Over Ethernet
25. PVT = Performance Verification Testing
26. V-LAN = Virtual Local Area Network
27. VMS = See DVRMS
28. VSS = Video Surveillance System
29. WAN = Wide Area Network
30. WDR = Wide Dynamic Range

D. Definitions

1. Surveillance System – IP-based electronic system which provides visual surveillance and recording of selected areas.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Specifications and Drawings are intended to be complementary. A specific section, paragraph or heading in a Division may not describe all details concerning work to be done and materials to be furnished. The Drawings are diagrammatic and may not show all of the work required or all construction details. Dimensions are shown for critical areas only; all dimensions and actual placements are to be verified in the field. It is to be understood that the best trade practices of the Division will prevail. It remains the responsibility of the Contractor or Subcontractor to provide all items, equipment, construction, and services required to the proper execution and completion of the Work.
- C. Reference listings are provided as a convenience to the Contractor or Subcontractor providing the Work of this Section and may not contain all the requirements affecting this Section. It remains the responsibility of the Contractor or Subcontractor to locate and comply with all requirements of the Contract Documents.
- D. All related specification sections shall be used in conjunction with this section.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer of all equipment installed as a part of this contract shall meet the following criteria:
  1. Shall be regularly engaged in the manufacture and assembly of similar type equipment for a minimum of five (5) continuous years preceding the date of this document.
  2. Shall have an office staffed with factory trained technicians, fully capable of engineering, supervising installation, system start-up, providing Owner training and supervising of both hardware and software for the all systems installed as a part of this project.
- B. Contractor Qualifications: The Contractor shall meet the following qualifications at a minimum:

1. Shall be an authorized factory trained and certified reseller of all system components installed or interfaced with as a part of this contract.
2. Contractor shall be regularly engaged in installing similar equipment, and shall have successfully completed 3 systems of a comparable size and scope within the preceding 3 years of the date of this document. These systems must be currently in operation, and the contractor shall supply the following reference information with their proposal:
  - a. Name of Client
  - b. Type of Facility
  - c. System Installed
  - d. Date of Substantial Completion
  - e. Names of Contractor's Key Personnel on Project
  - f. Contact Name, Title, Phone, and Email
3. It is expected by the Owner that the same key personnel will execute this project as completed the referenced work. This would include the Project Manager, the Project Engineer, and the Lead Installer. Resumes will be provided for these personnel. If different key personnel are executing this project than executed the reference projects, resumes for these personnel shall be provided for the Owner's approval with the Contractor's bid package.
4. Sub-contractors shall provide resumes showing qualification for the specific system that the sub-contractor will be installing / configuring.
5. In order to assure system cable plant is warranted for 20-Years, Contractor shall be certified in the installation of BerkTek Cabling systems. Project installation staff shall be similarly and independently certified as required by the manufacturer..

#### 1.04 SUBMITTALS

##### A. General:

1. Prior to installing any material related to or required by this section, submit the following information for review.
  - a. Block diagrams of the proposed system and interconnection wiring diagrams showing all connections required between system components.
  - b. A materials list with names of manufacturers, model numbers, and technical information on all equipment proposed. Product technical information sheets for each principal component in the proposed system. Where the data sheet covers a range of material, the specific part number shall be highlighted
  - c. 6 complete sets of operations and maintenance manual for the system products being supplied, provided in 3-ring binders, and 1 complete set submitted in electronic format on DVD. Include complete sets of the equipment operating instructions, installation instructions, and troubleshooting guides.

##### B. Testing:

1. PVT Plan to be submitted a minimum of 20 working days prior to planned start of PVT procedure.

##### C. Close Out:

1. Within 10 working days of substantial completion and prior to project closeout, the Contractor shall provide to the Owner a complete set of As-Built drawings, showing any deviation from the original plans and specifications, in mounting location, infrastructure pathway, or any other substantive change.

1.05 WARRANTY

A. General:

1. All equipment and system shall be warranted against defects in material and workmanship for a period of one (1) year from the date of startup. Warranty coverage shall include parts, labor, travel, expenses, and labor to remove/reinstall all products. The warranty document shall be submitted with the Contractor's submittals and shall include details on inclusions and exclusions, deductibles, and availability of extended coverage options, priced for extended coverage in years 2, 3, and 4 past expiration of the original warranty period.
2. Warranty service shall be separated into 2 classes of service, critical item service and non-critical item service.
3. Critical items shall be described as any part or device, included as a part of this contract which if fails would cause major parts of the system (more than 30% of the cameras) to be inoperable. Critical failures are to be corrected within 24 hours of notification to the Contractor, 7 days per week. Non-critical failures are to be corrected within 7 days of notification to the Contractor.

**PART 2 - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

A. Video Surveillance System Equipment:

1. WV-S2531LN Exterior Rated 1080p Resolution Dome Camera as manufactured by Panasonic. This device is being installed as part of an expansion to an existing District system, and in order to assure compatibility as well as simplify maintenance procedures and spare parts procurement, device shall be as specified with no equivalent.
2. Ocularis VMS Software by ONSSI. Security Contractor shall coordinate software version with the Owner. This software is being installed as part of an expansion to an existing District system, and in order to assure compatibility as well as simplify maintenance procedures and spare parts procurement, software shall be as specified with no equivalent.
3. All servers, workstations, and storage hardware shall be provided by the Owner. All software shall be provided, installed, and configured by the Contractor.
4. Network Switch / Patch Panel at termination point shall be provided by the Owner.
5. All cabling and cabling terminations shall be provided by the communications contractor.



PART 3 - EXECUTION

- 3.01 General Intent – It is the intent of the owner to have a qualified contractor install a complete and fully operational Video Surveillance System, as shown on the project drawings provides the ability to remotely view and record select areas of the campus as indicated on the project drawings.
- 3.02 The contractor shall procure, provide, install, and make fully operational the system as described in this specification and shown on the project drawings. Specific scope items include, but are not limited to:
- A. Provision, installation, and configuration of surveillance system components as shown on project drawings
  - B. Provision and installation of surveillance system software (Owner to provide workstations and servers)
- 3.03 DELIVERY, STORAGE AND HANDLING:
- A. Product Acceptance, Storage, and Handling Requirements
    1. Acceptance – Upon delivery to the project site, Contractor shall inspect all products and materials to assure that all products and material have been received in a new and undamaged state. Acceptance of the shipment, by the Contractor, shall constitute acknowledgement that the Contractor has reviewed the products and material and has found no discrepancies in quantity or condition, and that any products or materials subsequently found to be missing or damaged will be the sole responsibility of the Contractor.
    2. Storage and Handling - Store products and materials in the original manufacturer's sealed packaging, in an environmentally controlled area per the manufacturer's specifications.
  - B. Before Beginning Work
    1. Verification of Conditions – Security Contractor shall coordinate with Communications Contractor to assure all installed copper and fiber optic cabling being utilized as a part of the surveillance system is tested and completely operational and that cabling is free from interference, opens, grounds, or short circuits. Any unsatisfactory cabling shall be reported to the Owner.
    2. Proceed with installation only after all unsatisfactory issues have been corrected or resolved.
  - C. General Installation Requirements:
    1. Maintain strict site security throughout the course of the project. Rooms housing the equipment and workstations shall be locked up and secure during periods when Contractor personnel are not present.
    2. Utilize protective cover, fenders, and barriers to ensure all equipment remains in an undamaged and new condition until notice of substantial completion.
    3. Install system per the manufacturer's instructions.
    4. The installed system must meet all local, state, and federal codes.
    5. Contractor shall verify that all IDF outlets used for powering video surveillance system components are connected to the buildings emergency power UPS.

6. Camera locations shown on drawings are preliminary in nature and Contractor shall verify final placement of all cameras with the Owner before any installation takes place.
- D. Coordination
1. Contractor shall coordinate all work with any other trades present on the project which will be directly affected by the execution of this contract.
  2. Contractor shall coordinate all work with the Owner as to avoid impacting any student activities or classes to the greatest extent possible.
- E. Testing and Commissioning:
1. The Contractor shall be responsible for final system hardware installation, configuration and checkout prior to performance verification testing being conducted with the Owner.
  2. The Contractor shall develop a Performance Verification Testing (PVT) plan. The PVT plan shall identify each new system component included in the project, the intent of testing it, methods and tools required for the testing, and expected result. Each component shall be individually listed with space for noting PASS or FAIL, Contractor / Owner Sign-off, time and date of test, and related comments. The PVT plan shall be submitted to the Owner a minimum of 20 (TWENTY) working days prior to the scheduled beginning of PVT. No testing shall take place until Owner has approved the PVT.
  3. As a part of the final system commissioning, Contractor shall submit a listing of all enabled passwords within the system, and shall provide instruction specific to changing the password after the Contractor's departure from the site.
  4. Following satisfactory completion of PVT plan, the system shall be operated at normal facility load for a period of 30 calendar days as a burn-in period. If any item or system fails during the burn-in period, the burn-in period shall be suspended until such item or system has been corrected, at which time the test period will recommence. Notice of final System Acceptance will be withheld until burn-in period has been successfully completed.
  5. Notice of Final System Completion will not be issued until the following requirements have all been met:
    - a. All required submittals accepted.
    - b. Delivery of final documentation, including but not limited to As-Builts drawings.
    - c. Successful PVT & burn-in period
    - d. Completion of all required training activities.
    - e. Purging of all Contractor passwords and removal of all Contractor access to the systems.
- F. Training and Instruction:
1. Before the system is turned over to the owner, the manufacturer shall provide 16 hours of system operations and maintenance training at the project site using the customer's equipment for up to 10 of the owner's representatives. The Owner shall determine hours to be allocated to each training type.
  2. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
  3. This training shall be conducted by a manufacturer certified trainer.
  4. Training materials shall not be generic, and shall be specific to the project.

G. Warranty:

1. The system shall be warrantied for a period of 1 year from date of acceptance. Written notification shall be sent to the owner stating the date this warranty period has started.
2. The equipment manufacturer shall provide with their bid package to the owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.
3. The Contractor shall provide with their bid package to the Owner a proposal for an extended parts and labor warranty service, priced for the 1st, 2nd, and 3rd years of post-warranty period operation.

H. Site Clean-up

1. Upon completion of the contract, Contractor shall be responsible for project site cleanup. All installed materials shall be clean, enclosures free of dust and debris, and surfaces wiped free of smudges and fingerprints. The Contractor shall remove all project associated debris and rubbish occasioned by the work from the site. The contractor shall clean all interior spaces dirtied by the work. Remove all temporary protective covers and shrouds from all equipment.

**END OF SECTION**

**SECTION 28 30 00**

**FIRE ALARM SYSTEM**

**PART 1 – GENERAL**

**1.1 Work Included:**

1.1.1 Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating fire alarm system.

**1.2 Related Work:**

1.2.1 Division 26 01 00: Electrical General Provisions

1.2.2 Division 26 05 33: Conduit and Fittings

1.2.3 Division 26 05 34: Outlet and Junction Boxes

**1.3 The equipment and installation shall comply with the current applicable provisions of the following standards:**

NFPA 72-2016. . . . . National Fire Alarm Code with California Amendments.  
CBC - 2016. . . . . California Building Code (CBC), Part 2, Title 24, CCR.  
CEC - 2016. . . . . California Electrical Code, (CEC), Part 3, Title 24, CCR.  
CFC - 2016. . . . . California Fire Code (CFC), Part 9, Title 24, CCR.

**1.4 The system and all components shall be listed by Underwriters Laboratories, Inc. for use in Fire Protective Signaling Systems under the following standards as applicable:**

UL 38 . . . . . Manually Actuated Signaling Boxes.  
UL 50 . . . . . Cabinets and Boxes.  
UL 268 . . . . . Smoke Detectors for Fire Protective Signaling Systems.  
UL 268A . . . . . Smoke Detectors for Duct Applications  
UL 346 . . . . . Waterflow Indicators for Fire Protective Signaling Systems.  
UL 464 . . . . . Audible Signaling Appliances.  
UL 521. . . . . Heat Detectors for Fire Protective Signaling Systems.  
UL 864 . . . . . Control Units for Fire Protective Signaling Systems.  
UL 1481. . . . . Power supplies for Fire Protective Signaling Systems.  
UL 1971. . . . . Visual Signaling Appliances.

**1.5 Only Fire Alarm Control Panel Equipment and Peripheral Field Devices have been shown on the Contract Bid Single Line Block Diagram. Specific and complete wiring between Control Equipment and Peripheral Equipment has been deleted for clarity.**

**1.6 Submittal shall be made in accordance with Division 26 01 00 – Shop Drawings and Submittals. This submittal shall include the following:**

1.6.1 Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:

- 1.6.1.1 Quantity of each type of equipment item.
- 1.6.1.2 Description of each item.
- 1.6.1.3 Manufacturer's Name and Model Number.
- 1.6.1.4 Manufacturer's Specification Sheet.
- 1.6.1.5 California State Fire Marshall Listing Sheets for all components.
- 1.6.1.6 Equipment items which have individual components, will require that all component parts be listed individually.
- 1.6.1.7 Letter indicating the contractor's intent to comply with Phase II submittal drawings.

1.7 Phase II Submittal shall be provided **within (20) working days** after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System. Each submission shall include 'D' or 'E' size print copies to match the contract drawings, and one (1) data disk copy with files in a AutoCAD 2000i or 2004 format . Building floor plan CAD files on disk, will be made available via express mail after the receipt of payment of \$50.00 per building floor plan, or \$300.00 minimum which ever is less. Contractor shall make the request for drawings in writing directly to Johnson Consulting Engineers, confirmation of the request and a release form will be forwarded to the contractor to include a signed copy with payment prior to release of files. Detail or riser diagram sheets or any other drawings other than floor or site plans, will not be made available to the contractor.

1.7.1 **Provide complete shop drawings to include the following:**

- 1.7.1.1 Complete floor plans, at scale of contract documents, showing the locations throughout the project of all receptacles, conduits, wireways, tray, pullboxes, junction boxes, equipment racks, and other devices.
- 1.7.1.2 Point to point wiring diagrams showing wiring from panel terminals to each device.
- 1.7.1.3 Scaled floor plans indicating the location of devices, conduit runs, types, and number of conductors.
- 1.7.1.4 Riser diagram indicating all wiring and circuits.
- 1.7.1.5 Current State Fire Marshal listing sheets for all components and devices.

- 1.7.1.6 Provide battery power supply calculations, indicate point of power supply connection, means of disconnect, over-current protection, etc. for each panel.
  - 1.7.1.7 Provide detailed information on conductors to be used—manufacturer, type, size, insulation, etc.
  - 1.7.1.8 Provide voltage drop calculations for all conductor run is from each panel (i.e., main FACP, remotes, power extenders, etc.) for each panel.
  - 1.7.1.9 Provide written sequence of system operation matrix.
  - 1.7.1.10 Provide list of zones. (Every device that is addressable.)
  - 1.7.1.11 Provide detailed drawing for annunciator panel indicating all zones and initiating devices.
- 1.8 **Common submittal mistakes which will result in submittals being rejected:**
- 1.8.1 Not including the qualifications of the installing contractor.
  - 1.8.2 Not including all items listed in the above itemized description.
  - 1.8.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
  - 1.8.4 Not including actual manufacturer's catalog information of proposed products.
  - 1.8.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.
- 1.9 All equipment and material shall be new and unused, and listed by Underwriter's Laboratories for the specific intended purpose. All control panel components and field peripherals shall be designed for continuous duty without degradation of function or performance. All equipment covered by this specification or noted on Installation. Drawings shall be equipment suited for the application and shall be provided by a single manufacturer or be recognized and UL listed as compatible by both manufacturers.
- 1.10 It will be the responsibility of the Contractor to ensure proper specification adherence for system operation, final connection, test, turnover, warranty compliance, and after-market service. The distributor of the equipment specified must be factory-trained and certified.

- 1.11 Basic System Functional Operation, upon operation of any automatic, manual or other initiation device the following shall occur:
  - 1.11.1 The system alarm LED shall flash.
  - 1.11.2 A local piezo electric signal in the control panel shall sound.
  - 1.11.3 A backlit 80 character LCD display shall indicate all information associated with the fire alarm condition, including the alarm point and its location within the protected premises.
  - 1.11.4 History storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.
  - 1.11.5 All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
  - 1.11.6 LED display and audible signaling at the remote annunciator indicating building, fire zone, and type of device. Annunciator shall also provide a separate audible signal for CO detection with a green flashing light, with classroom number indication.
  - 1.11.7 Automatic retransmission to a UL central station for fire department notification.
  - 1.11.8 Automatic shut down of air conditioning units and/or smoke dampers furnished with duct detectors. Each building shall shut down all A/C units and dampers within that building as one zone.
- 1.12 All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protective signaling system, meeting the NFPA 72, 2016 Edition with California State Amendments.
- 1.13 All equipment and components shall be installed in strict compliance with manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- 1.14 All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. Fasteners and supports shall be adequate to support the required load.
- 1.15 All wiring shall be installed in a conduit system.

- 1.16 The contractor shall provide as a part of this contract additional control modules, heat detectors, smoke detectors, CO detector, duct detectors, manual pull stations, strobes, mini-horns and exterior horn devices etc., to equal 10% of the total quantity of devices shown on the drawings, or a minimum of three (3) for each type, whichever is greater. Installation of conduit, boxes and wiring of these devices shall be included, and required locations coordinated with CSFM final approved shop drawings. Any devices not required to be included during construction shall be delivered to the District at the completion of the project. The quantities of these devices shall be listed as a part of the Phase I submittals.
- 1.17 The installing contractor shall provide a copy of current documentation, indicating that the contractor installing the fire alarm systems or devices and wiring, is certified by Underwriters Laboratories (UL) in its product directories under the listing category "PROTECTIVE SIGNALING SERVICES - LOCAL, AUXILIARY, REMOTE STATION, AND PROPRIETARY." The contractor shall be certified by the manufacturer to install and program the system. The contractor must also provide complete installation of all wiring and equipment, and software programming. Supervised installation of the wiring, devices and/or any software programming shall not be permitted.
  - 1.17.1 The installing contractor must also be an "authorized dealer" by the equipment manufacturer, and must have completed all required training prior to the bid of this project.
  - 1.17.2 The fire alarm system installation shall be warranted by the manufacturer's representative.
  - 1.17.3 The Contractor shall have a current California C-10 or C-7 Contractor's License, and all individuals working on this project shall have passed the Department of Industrial Relations Division of Apprenticeship Standards – "Fire / Life Safety Certification Program."
  - 1.17.4 The installing contractor shall provide, at the time of submittal, a letter of intent to provide an extended service warranty. This warranty shall extend for a total of three (3) years, starting at the completion, testing, and training of this project. The service warranty shall cover all material and labor to keep operational all system devices installed under this project, and shall include two (2) complete U.L. system's tests and cleaning of all devices at year two (2) and year three (3) of the warranty. Routine cleaning of devices, other than at the two (2) specified U.L. system's testing periods, will not be included as a part of this warranty.
  - 1.17.5 The installing contractor shall provide, at the time of submittal, a letter indicating that the installation crew for this project meets the following NICET certifications:
    - 1.17.5.1 25% of the installing field personnel must have completed NICET Level 2 Certification.



- 1.17.5.2 One of the installing field personnel and /or supervisor must have completed NICET Level 3 Certification.
- 1.17.5.3 Contractor shop drawings shall be signed by an individual who has completed NICET Level 4 Certification.
- 1.18 All conduit and standard backboxes will be furnished and installed by the Division 26 Contractor. Specialty boxes will be furnished by the equipment supplier to be installed by the Division 26 Contractor.
- 1.19 Equipment and materials shall be the standard product of Simplex, Notifier, or FCI.

Alternate equipment as manufactured by any other manufacturer not specifically listed above will not be approved for use on this project. D.S.A approved drawings are included as a part of the drawing set

## PART 2 - PRODUCTS

### 2.1 Main Fire Alarm Control Panel

- 2.1.1 Fire alarm control panel Simplex, Notifier, or FCI .
- 2.1.2 The system shall be controlled and supervised by a microprocessor based monitoring fire alarm control panel. The systems shall be addressable, field configurable, programmable and editable. The system shall continuously scan devices for change of status. Each device shall have its own unique address, but shall also be grouped by building as a separate zone for remote annunciation and alarm report purposes.
- 2.1.3 The system shall be provided with a networking card and software and modem to communicate with the District-wide diagnostic and annunciation network.
- 2.1.4 The fire alarm control panel shall be housed in a lockable, code gauge steel cabinet with 80 character LCD display, master controller operators panel, Indicating lamps, silence switch and reset switch mounted on cabinet front. The fire alarm control panel shall be physically and visually located in the general office for monitoring by staff, and shall sound the "Temporal Pattern" in all zones. Signal duration shall be field programmable and initially set at three minutes. Provide all control modules, synchronous modules, etc., to provide a complete working system per all codes that apply.
- 2.1.5 The fire alarm control panel shall come with standardized software for on-site customization of the system. The unit shall be capable of providing a 600-event historical log with zone or point selectable alarm verification.
- 2.1.6 The unit shall support 127 addressable points per module and one output point, SPST contact per zone. Provide the number of modules

necessary to control and supervise fire alarm devices as shown on the Drawings, as well as to provide 25% spare capacity.

- 2.1.7 The fire alarm control panel shall be capable of providing a walk test.
- 2.2 The power feed for the FACP shall be 3-wire, 120volt, AC, single phase (20A circuit) permanently labeled "FIRE ALARM CONTROL POWER", terminating at the master fire alarm control and supervisory panel. The label shall be red with 1/4" high white lettering. The source circuit breaker must be provided with a lock-on device.
- 2.3 In addition to the AC circuit, the panel shall be equipped with a DC battery to activate an audible alarm and pilot light in case of a power failure on the AC circuit.
- 2.4 Batteries must drive signaling devices per current requirements of California State Fire Marshal. Battery calculations are required as part of the submittal.
- 2.5 The master fire alarm panel shall be equipped with a manual pull lever type, supervised report station.
- 2.6 With the exception of the manually operated report station required at the master fire alarm panel and large assembly areas, the remainder of the school facility shall be equipped with approved, electronically supervised, automatic fire detection devices, such that every room, space, including concealed spaces, such as the attic spaces above ceilings, etc., is provided with approved coverage.
- 2.7 Automatic fire detection devices shall be addressable analog smoke and heat detectors. Where used, heat detectors shall be fixed temperature x-rate of rise, fixed at 135°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 170°F.
- 2.8 MANUAL FIRE ALARM STATIONS shall be addressable test-reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal, except by use of a key. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet, front or side. Manual stations shall be constructed of die-formed, satin-finished aluminum, with operating directions provided on the cover in depressed red letters. The word FIRE shall appear on each side of the stations in depressed letters, 1/2-inch in size or larger. Stations shall be suitable for semi-flush mounting on a standard single-gang box or switch plate, and shall be provided with a terminal block for connection of fire alarm system wiring. Manual pull stations must comply with CBC sections 11B-309 and 11B-403.
- 2.9 HORN / STROBE DEVICE shall be of the semi-flush type designed for mounting to a standard four-inch square electrical outlet box. Each device shall be provided with a semi-flush accessory plate. Exterior horns shall be weatherproof. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately

- one flash per second, with candela rating as per UL standard 1971. Housing shall be white.
- 2.9.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, Per NFPA 72, Chapter 18 California Amendments (2016).
- 2.10 STROBES. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately one flash per second, with candela rating as per UL standard 1971. Housing shall be white.
- 2.10.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, per NFPA 72, Chapter 18 California Amendments (2016).
- 2.10.2 Maximum pulse duration to be 0.20 of a second with an ADAAG 4.28.3(3). Visual alarms maximum duty cycle of 40%.
- 2.10.3 Capable of providing minimum candela. Intensity as shown on plans (effective strength measured at the source).
- 2.10.4 The flash rate to be a minimum of 1.Hz and a maximum of 2 Hz per NFPA 72 18.5.3.1.
- 2.11 HEAT DETECTOR DEVICES shall be addressable, fixed temperature x rate of rise, fixed at 135°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 170°F.
- 2.12 SMOKE DETECTOR DEVICES shall be analog addressable, photo-electric.
- 2.13 CO – CARBON MONOXIDE detectors shall be provided in all Group E Classrooms and provided with a sounder base to alarm individual classrooms with a 4-pulse temporal pattern as well as transmitting to the staffed remote annunciator.
- 2.14 DUCT TYPE DETECTORS shall be analog addressable, photo-electric type, provide with remote test switch and auxiliary contacts as required for control of A/C units or smoke dampers.
- 2.15 DIGITAL ALARM COMMUNICATOR TRANSMITTER. The control panel shall have the ability to meet the requirements of UL 864 for central station connections, and shall be UL listed for use with the fire alarm control panel. The communicator shall be connected to supervise two telephone lines, all wiring required for this connection shall be provided by the fire alarm contractor Coordinate interface with District monitoring company as required.
- 2.16 REMOTE ANNUNCIATOR shall be an 80 character backlit, alphanumeric, LCD readout display. The display shall include alarm, supervisory, CO detection and trouble condition LEDs and tone alert. Each condition shall have a dedicated

acknowledge push button switch to silence the local tone alert but leaves the LED lights on until all conditions have been restored.

PART 3 - EXECUTION

- 3.1 All wiring shall be (min) #18 AWG copper or as noted on drawings. All underground conductors shall be UL wet location rated for use in wet locations, West Penn "Aquaseal" or equal. There shall be no splices in underground handholes or vaults. A multi-conductor cable rated for use in wet locations will also be acceptable. It must be labeled "FIRE ALARM" in all pull boxes, using a water-tight labeling system.
- 3.2 Interior, dry location wiring for low voltage initiating circuits shall be #18 AWG copper, twisted shielded pair minimum, signaling circuits shall be No. 14 AWG minimum, and wiring for 120 volt circuits shall be No. 12 AWG minimum. All wiring shall be color coded, solid copper conductor. Use of power limited cable shall be restricted to controls listed for this purpose. Single conductors shall be type THHN/THWN-2 insulated copper.
- 3.3 Wire markers shall be provided for each wire connected to equipment. The marker shall be of the taped bank type, of permanent material, and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Changing of wire colors within circuits shall be unacceptable.
- 3.4 A terminal cabinet shall be installed in the electric room for the fire alarm systems at each building. All fire alarm wiring shall terminate on UL approved strips in this terminal cabinet. All wiring shall be labeled at each termination strip. Wiring shall be configured such that all end-of-line resistors will be installed at the terminal cabinet.
- 3.5 Fire Sprinkler Activation detecting System(s) shall each be indicated on a separate zone in the fire alarm control panel.
- 3.6 Fire Alarm Control Panel and all other equipment shall be mounted with the center of all operable reset buttons, located a maximum of 48" front approach / 54" side approach above floor level.
- 3.7 Contractor shall provide complete wiring between all equipment.
- 3.8 The Fire Alarm/Life Safety Installation shall comply fully with all Local, State and National Codes, and the Local Authority Having Jurisdiction (AHJ) DSA.
- 3.9 The Fire Alarm Control Panel and power supply shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main Power Distribution Panel as FIRE ALARM CIRCUIT.
- 3.10 The Control Panel Cabinet shall be grounded securely to a power system ground conductor. Provide a 1/2-inch conduit and 1#12 grounding conductor to the building electrical service ground bus.

- 3.11 Conduit shall enter into the Fire alarm Control Panel back box only at those areas of the back box which have factory conduit knockouts.
- 3.12 All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; an audible and visual trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
- 3.13 All cables and wiring shall be listed for Fire Alarm/Life Safety use, and shall be of the type as required by and installed per CEC Article 760.
- 3.14 Final System Acceptance
  - 3.14.1 Provide an NFPA Certificate of Compliance to DSA, the School District and Local Fire Marshall. Complete fire alarm system shall comply with and be sound-tested for a "Temporal Pattern" in all zones.
  - 3.14.2 Beam detectors shall be tested by two methods:
    - 3.14.2.1 Manual slow cover test to confirm reflector alignment is correct.
    - 3.14.2.2 Software fire test per UL268.5 to demonstrate when signal level is reduced simulating obstruction the detector will go into alarm.
  - 3.14.3 The system will be accepted only after a satisfactory test of the entire system has been accomplished by a Factory-Trained Distributor in the presence of a representative of the authority having jurisdiction and the Owner's representative. This contractor shall provide all personnel, ladders and testing equipment to assist the local authority in completing this test. Actuate each device and verify that the system performs as specified.
  - 3.14.4 The Contractor will present a complete set of "as-built" Fire Alarm/Life Safety system drawings, and the factory supplied Operator's Manuals as required by the General Provisions section of this specification.
  - 3.14.5 Once the system has been tested and the certificate of compliance completed, the contract shall not be considered complete until after owner training has been completed. The contractor shall notify in writing their intent to provide the training for the system. This notification shall be given to the Division 21 Contractor, Architect and the Project Engineer a minimum of 2 weeks prior to the scheduled training session. The Division 21 Contractor and/or the architect shall be responsible for notifying the owner to confirm that the appropriate District personnel will be made available for this training session. If the Division 21 Contractor does not receive confirmation that the training session can be performed on the proposed date, than another time shall be provided. The training shall consist of the following:

- 3.14.5.1 Provide a minimum of one (1) four-to-six -hour training period located at the project site, to instruct District personnel in proper operation of all systems.
- 3.14.5.2 Provide a minimum of three (3) complete owner operation manuals for the District records.
- 3.14.5.3 Provide a minimum of two (2) complete as built sets of drawings for the District records.
- 3.14.5.4 Provide all spare parts as described in part 1 of these specifications
- 3.14.5.5 Provide written confirmation and proposed scheduled dates for follow up training and 1 year complete system test.

3.15 Follow up Training

- 3.15.1 Provide as a part of this contract, the follow up instructional training period within six (6) months after the final acceptance of the systems. This training shall include a minimum of one four-to-six-hour training period to instruct District personnel in proper operation of all systems and shall instruct the District technicians how to repair any non-operational parts of the system as required. All defective parts shall be replaced at no cost to the owner.

END OF SECTION

**SECTION 31 23 23**

**BACKFILLING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Authorized types of fill.
- B. Building area backfilling to subgrade elevations.

**1.02 REFERENCE STANDARDS**

- A. Conform to reference standards by date of issue current on date of Contract Documents.
- B. ASTM D1557 - Laboratory compaction characteristics of soil using modified effort.
- C. SSPWC - Standard Specifications for Public Works Construction, Latest Edition.
- D. Chapters 18A and 33, California Building Code, 2016.
- E. CSS - Caltrans Standard Specifications, Latest Edition.

**1.03 SUBMITTALS**

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each [on-site] [and] [borrow] soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site [and] [borrow] soil material proposed for fill and backfill.
- B.

**1.04 QUALITY ASSURANCE**

- A. Borrow. Fill, backfill, aggregate base, and other soil materials obtained from off-site sources shall be sampled and tested in compliance with CA EPA Department of Toxic Substances Control recommendations to prevent the importation of contaminated materials to the Site.
  - 1. Testing Frequency
    - a. For borrow up to 1,000-cu.yrd, conduct 1 test for each 250-cu.yrds.
    - b. For borrow between 1,001- and 5,000-cu.yrd; conduct 4 tests for first 1,000- cu.yrd, if material tests acceptable, conduct 1 test for each additional 500-cu.yrds.
    - c. For borrow over 5,000-cu.yrds, conduct 12 tests during import of first 5,000-cu.yrd, if material tests acceptable, conduct 1 test for each additional 1,000-cu.yrds.

2. Owner's Testing Laboratory shall take samples at source, conduct testing and evaluate test results prior to delivery.
3. Conduct tests for lead and other heavy metals, asbestos, PCB's, pesticides, herbicides, VOCs, and semi-VOCs.
4. When detectable quantities of hazardous materials are found, determine the risk to human health, the environment, or both using the DTSC Preliminary Endangerment Assessment Guidance Manual.
5. Do not import soils that exhibit a known risk to human health, the environment, or both.

## PART 2 - PRODUCTS

### 2.01 FILL MATERIALS

- A. This Section establishes standards of quality for backfill materials to be used as approved by Geotechnical Engineer in accordance with Chapter 18A CBC, Section 1803A.2 and Appendix J Section J107, California Building Code, and as scheduled in other Sections of this specification.
- B. Crushed Rock and Rock Dust: Crushed rock and rock dust shall be product of crushing rock or gravel. Portion of material that is retained on a 3/8 inch sieve shall contain at least 50 percent of particles having three or more fractured faces. Not over 5 percent shall be pieces that show no such faces resulting from crushing. Of that portion which passes 3/8 inch sieve but is retained on No. 4 sieve, not more than 10 percent shall be gravel particles. Crushed rock shall conform to 3/4 inch sieve size in accordance with Subsection 200-1.2, SSPWC, Crushed Rock Gradation Table.
- C. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded to the following:
  1. Minimum Size: 1/4 inch.
  2. Maximum Size: 5/8 inch.
- D. Sand: Sand shall consist of manufactured granular material, or combination thereof, free of deleterious amounts of organic material, mica, loam, clay and other substances not suitable for purpose intended. Conform to Section 200-1.5.5, SSPWC, for gradation as required for Portland Cement Concrete, sand must achieve compaction of a minimum 90 percent.
- E. Crushed Aggregate Base: Crushed rock and rock dust conforming to requirements of Section 200-1.2, SSPWC, or Class 2 aggregate base as defined in Section 26, CSS.]
- F. Imported Fill: Clean granular, free of debris, no rock larger than 3 inches in any dimension, non-expansive, approved by Geotechnical Engineer prior to placement on site.
- G. Structural Backfill: Shall conform to SSPWC section 217-3.
- H. Concrete: Structural, as specified in Section 03 30 00.
- I. Concrete Slurry: as specified in Section 31 23 17.



- J. Stockpiled Fill: On-site soils, stored separately on site, approved for re-use by Geotechnical Engineer.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify fill materials to be reused or imported are acceptable to Architect.
- B. Verify foundation perimeter drainage installation has been inspected and approved.

#### 3.02 BACKFILLING

- A. Backfill and compact areas to contours and elevations with unfrozen materials. Remove debris from areas to receive backfills.
  - 1. Compaction: ASTM D1557, Compact to 90 percent of maximum dry density.
  - 2. Floor slabs shall be in place a minimum of 7 days before backfill is placed against walls.
- B. Fill areas and types of fill shall be inspected, tested and approved by Geotechnical Engineer.
- C. Employ placement method that does not disturb or damage foundation perimeter drainage, foundation waterproofing and protective cover or utilities in trenches. Do not commence backfill until such work is in place, inspected and approved.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density. When operations are interrupted by rain, do not resume work until field tests indicate that moisture content and density of the fill are as previously specified.
- E. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Remove surplus backfill materials from site.
- H. Leave fill material stockpile areas completely free of excess fill materials.
- I. Compaction Equipment: Wherever feasible, perform compaction with approved power-driven equipment such as rollers and sheeps-foot compactors. Compact areas inaccessible to rollers with pneumatic tampers or other approved compactors.
- J. Flooding and jetting is not permitted.

#### 3.03 TOLERANCES

- A. Top Surface of Backfilling Subgrade: Within 0.05 feet from required elevations.

#### 3.04 FIELD QUALITY CONTROL

- A. No fill shall be placed on any prepared surface until that surface has been inspected and approved by Geotechnical Engineer.
- B. If tests indicate work does not meet specified requirements, remove work, replace and retest. Cost of retests shall be paid by Owner and deducted from contract sum by Change Order.
- C. Frequency of Tests: Geotechnical Engineer may require as many tests as are necessary to ensure specified results.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Recompress fills subjected to and damaged by vehicular traffic.

**END OF SECTION**