PRIDE ACADEMY AT PROSPECT AVE

LIBRARY RESOURCE CENTER

SANTEE SCHOOL DISTRICT

SPECIFICATIONS

NOVEMBER 05, 2019

Project Tracking No. 68361-111
DSA File No. 37-66, DSA Application No. 04-118742

studiowc
ARCHITECTURE + ENGINEERING

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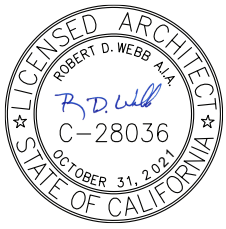
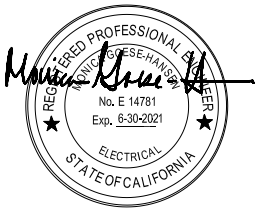
PROCUREMENT AND CONTRACTING REQUIREMENTS

SANTEE SCHOOL DISTRICT

PRIDE ACADEMY AT PROSPECT AVE.
LIBRARY RESOURCE CENTER
SANTEE SCHOOL DISTRICT

STATE OF CALIFORNIA Department of General Services DIVISION OF THE STATE ARCHITECT San Diego Regional Office 10920 Via Frontera, Suite 300, San Diego, CA 92127 Phone: (858) 674-5400	PROJECT TRACKING NO.: 68361-111 DSA APPLICATION NO.: STAMP DATE:

STUDIOWC
515 Encinitas Boulevard, Suite 201, Encinitas, CA 92024
(760) 753-6800

ARCHITECT: STUDIOWC Robert D. Webb, Architect, C-28036	
STRUCTURAL ENGINEER: WELSH STRUCTURES Stephanie Welsh, Engineer, License # S-2998	
MECHANICAL/ ELECTRICAL/ PLUMBING ENGINEER: PMPE Max Pajouhesh, Engineer, License # M-27488	
ELECTRICAL ENGINEER: JOHNSON ENGINEERING Monica Goese-Hansen, Engineer, License # E-14781	

END OF PROJECT TITLE PAGE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP. 04-118742 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02.05.20

PRIDE ACADEMY @ PROSPECT AVE.
LIBRARY RESOURCE CENTER
SANTEE SCHOOL DISTRICT

01 00 00

GENERAL REQUIREMENTS

SANTEE SCHOOL DISTRICT

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

A. Project: Learning Resource Center and Classroom Building at Pride Academy @ Prospect Ave. School for Santee School District.

B. Description of Work: Project consists of demolition of (1) existing portable building, existing site improvements, and existing utilities; construction of a new classroom/learning resource center; and modernization of student restrooms at existing building C. The new facility is non-sprinklered type VB construction with wood framing and concrete foundations. The new facility is approximately 6,000 square feet of enclosed area. The project will also require new utilities, finish (precise) grading and drainage for an approximately 0.5 acre site. The project also includes fencing, and other miscellaneous sitework, as indicated in the Contract Documents prepared by StudioWC.
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1.02 PERFORMANCE REQUIREMENTS

A. All work shall conform to 2016, Title 24, California Building Code (CBC).

B. Changes to the approved Drawings and Specifications shall be made by addenda or a construction change document (CCD) approved by the Division of the State Architect, Office of Regulation Services, as required by Section 4-338, Part 1, Title 24, California Building Code.

1.03 WORK UNDER OTHER CONTRACTS

A. No work is planned or scheduled to be performed by the Owner's own forces.

1.04 WORK SEQUENCE

A. Work is to be conducted in a single phase based on a single lump-sum contract. All work shall be completed within two hundred fifty (250) calendar days after the date of commencement of work stipulated in the Notice to Proceed. The contract closeout procedure as specified in Section 01 77 00 - Closeout Procedures shall be completed within this period. Normal inclement weather for the various seasons of the year shall not be grounds for extensions of contract time, and the Contractor shall take this into account when formulating his Construction Schedule. By submitting a Bid and entering into this Contract, Contractor certifies that he has adequate resources and is fully capable of completing the Work within the allotted time.

1.05 CONTRACTOR USE OF PREMISES

A. During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

B. Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public.

1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

C. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees 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.

D. Use of the Existing Buildings: Maintain the existing buildings in a weather-tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.06 OCCUPANCY

A. At each phase of completion, the Owner will occupy the Project in the manner outlined in Section 01 77 00 - Closeout Procedures, and as set forth in the General Conditions. Refer to General Conditions of the contract, for occupancy and completion conditions.

Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.

2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.

3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

A. Include in the Contract Sum all allowances stated in the Contract Documents.

B. Related Documents:

1. Drawings, Specifications, and General Provisions of the Contract.

1.02 ALLOWANCES FOR PRODUCTS

A. The amount of each allowance includes:

1. The cost of the product to the Contractor, less any applicable trade discounts.
2. Delivery to the site.
3. Labor for installation.
4. Applicable taxes.

B. In addition to the amount of each allowance, include in the Contract Sum the Contractor's costs for:

1. Handling at the site, including unloading, uncrating, and storage.
2. Protection from the weather and from damage.
3. Labor for installation and finishing.
4. Other expenses required to complete the installation.
5. Contractor's and Subcontractor's overhead and profit.

PART 2 - PRODUCTS

2.01 LUMP SUM ALLOWANCES

PART 3 - EXECUTION

3.01 SELECTION OF PRODUCTS

A. The Architect will:

1. Consult with the Contractor in consideration of products and suppliers or installers.

2. Make selection in consultation with the Owner. Obtain Owner's written decision, designating:

a. Product, design and finish.
b. Accessories and attachments.
c. Supplier and installer as applicable.
d. Cost to Contractor, delivered to the site or installed, as applicable.
e. Manufacturer's warranties.

B. The Contractor shall:

1. Assist Architect and Owner in determining qualified suppliers or installers.

2. Obtain proposals from suppliers and installers when requested by Architect.

3. Make appropriate recommendations for consideration of the Architect.

4. Notify Architect promptly of:

    a. Any reasonable objections Contractor may have against any supplier or party under consideration for installation.
    b. Any effect on the Construction Schedule anticipated by selections under consideration.

3.02 CONTRACTOR RESPONSIBILITY

A. On notification of selection, execute purchase agreement with designated supplier.

B. Arrange for and process Shop Drawings, product data and samples, as required.

C. Make all arrangements for delivery.

D. Upon delivery, promptly inspect products for damage or defects.

E. Submit claims for transportation damage.

F. Install and finish products in compliance with requirements of referenced specification sections.

3.03 ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order. The amount of the Change Order will recognize any changes in handling costs at the site, labor, installation costs, overhead, profit, and other expenses caused by the selection under the allowance.

B. Submit documentation for actual additional costs at the site, or other expenses caused by the selection under the allowance, within 60 days after completion of execution of the work. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

C. At contract closeout, reflect all approved changes in contract amounts in the final statement of accounting.

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

A. Contractor shall quote unit prices for additions or deductions of items of work as stated below.

1.02 UNIT PRICES

A. All unit prices quoted shall be for installed, completely finished and operable units or systems unless otherwise indicated and shall include overhead and profit, taxes, etc., so that they represent the complete price to the Owner.

B. It is hereby established that those unit prices shall not apply to work which the Contractor may elect to do or not to do, for the sake of his own convenience, nor shall they apply to work required to be performed in order to correct errors committed by the Contractor.

C. All unit prices shall be valid and in force during the life of the construction contract and shall be reconciled with the total construction cost, in accordance with the Contract Documents and before filing of the Notice of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All products listed for unit prices are subject to the inspection and replacement of water damaged materials and equipment.

B. Provide unit prices for the products listed in the Bid Form.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Review with the Inspector on unit price quantities and procedures for counting.

B. The Architect will review the Inspector's findings and review with the School District. A Change Order will be issued establishing the extra work to be performed using the unit prices provided at time of Bid.

3.02 CONTRACTOR RESPONSIBILITY

A. When given Notice to Proceed with extra work; order materials and proceed with the installation in accordance with the approved Change Order.

B. At contract close out, reflect all approved changes in contract amount in the final statement of accounting.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Administrative and procedural requirements for Alternates.

B. Perform work required for complete execution of each accepted alternate designated in the Owner-Contractor Agreement. Amount of alternate prices shall include cost of modifications made necessary including overhead and profit.

C. Work for alternates shall comply with applicable provisions of the contract documents, except as otherwise specified herein.

D. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates.

E. Schedule: Specification Sections referenced in the list of alternates contain requirements for materials and methods necessary to achieve the Work described under each alternate.

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 mentioned as part of the alternate.

1.02 COORDINATION

A. Coordinate pertinent related work and modify surrounding work as required to complete the project under each accepted alternate designated in the Owner-Contractor Agreement.

1.03 ADDITIVE ALTERNATES:

A. Refer to BID FORM for alternates.

B. All BID FORM ALTERNATES shall be bid, or the bidder may be deemed a "non-responsive" bidder.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for the proposal of substitutions.

1.02 MATERIAL

A. Equipment, materials, and articles incorporated into the work shall be new and suitable for the purposes intended.

B. Reference to equipment, material, article, or patented process by trade name or catalog number shall not be construed as limiting competition.

1. In cases where the Specifications designate a material, product, thing, or service by specific proprietary brand or trade name, and there is only one brand or trade name listed, the item involved is:

a. Used as a standard of quality which must be satisfied without compromise, or

b. The only brand or trade name known to the Owner and Architect.

2. Wherever in the Contract Documents a material, article, or process is indicated or specified by trade, patent, proprietary name, or name of manufacturer, such indication shall be deemed to be followed by the words, **"or equivalent, as accepted in writing by the Architect".**

a. Contractor shall submit a substitution request for Architect's written acceptance.

3. If the phrase "NO SUBSTITUTIONS" is used, the product is required to be used since it is a unique product application.

C. The naming of more than one manufacturer in a Section does not imply that all products of named manufacturers are acceptable for use on the Project. Where more than one proprietary name is specified, provide materials or equipment of any one of the manufacturers specified, only if full compliance with other portions of the Specifications can be provided.

D. Construction shall be in compliance with the cited standards for the materials specified.

1.03 SUBSTITUTIONS

A. Should the Contractor wish to substitute an item purported to be equal to the one specified, then the Contractor shall, no later than 35 days after Award of Contract, furnish to the Architect the name of the manufacturer, model number, color options and other pertinent data and information respecting the "or equivalent" item which has been proposed in the bid and which the Contractor contemplates incorporating in the work. If the "or equivalent" item is not found by the Architect to be, in fact, equivalent or better, then the item specified in the Contract Documents shall be furnished.

When colors have been indicated prior to Bid, Contractor shall be required to provide a custom color to match. See Section 01 33 00, Submittal Procedures.

B. When required by the Contract Documents, or when directed by the Owner, furnish full information concerning the material or article proposed for incorporation into the work. Testing of a proposed substitute material to assure compliance with the Specifications may be required by the Owner at the Contractor's expense. When so directed, submit samples for acceptance. Equipment, material, and articles installed or used without required acceptance shall be at the risk of subsequent rejection, and replacement at Contractor's cost.

C. Substitutions shall comply with, or exceed, requirements of dimension, function, structure, durability, and appearance without exception. Use of accepted substitutions shall in no way relieve the Contractor from responsibility for compliance with the Contract Documents after installation. It shall be incumbent upon the Contractor using accepted substitutions to assume extra costs caused by the use of such substitutions where they affect other work.

D. Do not substitute materials, equipment, or methods unless such substitution has been reviewed and approved by the Architect. **Substitutions shall be submitted to the Division of the State Architect for approval prior to acceptance by Architect.**

E. "Or Equivalent":

1. Where the phrase "or equivalent", "or approved equivalent", or "or equivalent as approved by the Architect" occurs in the Contract Documents, do not assume that materials, equipment, or methods will be accepted as equal unless the item has been specifically accepted, in writing, for the Work by the Architect **and by the Division of the State Architect for items which "affect health, safety or welfare" prior to installation or fabrication.**

F. Failure to place orders for specified equipment or material sufficiently in advance of the scheduled installation date will not be considered a valid reason upon which the Contractor may base his request for substitutions or for deviations from the Drawings and Specifications.

G. In the event the Contractor requests changes or revisions requiring drawings or services of the Architect or the Architect’s consultants, to facilitate installation or erection of any portion of the work, the Contractor shall accept the responsibility to hire and pay for the Architect's or Consultant's services. A standard hourly rate, as agreed upon, shall be paid by the Contractor whether the change is accepted or rejected. In the event the change is approved, this fee shall be deducted, and paid, from the Contract Sum.

H. Redesigning by the Contractor: Redesigning shall be by an Engineer licensed, in the State of California, to perform such work. In the event approval is required from authorities having jurisdiction, such approval shall be obtained by the Contractor at the Contractor’s expense before submitting the revised design or substitution to the Architect.

I. Revision after Approval: When a submittal has been reviewed by the Architect, resubmittal for substitution of materials or equipment will not be considered unless accompanied by an explanation acceptable to the Architect as to the reason substitution is considered necessary. Changes in Plans and Specifications, which effect safety, health or welfare, shall be made by Addenda or Construction Change Document approved by the Division of the State Architect.

1.04 SUBSTITUTION REQUEST FORM:

A. Submittal of the requested information shall be accompanied by the attached Substitution Request Form. Submit six copies of each request to the Architect. Architect will distribute as appropriate.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

ATTACHMENT: Substitution Request Form

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SUBSTITUTION REQUEST FORM

Re: _____
Project Name

_____
Project Manual Section Number

_____
Item

To: _____
Architect

From: _____
Contractor

Reviewed for timeliness and completeness by General Contractor:

We hereby submit for your consideration the following product comparisons of the specified item and the proposed substitution:

A. Comparison	Specified Item	Substitution
1. Product Name/Model	_____	_____
2. Manufacturer	_____	_____
Address	_____	
Address	_____	
Phone Number	_____	
3. Product Cost	_____	
Installation/Labor Cost	_____	
4. Delivery Time	_____	
Installation Time	_____	
5. Product Characteristics	_____	
6. Dimensions	_____	
Effects	_____	
7. Guarantee/Warranty	_____	
8. **ICC No.**	_____	
9. UL Rating	_____	

B. Substantiating Data:

Attach manufacturer's literature for both specified item and substitution.

C. Samples: Provide samples for both specified item and substitution, if applicable.

D. Similar Projects for Reference:

1. _____ _____
Name Date

_____
Address

_____
Address

_____
Contact

_____
Telephone

2. _____ _____
Name Date

_____
Address

_____
Address

_____
Contact

_____
Telephone

E. Maintenance Service/Parts/Supplier:

_____
Name

_____
Address

_____
Address

_____
Telephone

F. What effect does this substitution have on applicable code requirements?

_____

_____

_____

_____

G. Change Data:

Attach complete information for changes to be made to Drawings and Project Manual.

* * * * * * * * * * * * * * *

* Certification of equal performance and assumption of liability for equal performance.

* The Contractor shall agree to pay for costs involved in changing the building design; including engineering, drafting and detail cost caused by the proposed substitution.

Submitted by:

_____ _____
Signature Name

Title _____

_____ _____
Firm Name Date

_____ _____
Address Address

_____ _____
City State Zip Telephone

Remarks:

_____

_____

_____

Signature must be by persons having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

PRIDE ACADEMY @ PROSPECT AVE.
LIBRARY RESOURCE CENTER
SANTEE SCHOOL DISTRICT

Product substitution of _____

for _____

Specifications Section _____
(number) (name)

For Use by Owner's Representative:

□ Accepted □ Not Accepted

Owner's Consultant:

By: _____

Date: _____

□ Accepted □ Not Accepted

School District:

By: _____

Date: _____

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Administrative and procedural requirements governing the Contractor's Applications for Payment.

B. Related Work:

1. The Construction Progress Schedule is included in Section 01 32 16 and shall be coordinated with the work of this Section.

2. PROJECT RECORD DOCUMENTS: All requirements for record documents, Specification Section 01 78 39, shall be completed to the Owner's satisfaction prior to Owner's processing of each month's Application for Payment.

1.02 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Network Analysis Schedule.

B. Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment. Include with initial submission a projected monthly payment request schedule for total cost of project, for Owner's cash flow planning.

C. Acceptance of the Schedule of Values by the Architect and the District is required prior to approval and payment of the first application for payment.

D. Format and Content: The Project Manual Table of Contents may be used as a general guide to format the Schedule of Values; specific item numbers may be sequentially numerical.

1. The Schedule of Values shall be a detailed breakdown of the price to provide and install each item of work and material on the project.

2. Each line item on the Schedule of Values shall be presented to allow the Architect to easily find that item of work within the construction during his review of the construction operations and evaluate whether that line item is 100% complete or not.

3. Each line item of the Schedule of Values shall be given a value by the Contractor that, in the opinion of the Contractor, best represents the value of that work, and if required to present evidence of his opinion, the Contractor will be able to substantiate the value by the use of supplier, subcontractor written quotations, labor wages/rates, hourly estimates and/or by industry recognized cost estimating references.

4. Each line item of the Schedule of Values shall be in such detail and coordinated with other line items of work and with the contractor's Construction Schedule, that when making application for payment each month, each line item depicts a portion of work that can be completed within one month's pay period, reviewed by the Inspector and the Architect; if that line item is 100% complete, recommended to the Owner for payment. If, in the opinion of the Architect, the line item is not 100% complete, the line item will not be recommended for payment.

5. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed. Each sheet of the Schedule of Values shall be titled and numbered sequentially.

    a. Line Item Number

    b. Description of Item.

    c. Quantity.

    d. Unit of Measure.

    e. Unit Price.

    f. Value of Line Item.

    g. Line Item Value Request this month.

    h. Line Item Value previously completed.

    i. At the bottom of each sheet, the Total Amount of Columns f, g, and shall be tabulated and carried forward on each page and the TOTAL AMOUNT presented at the end.

E. Round amounts off to the nearest whole Dollar; the total shall equal the Contract Sum.

F. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.03 APPLICATIONS FOR PAYMENT

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

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

B. Payment Application Times: The date for each progress payment is the 15th day of each month. The period of construction Work covered by each Application for Payment is the period ending 15 days prior to the date for each progress payment and starting the day following the end of the preceding period.

C. Payment Application Forms: Use AIA Document G702 and the form of Schedule of Values accepted by the Architect and approved by the District.

D. Application Preparation: Complete each entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Network Analysis Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Owner-approved Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit three (3) executed copies of each Application for Payment to the Architect by means of ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment.

1. Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period covered by the Application.

2. Submit final Application for Payment with or precede by final waivers from entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.

G. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:

1. List of subcontractors.

2. Schedule of Values.

3. Contractor's Construction Schedule.

4. Schedule of unit prices, if applicable.

5. Submittal Schedule.

6. Copies of permits as may be required to start the Work (encroachment permits, etc., may be obtained as necessary for sequence of construction).

7. Copies of authorizations and licenses from governing authorities for performance of the Work.

8. Initial progress report.

9. Report of pre-construction meeting

10. Certificates of insurance and insurance policies.

11. Performance and payment bonds.

Note: Each preceding item shall be submitted to the Architect, accepted by the Architect and approved by the Owner prior to the certification and approval of the first payment to the Contractor.

H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.

2. Warranties (guarantees) and maintenance agreements.

3. Test/adjust/balance records.

4. Maintenance instructions.

5. Meter readings.

6. Start-up performance reports.

7. Change-over information related to Owner's occupancy, use, operation and maintenance.

8. Final cleaning.

9. Application for reduction of retainage, and consent of surety.

10. Advice on shifting insurance coverages.

11. Final progress photographs.

12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion. Each work item value shall be listed and the total amount deducted from amounts owed over and above the retention.

I. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project closeout requirements.

2. Completion of items specified for completion after Substantial Completion.

3. Written assurance that unsettled claims will be settled.

4. Written assurance that Work not complete and accepted will be completed without undue delay.

5. Transmittal of required Project construction records to Owner.

6. Certified property survey.

7. Proof that taxes fees and similar obligations have been paid.

8. Removal of temporary facilities and services.

9. Removal of surplus materials, rubbish and similar elements.

10. Change of door locks to Owner's access.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

Attachments: Application and Certification for Payment – Form G702
Continuation Sheet – Form G702

APPLICATION AND CERTIFICATE FOR PAYMENT (G702)

TO: SANTEE SCHOOL DISTRICT

PROJECT:

APPLICATION NO:
PERIOD TO:
PROJECT NO:
CONTRACT DATE:
CONTRACT FOR:

DISTRIBUTION TO:
- ☐ OWNER
- ☐ ARCHITECT
- ☐ CONTRATOR
- ☐ FIELD
- ☐ OTHER

PHONE:

FROM:

VIA ARCHITECT:

PHONE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made fro payment, as shown below, in connection with the Contract Continuation Sheet, AIA Document G703, is attached.

1. **ORIGINAL CONTRACT SUM**	$	
2. **Net Change by Change Orders & Extras**	$	
3. **CONTRACT SUM TO DATE** (Line 1 + Line 2)	$	
4. **TOTAL COMPLETED & STORED TO DATE** (Column G on G703)	$	
5. **RETAINAGE:**		
a. ____ % of Completed Work …$_____		
b. ____ % of Stored Material …...$_____		
Total Retainage (Line 5a + 5b)		
Total in Column I of G703	$	
6. **TOTAL EARNED LESS RETAINAGE** (Line 4 less Line 5 Total)	$	
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT** (Line 6 from prior Certificate	$	
8. **CURRENT PAYMENT DUE**	$	
9. **BALANCE TO FINISH, INCLUDING RETAINAGE** (Line 3 less Line 6)	$	

CHANGE ORDER SUMMARY		
Total changes approved in		
Previous months by Owner	$	
Total approved this month	$	
NET CHANGES by Change Order	$	

State of: _____ County of _____ .

Subscribed and sworn to before me this _____ day of _____ , 20___.

Notary Public: _____ My Commission Expires:

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ **Date:** _____

INSPECTOR:

By: _____ **Date:** _____

OWNER:

By: _____ **Date:** _____

AMOUNT CERTIFIED ……..……..$ _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

ARCHITECT:

By: _____ **Date:** _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CONTINUATION SHEET (G703)

PROJECT: APPLICATION NO: CONTRACT DATE:

PERIOD TO: CONTRACT FOR:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G+C)	BALANCE TO FINISH (C-G)	RETAINAGE
			FROM PREVIOUS APPLICATIONS (D+E)	THIS PERIOD					
	TOTAL PAGE 1								

SECTION 01 31 13

PROJECT COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Administrative and supervisory requirements required to ensure orderly progress and timely completion of the Work.

B. Related Work Described Elsewhere:

1. Additional requirements for coordination are included on Contract Drawings and other Sections of the Specifications. It is intended that all work provided under this Contract shall be complete except where otherwise specified or shown. Any drawing, document, or section, by itself, is not a complete description of the work. Cross references to related work, where given, are provided as a convenience and shall not limit the applicability of other requirements specified or shown unless specifically stated.

1.02 QUALITY ASSURANCE

A. Familiarity With Contract Documents:

1. Contractor and all Subcontractors shall conduct a study necessary to become completely familiar with all requirements. Applicable requirements indicated or described in the Contract Documents, and the publications referred to, are a part of the Work required as though repeated in each such Section.

2. In the event discrepancies or conflicts are encountered, notify the Architect immediately. Where there is discrepancy between different parts of the contract documents, including referenced codes and standards, the documents requiring the higher quality, the greater quantity, or the more difficult work shall govern, unless determined otherwise by the Architect.

3. Promptly distribute required information to entities concerned and ensure the needed actions are taken.

B. Reporting: Unless otherwise noted by the Contractor in his transmittals, all of the Contractor's data transmittals to the Architect for the Architect's review will be construed as stipulating that the Contractor has thoroughly and completely reviewed and coordinated the data prior to transmittal.

C. Interfacing: It shall be solely the responsibility of the Contractor to make sure that each Subcontractor completes in a timely manner the assigned work and that all interfaces are prepared, connected, and function as required.

1.03 REQUEST FOR INFORMATION

A. The General Contractor shall plan, schedule, coordinate and sequence Work so Requests for Information (RFI), if necessary, may be submitted to the Architect in a timely manner so as not to delay progress of Work. Submission of and responses to RFI(s) with copies to Owner, shall be transmitted via email.

B. Telephone conversations requesting information shall be confirmed in writing for prompt reply of all RFIs. Contractor shall coordinate the timing of email and telephone conversations to be made with the Architect's office between the hours of 8:00 a.m. and 4:00 p.m., Monday through Friday.

C. RFI will be unanswered until Contractor submits a "Construction Schedule". "Construction Schedule" shall be based on Specification Section arrangement, and establish starting and ending dates for Work in each section. "Construction Schedule" shall be updated monthly and delivered to Architect and Owner at "Request for Payment".

D. If "Construction Schedule" is not received by Architect and Owner by that date, Architect's response to pending RFI(s) will be delayed by the same number of days as the days the "Construction Schedule" is late.

E. Architect shall have the same time period to respond to RFI(s) as "shop drawing review period". When the response to a Request for Information is already contained or included within contract documents, or is based on referenced standards, or is based on established and common construction practices, Contractor shall reimburse the Architect at the following hourly rates:

Principal	$200.00/hour
Associate Architect/Project Manager	$150.00/hour
Project Architect	$ 95.00/hour
CADD	$ 85.00/hour
Job Captain	$ 75.00/hour
Draftsperson	$ 65.00/hour
Support Staff	$ 55.00/hour

If RFI requires Architect's Consultant(s) acknowledgment, Contractor shall reimburse consultant(s), at the same hourly rates for consultant's staff; Contractor shall also pay to the Architect, a percentage for overhead and profit to the consultant's fee, equal to the markup the General Contractor adds to "Change Orders" from his "Subcontractors".

F. Contractor shall be billed at "Request for Payment" meeting, and payment is due on the 10th day of the following month. If payment is not received by Architect by that date, Architect's response to pending RFI's will be delayed by the same number of days as the days the payment check for RFI services is late.

G. No damages for delay due to RFI response beyond allotted time will be allowed, unless Contractor can show that RFI was not foreseeable with proper planning, scheduling, coordination, and sequencing and the Architect's late response delayed timely purchase or delivery of equipment or material, or limited construction personnel from proceeding with their task(s), within previously listed "Construction Schedule" activity period(s).

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.01 PLANNING THE WORK

A. By thorough advance planning of activities, coordinate the following in addition to other coordination activities required:

1. Materials, services, and equipment purchasing.

2. Shipping.

3. Receipt and storage at the site.

4. Installation, including interface with related items.

5. Inspection and testing, to the extent required under the Contract.

6. Assistance in initial start-up and operational tests.

7. Completion of the Work, including removal and disposal of Contractor's surplus material and equipment, and final cleaning of structures and sites.

3.02 COORDINATION

A. Coordinate construction activities included under various Sections of these Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work.

3.03 GENERAL INSTALLATION PROVISIONS

A. Coordination methods used by the Contractor are at the Contractor's option, except that the Architect may disapprove Work completed by the Contractor or data submitted by the Contractor when, in the Architect's judgment, coordination has been inadequate to ensure the specified quality.

B. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

END OF SECTION

Attachment: Request for Information – Form RFI

REQUEST FOR INFORMATION (RFI)

SCHOOL NAME - PROJECT NAME

NOTE: AN RFI IS A REQUEST FOR INFORMATION ONLY. IF A REPLY TO AN RFI REQUIRES ADDITIONAL SERVICES BY A DESIGN CONSULTANT, OR WILL CHANGE SCOPE OF WORK OR CONTRACT TIME, SUBMIT PROPOSAL REQUEST IN ACCORDANCE WITH SECTION 01 25 00.

RFI #: _____

To: _____ Date: _____

Architect: _____ Project No.: _____

Address: _____ Drawing Ref.: _____

Phone: _____ Fax: _____ Spec. Sect. Ref.: _____

Email: _____

☐ POSSIBLE COST IMPACT ☐ TIME IMPACT ☐ PRIORITY ATTENTION REQUIRED

Subject:

INFORMATION REQUESTED: (Attach additional sheets as required)

PLEASE RESPOND BY: _____ TRANSMITTED BY: _____

RESPONSE: (Attach additional sheets as required)

RESPONDED BY:

Name: _____ Company: _____ Date: _____

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Prior to commencement of the Work, a Preconstruction Conference will be held to discuss procedures to be followed during the progress of the Work.

B. Location: A convenient site for all parties designed by the District.

C. Attending the Preconstruction Conference shall be:

1. District Representative
2. District's Project Representative
3. Architect
4. District's and Architect's Consultants
5. Contractor
6. Contractor's Superintendent
7. Major listed Subcontractors
8. Others as appropriate

1.02 PROPOSED PROGRESS MEETINGS

A. Schedule and hold weekly meetings or as required by the District Representative.

1. Agenda to be prepared and submitted 48 hours prior to meeting.

B. Location: A convenient site for all parties designed by the District.

C. Attending Progress Meetings shall be:

1. Contractor and/or fully delegated Representative
2. Contractor's Superintendent
3. Subcontractors, as appropriate to the Agenda.
4. Others, as appropriate to the Agenda.
5. Inspector of Construction
6. District Representative
7. Architect

D. The Architect will record and distribute Meeting Minutes to the attendees. Attendees taking exception to anything in the meeting notes shall state same in writing, directed to the Architect within (5) five working days following receipt of meeting notes.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Manually prepared construction schedule based on Gantt (bar) Charts. Prepare and maintain schedules and issue reports to assure adequate planning and execution of the Work. Complete Work within the number of calendar days allowed in the Contract. Schedule shall be in sufficient detail to assist the Architect in appraising the reasonableness of the proposed schedule and to evaluate progress of the Work.

1.02 DEFINITIONS

A. Day: As used throughout the Contract, the work "day" means "calendar day" unless otherwise indicated.

B. Adverse weather that is normal for the area and the season shall be taken into account in the Construction Schedule.

1.03 QUALITY ASSURANCE

A. Qualifications of Scheduling Personnel: Employ a project scheduler thoroughly trained and experienced in compiling construction schedule data and in preparation of periodic reports.

B. Reliance Upon Accepted Schedule:

1. The construction schedule, as accepted by the Architect, shall be an integral part of the contract and will establish interim Contract completion dates for various activities.

2. Should any activity fail to be completed within 15 days after the stipulated schedule date, the Owner shall have the right to order the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor, and as set forth in the General Conditions of the Contract.

3. Should any activity be 30 or more days behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner may deem appropriate, and as set forth in the General Conditions of the Contract.

4. Costs incurred by the Owner in connection with expediting construction shall be deducted from the Contract amount.

5. Failure by the Owner to exercise the option to either order the Contractor to expedite an activity or to expedite the activity by other means, will not be considered a precedent for any other activities nor a waiver of the Owner's rights to exercise his rights on subsequent occasions.

1.04 SUBMITTALS

A. Submittal Procedure: Refer to Section 01 33 00 – Submittal Procedures and to Section 01 25 00 – Substitution Procedures.

B. Preliminary Analysis: Within 10 days after receipt of notice to proceed, submit one reproducible copy and four prints of a preliminary Construction Schedule.

C. Construction Schedule: Within 30 days after receipt of notice to proceed, submit one reproducible and four prints of the initial construction schedule.

D. Periodic Reports: On the first working day of each month following submittal of the initial construction schedule, submit four prints of the updated Construction Schedule.

PART 2 - PRODUCTS

2.01 CONSTRUCTION ANALYSIS

A. Graphically show the order and interdependence of activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram. Show all activities on the diagram. Each activity shall indicate work item breakdown noting duration and responsibility for each item, including, but not necessarily limited to:

1. Project mobilization.

2. Submittal and review of shop drawings and samples.

3. Procurement of equipment and critical materials.

4. Fabrication of special material and equipment. Installation and testing of each by item and by system.

5. Final Cleanup.

6. Final inspection and testing.

7. Activities by the Architect that affect progress, required dates for completion, or both, for each part of the work.

PART 3 - EXECUTION

3.01 PRELIMINARY ANALYSIS

A. Prepare a Preliminary Construction Schedule:

1. Show all activities of the Contractor under this Contract for the period between receipt of notice to proceed and submittal of initial construction schedule.

2. Show the Contractor's general approach to remainder of the Work.

3. Show cost of all activities scheduled for performance before submittal and review of the Construction Schedule.

3.02 INITIAL CONSTRUCTION SCHEDULE

A. Update the Preliminary Construction Analysis for use as the initial Construction Schedule:

1. Clearly indicate the critical path and slack where it occurs.
2. Meet with the Architect and review contents of proposed Construction Schedule.
3. Make all revisions required by the Architect.

3.03 PERIODIC REPORTS

A. On a monthly basis as specified above, submit updated Construction Schedule:

1. Indicate "actual" progress in percent completion for each activity.

2. Provide written narrative summary of revisions causing delay in the program. Explain corrective actions taken or proposed.

B. Revise accepted construction schedule only when revisions are reviewed and approved in advance by the Architect.

END OF SECTION

SECTION 01 32 16.13

NETWORK ANALYSIS SCHEDULES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Computer generated construction scheduling based on CPM Network Analysis.

1.02 RESPONSIBILITY

A. Be responsible for developing schedule logic with appropriate durations, manpower and cost data. Information shall be acceptable and compatible with the Owner's Master Schedule. Target completion and milestone dates generated shall be acceptable to the Owner.

B. Adverse weather that is normal for the area must be taken into account in the Construction Schedule.

C. Be responsible for providing a schedule meeting the contract agreement time of completion. The Owner requires the school facilities to be complete at the completion of Contract Agreement. A schedule that establishes completion prior to the end of Contract Agreement time will be considered for the Contractor's benefit only. Delays caused during construction that do not result in extensions of time beyond contract agreement time shall not be considered a cause for claim.

1.03 PROJECT INSPECTION

A. The Owner will designate the time for a regular monthly update inspection at which time representatives of the Owner, Architect, and Contractor will inspect the Project and agree on progress of activities. The information so obtained shall be the basis for schedule update and monthly payments.

1.04 PROGRESS MEETINGS

A. The Owner will designate time and location for a regular Monthly Progress Meeting at which principal parties shall attend. Current schedule, job progress, delays, projections, alternatives, cost report and payment applications to be among the priority items addressed in detail.

PART 2 - PRODUCTS

2.01 HARDWARE

A. Provide microcomputer, along with required peripherals to be provided at the job site, for processing the Schedule and preparing reports.

2.02 SCHEDULING SOFTWARE

A. Use a critical path based scheduling software program which is commercially available and commonly used in the construction industry for the preparation of graphic reports.

2.03 SCHEDULING PERSONNEL

A. Designate a Project Scheduler dedicated to scheduling responsibilities for this Work. Project Scheduler shall have had previous scheduling responsibilities on projects of equal size and complexity. Submit resume of the designated Scheduler for approval by Owner prior to the Notice To Proceed.

2.04 REPORTS REQUIRED

A. Provide the following Reports:

1. Activity ID Report: Ordered by number in ascending order showing the activity description, early and late, start and finish dates, activity duration, per cent complete, and total float.

2. Early Start Report: Sorted by building/area/early start/total float.

3. Predecessor and Successor Analysis Report: Show activities and their predecessors and successors, relationship types and lag/lead time between activities.

4. Network Logic Diagram: Drawn on 24" x 36" sized sheets, in a legible format, showing activities and relationships for construction activities.

5. Bar Chart: Drawn in a legible format sorted by building or area and early start and showing activities occurring within the first 120 days of construction following the Notice To Proceed.

6. Narrative: Provide a written narrative under the following circumstances:

   a. To describe or explain logic changes.
   b. To explain out of sequence progress.

7. Construction Cost Report: This shall be produced based on the approved schedule of values for each building or area and other appropriate breakdowns.

2.05 REPORT SUBJECTS

A. Reports required shall include cost updated, written narratives, network logic diagrams, graphic bar charts, in both detailed and summary format, and tabular printouts sorted and filtered as described hereinafter.

B. Network Diagrams shall legibly show the order and interdependence of activities, and the sequence in which the work is to be accomplished as planned. Networks shall be drawn on 24" x 36" sized sheets with title, match data and date of latest version on each sheet.

1. A complete network diagram indicating current logic and activity durations shall be provided. A new updated network logic diagram will be required whenever material changes to the logic are made.

C. Tabular printouts shall show one activity per line along with appropriate date for the purpose intended including various combinations of the following:

1. Activity ID
2. Activity description

3. Proceeding and succeeding activity ID's and descriptions
4. Original duration (in work days)
5. Revised duration (in work days)
6. Days remaining (in work days)
7. Per Cent complete and contract dollars paid
8. Earliest start date (by calendar date)
9. Earliest finish date (by calendar date)
10. Latest start date (by calendar date)
11. Latest finish date (by calendar date)
12. Actual start date (by calendar date)
13. Actual finish date (by calendar date)
14. Total Float

D. Activities shall include in addition to the construction activities, the submittal, review and approval of samples, manufacturer's date, and shop drawings, the procurement of materials and equipment, installation and testing. Any impact resulting from the operations of other contractors, of from operating restraints imposed by the Owner shall be identified in the network schedule. The selection and number of activities shall be subject to the Owner's approval.

1. Once activity data is acceptable to the Owner, permission may be granted to reduce certain routine Update Reports to reflect only the next 90 day period of activity.

E. Bar charts shall be required for summary purposes to compare actual progress per building/area with baseline schedule, and to indicate the effect of proposed logic changes and compression alternative.

F. Cost Reports shall be based on agreed completions for each work activity and be formatted to be consistent with the approved Schedule of Values.

2.06 SCHEDULE FORMAT

A. The detailed Network Schedule shall be developed using precedence or arrow format.

1. Durations shall be in working days and activities shall be of no greater duration than 20 days.

2. Activities shall be defined by profession/ trade/subcontractor.

3. Specific exceptions shall be approved by the architect/owner.

B. An appropriate monetary value is to be assigned to each work activity or group of activities by the Contractor and approved by the Owner. As the work progresses, each Schedule update shall provide the Owner with an updated cost report which will be the basis for approving application for payment. The Contractor may also resource load the Schedule based on manpower, materials and equipment by work activity, if he so chooses.

2.07 CONSTRUCTION COST REPORT

A. Within 30 calendar days following the Notice To Proceed, prepare and submit for approval a detailed, cost loaded construction schedule. Indicate information from subcontractors and suppliers, coordinate, and incorporate it into the detailed Construction Schedule. Relevant data shall be acquired, processed, submitted by the designated

Project Scheduler. Reports submitted shall be accompanied by a certificate from the project scheduler that the data is current, complete, and representing the current network knowledge and values.

B. The detailed construction schedule submitted by the Contractor shall:

1. Reflect complete sequence of construction by activity including:

   a. Submittal and shop drawing activities for procurement packages and equipment.

   b. Product procurement and delivery dates including long lead items.

   c. Contractual milestone dates.

   d. Dates for beginning and completion of each element of construction.

   e. Disruptions and shutdowns due to other operations, facilities and functions.

   f. Dates for installation and testing of equipment.

   g. Cleanup

   h. Contract start-up and closeout.

2. Identify work of separate buildings, separate areas and other logically grouped activities.

3. Show projected percentage of completion for each item of work as of the last day of each month.

4. Provide special schedules to define critical portions of the entire Schedule as requested by Owner.

5. Incorporate the procurement submittal Schedule.

   a. Discrete activities shall be separated by trade or other category as requested by the Owner and separate activities shall be assigned activity numbers for use and monitoring.

   b. Separate activities shall be reflected in a level of detail such that no activity shall be of greater duration than 20 days. Specific exceptions must be requested in writing.

6. Provide complete and accurate cost reports.

PART 3 - EXECUTION

3.01 INITIAL SUBMISSION

A. Within 10 days following the Notice to Proceed, submit a basic schedule indicating anticipated progress during the first 60 days following Notice to Proceed.

B. The sixty-day plan shall be an initial logic network identifying overall activities, relationships and durations, and meeting owner defined milestones, and including a calendar of holidays.

C. Within 30 calendar days of receiving its Notice to Proceed, prepare and submit a detailed procurement and construction schedule integrating the 60-day schedule, for review and approval by the Owner. Emphasis shall be placed upon the procurement of equipment and materials. This schedule shall provide the following:

1. Appropriate tabular printouts and graphic reports provided to clearly show activity, logic relationships, activity durations, early and late start and finish dates, and total float.

2. Complete details are required for work occurring within the following 120 days and sufficient detail for the balance of project to insure meeting completion criteria. When approved by the Owner, this Schedule is to be preserved and identified as the original Baseline Schedule.

3. Activity code definition describing sub-elements of the activity identification or any other code values used for the purpose of sorting or grouping date.

4. Cost reports consistent with the payment procedures and Schedule of Values approved by the Owner.

3.02 MONTHLY UPDATES

A. Each month shall issue a revised detailed Construction Schedule consisting of tabular data and bar chart summaries, plus certified date which:

1. Shows changes occurring since the previous submission of updated schedule,

2. Indicates progress of each activity and shows completion dates,

3. Includes:

a. Major changes in scope and logic changes.
b. Activities modified since previous updating.
c. Identification of any slippage.
d. Revised projections due to changes.
e. Out of sequence progress.
f. Other identifiable changes.

4. In the event that a revised detailed Schedule is not acceptable to the Owner, Schedule shall be revised and resubmitted until acceptable by the Owner.

B. The monthly schedule submittal shall include the following reports:

1. Activity report sorted by activity.

2. Critical activity report sorted by total float/early start.

3. Cost report based on the agreed progress on each work activity or group of activities.

4. Other reports as requested by the Owner.

C. Network logic diagram produced on 24" by 36" paper shall show current data dates, activities whether complete or not, and the status of each. This diagram shall reflect reported construction progress and projected activity. The critical path is to be highlighted for ease of identification. The logic diagram shall be grouped by building and sub-grouped by logically related activities, such as Specification Division, responsibility, or area. Sheets of the network diagram that are unaffected by change since the previous issue need not be resubmitted.

D. In the event that the Contractor fails to provide the required schedules, reports, or updates noted above in a timely manner, the Owner shall have the right to withhold progress payments until the scheduling documentation requirements of this Section are satisfied.

3.03 PROJECT CLOSEOUT

A. As the project approaches completion, separate reports shall be submitted showing the sequence durations and dates for testing, adjusting, and commissioning items of equipment installed under this Contract. Both detailed and summary reports are required.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.

2. To help ensure that the specified products are furnished and installed in accordance with design intent, submit design product and data in advance for review by the Architect. Review by the Architect and the design consultants in no way relieves the contractor or subcontractor or supplier from providing the products or construction as described in the Contract Documents.

3. Make submittals required by the Contract Documents. Revise and resubmit when requested to establish compliance with the specified requirements.

B. Related Work Described Elsewhere: Additional requirements for submittals are described in other Sections of these Specifications and the General Conditions.

1.02 QUALITY ASSURANCE

A. Coordination of Submittals: Prior to each submittal, review and coordinate each item being submitted and verify that each item and the submittal conform with the requirements of the Contract Documents. **By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.**

B. Certificates of Compliance:

1. Certify that materials used in the Work comply with specified provisions thereof. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, the material is found not to meet specified requirements.

2. Show on each certification the name and location of the Work, name and address of Contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. Certification shall be in the form of letter or company-standard forms containing required data. Certificates shall be signed by an officer of the manufacturing or fabricating company.

3. In addition to the above information, laboratory test reports submitted shall show the date or dates of testing, the specified requirements of which testing was performed, and results of the test or tests.

1.03 SUBMITTALS

A. Contractor shall submit all shop drawings, samples, requests for substitutions, mix designs, and other items, in accordance with this Section. Submit schedule per Section 01 32 16, Construction Progress Schedule, indicating timing of all required submittals.

B. Prior to submittal of the Contractor's first application for payment, submit a schedule of all submittals required by the Contract Documents.

C. Submittals shall be submitted per the following time schedule for the following specific items. Failure to submit by these dates will be considered sufficient grounds to delay Architect's certification of Contractor's Application for Payment until these items are received in proper order.

1. Within **15 calendar days** after Award of Contract:

a. **All Requests for Substitutions:** After this date, no further requests for substitution will be considered, and Contractor shall be obligated to provide the specified products - **NO EXCEPTIONS.**

2. Within **20 calendar days** after Notice to Proceed:

a. Concrete mix design, steel connectors to be embedded in concrete foundations and slabs, materials for underground site plumbing, sewer, storm drainage, and underground site electrical.

3. Within **30 calendar days** after Notice to Proceed:

a. Hollow metal, door hardware, fire alarm system, fire sprinkler system, glu-lam beams and other structural lumber, structural steel, miscellaneous structural connectors, mechanical, plumbing and electrical materials, and equipment and fixtures.

b. All materials requiring a color selection by the Owner and Architect.

c. All casework.

4. Within **45 calendar days** prior to installation:

a. All other items not specifically mentioned in 1, 2 and 3 above.

D. Provide required submittals for the following products to interface with other portions of the Work. Submit data to verify compliance only.

1. For products specified only by reference standard, select product meeting that standard, by manufacturer.

2. For products specified by naming several products or manufacturers, select one of the products or manufacturers named.

3. For products specified by naming one or more products or manufacturers and stating "or other approved', or "or approved equivalent", or other such wording on drawings or within specifications sections, submit a request for substitutions for product or manufacturer which is not specifically named, but only after submitting bid on specified products and systems.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS AND COORDINATION DRAWINGS

A. Scale and Measurements: Make shop drawings to a scale sufficiently large to shown pertinent aspects of the item and its method of connection to the Work.

B. Type of Prints Required: When contractor desires a reproducible shop drawing, submit shop drawings in the black and white paper and PDF format.

C. Reproduction of Reviewed Shop Drawings: Printing and distribution of reviewed shop drawings for the Architect's use will be by the Architect.

D. Review comments of the Architect will be shown on the sepia transparency when it is returned to the Contractor. The Contractor shall make and distribute copies required for his purposes.

2.02 MANUFACTURERS' LITERATURE

A. General: Where submitted literature from manufacturers includes data not pertinent to the submittal, indicate which portion of the contents is being submitted for review. Submittals not clearly marked will be returned without review.

B. Number of Copies Required: Nine (9) total, three (3) for Contractor plus six (6) copies to be retained by the Architect. The Architect will distribute stamped copies to the Consultant, D.S.A., the Inspector, and two (2) to the Owner.

C. The Contractor shall make and distribute copies required for his purposes.

2.03 SAMPLES

A. Accuracy of Samples: Precise article proposed to be furnished shall be labeled with a submittal number, and project name.

B. Number of Samples Required: Submit quantity required to be returned plus one each retained by the Architect, the Inspector, D.S.A., and the Owner, unless otherwise noted.

C. Reuse of Samples: In situations accepted by the Architect, the Architect's retained sample may be used in the construction as one of the installed items.

D. Size of Samples: Samples shall be 6" x 6", or manufactured width by 12 inches, unless otherwise required by the pertinent Specification section.

2.04 COLORS AND PATTERNS

A. When the precise color and pattern is not specifically described in the Contract Documents, and whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts to the Architect for review and selection. Submit data to verify compliance only. If the color is specifically described in the Contract, submit only that color for verification and approval.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS

A. General: Consecutively number submittals within the respective specification section. Accompany each submittal with transmittal cover letters attached to the end of this Section. Fill out each transmittal cover letter completely, number sequentially, include specification section, name of supplier or installer, and contact person and telephone number.

B. Internal Identification: On the first page of each copy of each submittal, and elsewhere as required for positive identification, indicate the submittal number.

C. Resubmittals: When material is resubmitted, transmit under a new letter of transmittal and with same submittal number plus a "alphabetic" suffix indicating its a re-submittal, e.g. 05500-1A, 05500-1B.

D. Submittal Log: Maintain submittal log for the duration of the Contract. Show current status of submittals, with columns showing "approved", "approved as corrected", etc, to match Architect's categories. Make the submittal log available for the Architect's review upon request. Log shall be available and will be reviewed at each project meeting.

3.02 COORDINATION OF SUBMITTALS

A. The Contractor's Project Engineer shall be responsible to coordinate and review all submittals prior to forwarding to Architect. All submittals shall be stamped with Contractor's stamp, signed and dated, stating:

1. Contractor has reviewed submittal for compliance with requirements of the Contract Documents.

2. Contractor has reviewed submittal for proper interfacing with other trades.

B. General: Prior to making submittals, coordinate materials including, but not necessarily limited to:

1. Determine and verify interface conditions, catalog numbers, and similar data,

2. Coordinate with other trades as required,

3. Clearly indicate deviations from requirements of the Contract Documents. Deviations which are <u>not</u> clearly called out as a deviation and which subsequently become a part of an approved submittal can under no circumstances be considered legitimate grounds for an additive change order.

C. Grouping of Submittals: Make submittals in groups containing associated items to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying and the Contractor shall be strictly liable for occasioned delays.

D. Color selections for materials in the same space or same elevation shall be submitted at one time. "Piece meal" submission of the color samples or charts is unacceptable and will be returned awaiting a "complete" submission.

3.03 TIMING OF SUBMITTALS

A. General: Make submittals far enough in advance of dates scheduled for installation to provide time required for reviews; for possible revisions and resubmittals; and for placing orders and securing delivery, and as otherwise required by Part 1.03 of this Section.

B. Architect's Review Time: In scheduling, allow at least 20 calendar days for review by the Architect following his receipt of the submittal or as otherwise may be required under each Specification section. Allow an additional 10 days for reviews involving Architect's consultants or as otherwise may be required under each Specification section.

C. Delays: Delays caused by tardiness in making submittals or resubmittals will not be an acceptable basis for extension of the Contract completion time.

3.04 ARCHITECT'S REVIEW

A. General: Corrections or comments made on Shop Drawings during his review shall not relieve the Contractor from compliance with requirements of the Drawings and Specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of other trades, and performing his work in a safe and satisfactory manner.

1. Authority to Proceed: The notations "Furnish as Submitted" or "Furnish as Corrected" authorize the Contractor to proceed with fabrication, purchase, or both or the items so noted, subject to the revisions, if any, required by the Architect's review comments.

2. Revisions: The notation "Revise and Resubmit" or "Submit Specified Item" means make revisions required by the Architect and resubmit. If the Contractor considers required revision to be a change, he shall so notify the Architect as provided for under "Changes" or "Changes in the Work" in the General Conditions. Show each drawing revision by number, date, and subject in a revision block on the drawing. Make only those revisions directed by or accepted by the Architect.

3. Rejection: The notation "Rejected" means the submission does not meet requirements of project contract documents. Make new submission meeting project contract documents.

END OF SECTION

Attachment: Contractor’s Form - Shop Drawings / Submittal Transmittal Letter
Cover Sheet referenced herewith.

SHOP DRAWINGS / SUBMITTAL TRANSMITTAL LETTER

School: Project: District: DSA Application No.:	Specification Section: Submittal No.: Submittal Description: Date:

Contractor: **Address:** **Phone No.:** **Contact:**	**Subcontractor:** **Address:** **Phone No.:** **Contact:**

FIRM NAME
Address
Phone No.

SUBMITTAL HISTORY
ARCHITECT/ENGINEER'S SHOP DRAWING STAMP
REMARKS:

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Special procedures required for alteration work.

1.02 SCHEDULING

A. Before commencing alteration or demolition work, submit for review by the Architect and approval of the Owner, a Schedule showing the commencement, the order and the completion dates for the various parts of this work.

B. Before starting work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing building, notify the Architect and the Owner 72 hours in advance and obtain the Owner's approval in writing before proceeding with this phase of the work.

1.03 PROTECTION

A. Make such explorations and probes as are necessary to ascertain required protective measures before proceeding with demolition and removal. Give particular attention to shoring and bracing requirements so as to prevent damage to existing construction.

B. Provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs, and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

C. Provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until protection is provided by new construction.

D. Provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and new work is being done, connections made, materials handled, or equipment moved.

E. Take necessary precautions to prevent dust and dirt from rising by wetting demolished masonry, concrete, plaster and similar debris. Protect unaltered portions of the existing building affected by the operations under this Section by dustproof partitions and other adequate means.

F. Provide adequate fire protection in accordance with local Fire Authority and with Section 01 50 00, Temporary Facilities and Controls.

G. Do not close or obstruct walkways, passageways or stairways. Do not store or place materials in passageways, stairs, or other means of egress. Conduct operations with minimum traffic interference.

H. Be responsible for damage to the existing structure or contents by reason of the insufficiency of protection provided.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials and workmanship employed in the alterations, unless otherwise shown or specified, shall conform to that of the original work, or to new construction as specified elsewhere in these specifications.

B. If interior finish materials, or existing surfaces to be removed are indicated to be re-used in areas necessary to match existing surfaces. Care in removal and stockpiling shall be exercised to ensure re-use.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Perform demolition, removal and alteration work with due care, including shoring and bracing. Be responsible for damage which may be caused by such work to part or parts of existing structures or items designated for re-use. Perform patching, restoration, and new work in accordance with applicable technical sections of the Specifications.

B. Materials and items designated to become the property of the Owner shall be as shown. Remove such items with care, under the supervision of the trade responsible for reinstallation; protect and store until required. Replace material and item damaged in its removal with approved similar and equal new material.

C. Materials and items demolished and not designated to become the property of the Owner or to be reinstalled shall become the property of the Contractor and shall be removed from the Owner's property. Storage or sale of removed items on site will not be permitted.

D. Execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.

E. Where alterations occur, or new and old work join, cut, remove, patch, repair or refinish the adjacent surfaces or so much thereof as is required by the involved conditions, and leave in as a good a condition as existed prior to the commencing of the work. The alteration work shall be performed by the various respective trades which normally perform the particular items of Work.

F. Finish new and adjacent existing surfaces as specified for new work. Clean existing surfaces of dirt, grease, loose paint, etc. before refinishing.

G. Where existing equipment and fixtures are indicated to be re-used, repair such equipment and fixtures and refinish to put in excellent working order. Refinish as directed.

H. Cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.

I. Confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. Cut and fold back existing built-up roofing. Cut and remove insulation. Provide temporary weathertight protection as required until new roofing and flashings are applied.

J. Should any existing conditions, such as deterioration or non-complying construction, be discovered which is not covered by the DSA approved documents, wherein the finished work will not comply with the current Title 24, California Building 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.

3.02 CLEANING UP

A. Remove debris as the work progresses. Maintain the premises in a neat and clean condition.

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and methods for testing and reporting on the pertinent characteristics.

B. Provide materials and workmanship which meet or exceed the specifically named code or standard.

C. Deliver to the Architect required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested by the Architect and will generally be required to be copies of a certified report of tests conducted by a testing agency acceptable for that purpose to the Architect.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Specific naming of codes or standards occurs on the Drawings and in other Sections of these Specifications. Comply with laws, ordinances, and regulations of authorities having jurisdiction. Proof of compliance with laws, ordinances, and regulations shall be by the signed approval of the respective authorities having jurisdiction. Costs relative thereto shall be borne by the Contractor.

1.03 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards: Verify the requirements of the specifically named codes and standards as well as requirements mandated by law, ordinance and authority. Verify that the items procured and installed in this Work meet or exceed the specified requirements.

B. Rejection of Noncomplying Items: The Architect reserves the right to reject items incorporated into the Work which fail to meet such minimum requirements.

1.04 APPLICABLE CODES

A. Work of the project shall conform to the following list of the **Title 24, California Code of Regulations 2016 (CCR),** a List of Codes, copies of which shall be maintained at the job site by the Contractor throughout the duration of the work.

B. **Partial List of Applicable Codes**:

1. **California Building Standards Administrative Code** 2019, (CAC), Part 1, Title 24, California Code of Regulations (CCR).**

2. **California Building Code 2016,** (CBC), Part 2, Title 24, California Code of Regulations (CCR) [International Building Code (IBC) Volumes 1-2 and California Amendments].

3. **California Electrical Code 2016**, (CEC), Part 3, Title 24, California Code of Regulations (CCR) [National Electrical Code and California Amendments].

4. **California Mechanical Code 2016,** (CMC), Part 4, Title 24, California Code of Regulations (CCR) [Uniform Mechanical Code and California Amendments].

5. **California Plumbing Code 2016,** (CPC), Part 5, Title 24, California Code of Regulations (CCR) [Uniform Plumbing Code and California Amendments].

6. **California Energy Code** 2016, Part 6, Title 24, California Code of Regulations (CCR).

7. **California Historical Building Code** 2016, Part 8, Title 24, California Code of Regulations (CCR).

8. **California Fire Code** 2016, Part 9, Title 24, California Code of Regulations (CCR) [International Fire Code and California Amendments].

9. **California Existing Building Code 2016**, Part 10, Title 24, California Code of Regulations (CCR).

10. **California Green Building Standards Code 2016**, Part 11, Title 24, California Code of Regulations (CCR).

11. **California Reference Standards Code 2016**, Part 12, Title 24, California Code of Regulations (CCR).

12. Title 19, CCR, Public Safety, State Fire Marshal Regulations.

13. ASME A17.1 (w/A17.1a/CSA B44a-08 addenda) Safety Code for Elevators and Escalators.

C. **Partial List of Applicable Standards**:

Reference code section for NFPA Standards, CBC (SFM)

NFPA 13	Automatic Sprinkler Systems
NFPA 14	Standpipes and Hose Systems
NFPA 17	Dry Chemical Extinguishing Systems
NFPA 17a	Wet Chemical Systems
NFPA 20	Stationary Pumps
NFPA 24	Private Fire Mains
NFPA 72	National Fire Alarm Code
NFPA 80	Fire Doors and Other Opening Protectives
NFPA 92	Standard for Smoke Control Systems

NFPA 253	Critical Radiant Flux of Floor Covering Systems
NFPA 2001	Clean Agent Fire Extinguishing Systems
ICC 300	ICC Standards on Bleachers, Folding and Telescoping Seating and Grand Stands
UL 300	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UL 464	Audible Signal Appliances
UL 521	Heat Detectors for Fire Protective Signaling Systems

Reference code section for NFPA Standards – CBC (SFM) Chapter 35. See Chapter 35 for State of California amendments to NFPA Standards

**** California Administrative Code, Part 1, Chapter 10, Administrative Regulations for the California Energy Commission (CEC).**

1.05 REFERENCE STANDARDS

A. Standards referenced in the Specifications are usually referred to by the abbreviation of the organization's name and the designation of the document (e.g., ASTM A36). Documents in common use may be referred to by their own designation (e.g., the California Electrical Code is published by the National Fire Protection Association as NFPA-70 but is referred to as CEC, and is part of a series of documents or standards referred to as the National Fire Code). References are to the latest issue of the publication available on the date stipulated for the receipt of bids.

STANDARDS ORGANIZATIONS

AA	Aluminum Association
AAMA	American Architectural Manufacturer's Association
ASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AISC	American Institute of Steel Construction
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute, Inc.
APA	APA-The Engineered Wood Association
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Protection Association
AWPB	American Wood Preservers' Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CBC	California Building Code
CDA	Copper Development Association
CEC	California Electrical Code
CEQA	California Environmental Quality Act
CGA	Compressed Gas Association
CISPI	Cast Iron Soil Pipe Institute
CMC	California Mechanical Code - See IAPMO
CPC	California Plumbing Code - See IAPMO
CPSC	Consumer Product Safety Commission
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard of U.S. Dept. of Commerce
CTIOA	Ceramic Tile Institute of America (former CTI)
CSMA	Chemical Specialties Manufacturing Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Global (former FMS)
FS	Federal Specification
GA	Gypsum Association
HI	Hydraulic Institute
HRI	Hydraulics Research Institute
IAPMO	International Association of Plumbing and Mechanical Officials

ICC	International Code Council (former ICBO)
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society of North America
MIL-STD	Military Specifications (former MIL)
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAAMM	National Association of Architectural Metal Manufacturers
NIST	National Institute of Standards and Technology (former NBS)
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers Association
N FLUID PA	National Fluid Power Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NWWDA	National Wood Window and Door Association
PS	Voluntary Product Standard (of NIST former NBS)
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SSPC	The Society for Protective Coatings (former SSPC)
TCNA	Tile Council of North America, Inc. (former TCA)
TSIB	Technical Services Information Bureau (former WLPDIA)
UL	Underwriters Laboratories, Inc.
WI	Woodwork Institute (former WIC)
TITLE	Title 24, California Code of Regulations, Part 1, 2, 3, 4, 5, 6, 8, & 9
TITLE	Title 19, California Code of Regulations

1.06 REFERENCE COPIES

A. A minimum of one copy of Codes, Regulations, and Standards referenced in the drawings or the specifications, or applicable to the work, shall be furnished to the Owner's Representative at least (2) two weeks prior to the commencement of work affected by such codes, regulations or standards.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 01 45 23

TESTING AND INSPECTING SERVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Cooperate with the Owner's selected testing agency, the Owner's assigned Inspector, and others responsible for testing and inspecting the Work, and assist the Owner by coordinating such testing and inspecting services as specified in this Section and/or elsewhere in the Contract Documents.

B. Related Work Specified Elsewhere:

1. Requirements for testing may be required in other Sections of these Specifications.

2. Where no testing requirements are specified or required by reference standards or authorities having jurisdiction, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described herein.

C. Work Not Included:

1. The Owner will select a pre-qualified independent testing laboratory and Inspector as approved by the Division of the State Architect (DSA), Department of General Services, Architect and Structural Engineer.

2. The Owner will pay for initial services of the testing laboratory as further described hereinafter.

1.02 QUALITY ASSURANCE

A. The Owner will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the Owner's representative and not by the Contractor.

B. Qualifications of Testing Laboratory: The testing laboratory, approved by DSA, shall be qualified to the Owner's acceptance in accordance with ASTM E329. The testing laboratory shall be qualified by the Division of the State Architect.

C. Codes and Standards: Testing, when required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials and other organizations or agencies which publish recognized codes, standards, or tests. Refer to Article 3.04 - Required Testing of this Section.

1.03 TEST REPORT DISTRIBUTION

A. Promptly process and distribute required copies of test reports and related instructions to ensure necessary retesting and/or replacement of materials with the least possible delay in progress of the Work.

B. One copy of Test Reports shall be forwarded to the Project Inspector by the testing agency. Such reports shall include tests made, regardless of whether such tests indicate that 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. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.

C. Each Testing Agency shall submit to the Division of the State Architect a verified report in duplicate covering tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, including tests up to that time, and at the completion of the project. For additional information, refer to DSA PR13-01.

1.04 PAYMENT FOR TESTING SERVICES

A. Initial Services: The Owner will pay for initial testing and inspection except as specifically modified herein- after or as specified otherwise in technical sections, provided the results of inspection indicate compliance with the Contract Documents.

B. Retesting: When initial tests or inspection indicate noncompliance with the Contract Documents, subsequent retesting or re-inspection occasioned by the noncompliance shall be performed by the same testing laboratory or Inspector and the costs thereof will be deducted by the Owner from the Contract Sum. Retesting and re-inspection will continue until test or inspection results indicate compliance.

C. Code Compliance Testing: Inspections and tests required by codes or ordinances, or by authorities having jurisdiction and made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Owner, but backcharged to the Contractor in case of retesting due to non-compliance.

D. Specified Inspections and Tests: Tests and inspections specified in the Specifications, directly or by reference, shall be coordinated by the Contractor at his expense and paid for by the Owner. Corrections of noncompliance and test failures shall be paid for by the Owner, but shall be backcharged to the Contractor. Re-inspection and retesting shall be in accordance with paragraph 1.04-B.

E. Contractor's Convenience Testing: Inspecting or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of and at the expense of the Contractor.

1.05 INSPECTION BY THE OWNER

A. The Owner and his representatives will have access, for the purpose of inspection, to parts of the work and to the shops wherein the work is in preparation, and the Contractor shall maintain proper facilities and provide safe access for such inspection.

B. The Owner shall have the right to reject materials and workmanship which are defective, and to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct rejected work and charge the expense to the Contractor.

C. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish necessary facilities, labor and materials. If such work is found to be defective in respect due to fault of the Contractor or his subcontractor, he shall defray expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the additional cost of labor and material necessarily involved in the examination and replacement will be allowed the Contractor.

1.06 OWNER'S INSPECTOR

A. An Inspector employed by the Owner, approved by DSA in accordance with the requirements of the State of California Administrative Code, Title 24, Part 1, and qualified in accordance with Division of the State Architect will be assigned to the work. Reference DSA IR A-7 and IR A-8 for project Inspector certification and approval and duties and performance rating by DSA. The inspector duties are specifically defined in Title 24, Part 1, Section 4-342, reprinted herein:

" 4-342 Duties of the Project Inspector

(a) **General.** The project inspector shall act under the direction of the architect or registered engineer and under the supervision of the enforcement agency.

(b) **Duties.** The general duties of the project inspector in fulfilling project inspection responsibilities are as follows:

1. **Continuous inspection requirement.** The project inspector must have actual personal knowledge obtained by personal and continuous inspection of the work of construction in all stages of its progress that the requirements of the approved plans and specifications are being completely executed.

Continuous inspection means complete inspection of every part of the work. Work, such as concrete work or masonry work which can be inspected only as it is placed, shall require the constant presence of the inspector. Other types of work which can be completely inspected after the work is installed may be carried on while the inspector is not present. In any case, the inspector must personally inspect every part of the work. In no case shall the inspector have or assume any duties that will prevent the inspector from giving continuous inspection. DSA may require verification from the project inspector of time spent at the construction site during all phases of the work.

The project inspector may obtain personal knowledge of the work of construction, either on-site or off-site, performed under the inspection of special inspectors and/or assistant inspectors (Section 4-333). The project inspector may obtain personal knowledge that materials used in the construction conform to the DSA approved documents by verifying test reports performed by DSA accepted testing facilities, verifying materials certifications shipped with the materials, or other means as specified in the DSA approved documents and referenced codes and standards. The project

inspector shall be responsible for monitoring the work of the special inspectors and testing laboratories to ensure that the testing program is satisfactorily completed. The project inspector shall be responsible for supervising the work of all assistant inspectors in accordance with Section 4-333(d). The exercise of reasonable diligence to obtain the facts shall be required.

2. **Relations with the architect or engineer.** Any uncertainties in the inspector's comprehension of the plans and specifications or inconsistencies or seeming errors in the approved construction documents shall be reported promptly to the architect or registered engineer for interpretation and instructions. In no case shall the instruction of the architect or registered engineer be construed to cause work to be done which is not in conformity with the DSA approved documents.

3. **Job file.** The project inspector shall keep and maintain a file on the job at all times with all of the following:

   A. DSA approved plans and specifications including DSA approved addenda and all construction change documents.

   B. Applicable parts of the edition of Title 24, C.C.R. referred to in the plans and specifications, and any pertinent reference standards.

   C. DSA approved statement of structural tests and special inspections.

   D. Copies of the project inspector's semi-monthly reports.

   E. Copies of all deviation notices and a log of all deviation notices. The log shall reference all applicable details and specification sections related to nonconforming materials and workmanship including field change documents, change orders, addenda and deferred submittals. The log shall describe all corrective actions taken whether performed in accordance with DSA approved documents or not, the current status of each deviation issue and the resolution for each issue.

   F. Log documenting all significant communications with the design professionals, contractors, DSA representatives and other persons involved in the project. Significant communications include, but are not limited to, interpretations, clarifications or directions from the design professionals, issues identified by DSA representatives, directives from the school district, and start notices from the contractor.

   G. Laboratory test and inspection reports.

   H. Contractor's request for information (RFI) and responses to the RFIs.

I. Interpretations and clarifications from the design professional in general responsible charge.

J. Special inspection reports.

K. Concrete placing operation records showing the time and date of placing concrete and the time and date of removal of forms in each portion of the structure.

L. Welding operation records including identification marks of welders, lists of defective welds, manner of correction of defects, etc.

M. Pile driving operation records including penetration under the last 10 blows for each pile when piles are driven for foundations.

N. Verified reports for all persons required by this code for file verified reports.

O. Any other applicable documents required to provide a complete record of construction.

The job file shall be kept on the job site until the completion of the project and shall be readily accessible to DSA personnel during site visits. A copy of the job file shall be made available to DSA upon request. The job file, with exception of building codes and reference standards, shall be made a part of the permanent school district records.

4. **Project inspector's semimonthly reports.** The project inspector shall keep the architect or registered engineer thoroughly informed as to the progress of the work by making semimonthly reports in writing as required in Section 4-337.

5. **Notifications to DSA.** The project inspectors shall notify DSA by email at the following times:

   A. When construction work on the project is started, or restarted if previously suspended per Item D below.

   B. At least 48 hours in advance of the time when foundation trenches will be complete, ready for footing forms.

   C. At least 48 hours in advance of the first placement of foundation concrete and 24 hours in advance of any subsequent and significant concrete placement.

   D. When all work on the project is suspended for a period of more than one month.

6. **Deviations.** The project inspector shall notify the contractor, in writing, of any deviations from the approved plans and specifications which are not immediately corrected by the contractor when brought to the contractor's attention. Copies of such notice shall be forwarded immediately to the architect or registered engineer, and to DSA.

Failure on the part of the project inspector to notify the contractor of deviations from the approved plans and specifications shall in no way relieve the contractor of any responsibility to complete the work covered by his or her contract in accordance with the approved plans and specifications and all laws and regulations.

7. **Inspector verified reports.** The project inspector shall make and submit directly to DSA verified reports (see Section 4-336). The project inspector shall prepare and deliver to DSA detailed statements of fact regarding materials, operations, etc., when requested.

8. **Performance of duties.** The inspector shall perform all duties and render all services with honestly. Inspectors who fail to carry out their duties in an ethical manner or who engage in illegal activities may be subject to disciplinary action as defined in Section 4-342(d).

(c) **Violations.** Failure, refusal or neglect on the part of the inspector to notify the contractor of any work which does not comply with the requirements of the approved plans and specifications, or failure, refusal or neglect to report immediately, in writing, any such violation to the architect or registered engineer, to the school board, and to DSA shall constitute a violation of the Act and shall be cause for DSA to take action which may result in withdrawal of the inspector's approval. The State Architect or designee may take appropriate action as described in Section 4-342(d) when any of the following conditions exist:

1. The inspector has failed to fulfill any of the relevant requirements of this code.

2. The inspector has been convicted of a crime considered to be substantially related to the qualifications, functions or duties of an inspector in a manner consistent with the public health, safety or welfare.

(d) **Disciplinary actions.** Failure to satisfactorily perform inspector duties identified in this code may be cause for DSA to take action(s) which included but are not limited to the following:

1. Requiring the inspector to meet with DSA in the regional office for counseling.

2. Requiring the inspector to attend training classes.

3. Withdrawal of the inspector's approval for the project.

4. Downgrading of the inspector's class of certification.

5. Suspension of the inspector's certification.

6. Withdrawal of the inspector's certification.

(e) **Notice of disciplinary actions.** Notice of disciplinary action shall specify the grounds for the actions taken.

(f) **Criteria for reinstatement.** When considering reversal of any disciplinary action taken pursuant to Section 4-342(d), the State Architect or designee evaluating the reinstatement of an inspector's approval for a project, or certification, may consider the following criteria:

1. Nature and severity of the act(s) or offense(s).

2. The time that has elapsed since the commission of the act(s) or offense(s).

3. If applicable, evidence of expungement proceedings pursuant to Section 1203.4 of the Penal Code.

(g) **Filing an appeal.**

1. The State Architect or his/her designee has the discretion to immediately order that approval of a project inspector for a project, or certification, be temporarily invalidated or to seek additional information, pending a final determination by the State Architect or his/her designee pursuant to Section 4-342©. The decision to temporarily invalidate approval of a project inspector for a project, or certification, will be made on a case by case basis, as necessary to ensure public health, safety and welfare.

2. The State Architect or his/her designee shall provide the appellant with written notice that their approval for a project, or certification, has been temporarily invalidated as of a specific date or is subject to suspension or denial pursuant to Section 4-342(d), pending a final determination. The written notice shall include the reasons for the action being taken or investigated, as applicable, and provide a summary of the facts and allegations. Service of the written notice of the proposed action shall be confirmed by certified mail.

3. Written notice of the final determination by the State Architect or his/her designee shall be confirmed by certified mail within 60 days from the initial written notification. The time to render his/her determination may be extended an additional 30 days, as necessary, to consider any additional supporting documentation provided to the State Architect relevant to the issue being investigated.

4. An appeal of an action by the State Architect or his/her designee to suspend approval of a project inspector for a project, or certification, or to deny renewal of a certification must be filed in wiring with DSA within 60 days of the date posted on the certified service of the written notice of the final determination from the State Architect. Unless a hearing is specifically requested as provided in Section 4-342(g)6 the appeal will be based on an analysis of the materials available.

5. Within 60 days from the date of receipt of the appeal the State Architect or his/her designee shall render his/her determination on the appeal. The time to render the determination may be extended an additional 30 days, as necessary to conclude any research or investigation required, at the discretion of the State Architect or his/her designee.

6. Should an individual submit a written request for a hearing, the State Architect may designate an appropriate hearing officer to conduct the hearing. Written notice of the date and time of the hearing and the reasons for the action being taken or investigated, as applicable, shall be provided to the appellant. The hearing shall be limited in scope to the actions stated in the written notice. The appellant may bring a representative of his/her choice.

7. The appellant shall be notified in writing of the determination made by State Architect or his/her designee regarding the appeal. Service of the written notice of the decision shall be confirmed by certified mail.

8. Any appeal of a decision rendered by the State Architect or his/her designee to rescind approval for a project or certification may be appealed to the Superior Court.

Authority: Education Code Sections 17310 and 81142.

Reference: Education Code Sections 17309, 17311, 81141 and 81143. **"**

B. The work of construction in stages of progress shall be subject to the personal continuous observation of the Inspector as continuous observation is defined by Title 24. He shall have free access to all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from obligation to fulfill this Contract.

1.07 OWNER'S OTHER PERSONNEL

A. From time to time, other personnel in the employ of the Owner may inspect the Work when the Work is in progress but shall have no authority to direct the Contractor or request changes in the Work except as may be provided elsewhere in the Contract Documents.

1.08 REPRESENTATIVE OF THE DIVISION OF THE STATE ARCHITECT

A. Architect shall have access to the site in accordance with Title 24.

B. Field Engineers and Inspectors from DSA. Structural Safety Section, Fire & Life Safety Review and Access Compliance shall have access to the site in accordance with Title 24.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY AND INSPECTORS

A. Inspectors and representatives of the testing laboratory shall have access to the work. Provide facilities for such access in order that the testing, inspection, and the obtaining of samples may be done properly.

B. Contractor shall deliver material specimens to the Owner's testing lab, which must by terms of the Contract be tested prior to inclusion in the Project, at least 45 days prior to scheduled delivery to the job site.

C. 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 job.

3.02 TAKING SPECIMENS

A. Field specimens and samples for testing, unless otherwise provided in these Contract Documents, shall be selected and taken by the Testing Laboratory or Inspector and not the Contractor. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory. Soil samples for approval of import fill shall be delivered to the Testing Laboratory by the Contractor, as directed by the Testing Laboratory.

3.03 SCHEDULES FOR TESTING

A. Establishing Schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide required time within the Construction Schedule.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the testing laboratory as required.

C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedules, but is prevented from testing or taking specimens due to incompleteness of the work, extra charges for testing attributable to the delay may be back-charged to the Contractor and will be deducted by the Owner from the Contract Sum.

3.04 REQUIRED TESTING

All Testing and Inspection requirements shall comply with the Stamped Approved DSA-103, in accordance with California Building Code, Title 24, Part 2.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Construction facilities and temporary controls including:

1. Temporary utilities such as heat, water, electricity, and telephone.
2. Field offices and storage areas, including offices for Architect and Inspector.
3. Sanitary facilities for construction personnel.
4. Enclosures such as tarpaulins, barricades, and canopies.
5. Provision of fire safety and fire fighting facilities.

B. Related Work Specified Elsewhere:

1. Installation and connections to existing utility lines are described in the Sections of these Specifications relative to permanent connections required.

2. Requirements for storage areas shall be as specified in Section 33 44 19 – Utility Storm Water Treatment.

1.02 QUALITY ASSURANCE

A. Conform with the following criteria of the California Fire Code, Chapter 33 – Fire Safety During Construction, And Demolition:

1. Section 3301.1 SCOPE

2. Section 3302 DEFINITIONS

3. Section 3303 TEMPORARY HEATING EQUIPMENT

4. Section 3304 PRECAUTIONS AGAINST FIRE

5. Section 3305 FLAMMABLE AND COMBUSTIBLE LIQUIDS

6. Section 3306 FLAMMABLE GASES

7. Section 3307 EXPLOSIVE MATERIALS

8. Section 3308 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION

9. Section 3309 FIRE REPORTING

10. Section 3310 ACCESS FOR FIRE FIGHTING

11. Section 3311 MEANS OF EGRESS

12. Section 3312 WATER SUPPLY FOR FIRE PROTECTION

13. Section 3313 STANDPIPES

14. Section 3314 AUTOMATIC SPRINKLER SYSTEM

15. Section 3315 PORTABLE FIRE EXTINGUISHERS

16. Section 3316 MOTORIZED CONSTRUCTION EQUIPMENT

17. Section 3317 SAFEGUARDING ROOFING OPERATIONS

END OF CHAPTER 33

1.03 PROJECT CONDITIONS

A. Make required connections to existing utility systems with minimum disruption to services.

B. When disruption of the existing service is required, do not proceed without the Owner's and Architect's review and, when required, provide alternate temporary service.

C. Environmental Requirements: Provide and maintain heat, fuel, materials, and services necessary to protect work and materials against injury from extreme heat, cold, dry winds, dust, or dampness as follows:

1. During the placing, setting and curing of concrete and cement work, provide sufficient heat to ensure the heating of spaces involved do not fall to less than 50 degrees Fahrenheit.

2. Suspend operations on work when subject to damage by climatic conditions, flooding, or because of insufficient curing or drying of surfaces or materials.

3. Take necessary action to protect site and Work from wind, flood, and storm damage.

PART 2 - PRODUCTS

2.01 GENERAL

A. Construction facilities shall be subject to the Architect's review and approval.

2.02 UTILITIES

A. Water:

1. Provide necessary temporary water lines and water supply and, upon completion of the work, remove temporary facilities.

2. Furnish water needed for construction. Comply with the regulations of local water authority including transport of reclaimed water for construction.

B. Electricity:

1. Provide necessary temporary wiring and, upon completion of the work, remove temporary facilities.

2. Provide area distribution boxes so located that the individual trades may use 100 feet maximum length extension cords to obtain adequate power and artificial lighting at points where required for the work, for inspection and for safety.

3. Furnish electricity needed for construction.

C. Heating: Provide and maintain heat needed for proper conduct of operations included in the work.

D. Telephone: Make necessary arrangements and pay costs for operation and installation of separate telephone service at locations approved by the District's Inspector.

E. Utilities for Testing: Normal quantities required to make final tests of installed permanent systems shall be furnished at no cost to the Owner.

F. Temporary facilities in the public right-of-way are subject to approval. Obtain and pay for any permits required.

2.03 SIGNAGE

A. Bid Package No. 1, shall provide a 4' x 8' self-supporting temporary sign per the Drawing at the end of this Section. Supporting posts to be wood 4 x 4's embedded minimum four feet into tamped (compacted) soil to discourage easy removal. Verify text with Architect and Owner prior to fabrication. Sign shall remain the property of the School District at the completion of the Work. Remove sign and deliver to the District to location directed by the Owner when the temporary office facilities are removed.

B. Location of signs shall be as directed by the Architect.

PART 3 - EXECUTION

3.01 MAINTENANCE AND REMOVAL

A. Maintain facilities and temporary controls as long as needed for the safe and proper completion of the work.

B. Remove such construction facilities and temporary controls as rapidly as progress of the work will permit, or as directed by the Architect.

END OF SECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Site clearing as specified herein.

B. Related Sections:

1. Section 01 50 00, Temporary Facilities and Controls
2. Section 31 20 00, Earth Moving
3. Section 32 84 00, Planting Irrigation
4. Section 32 92 00 Turf and Grasses
5. Section 33 44 19, Utility Storm Water Treatment

C. Principal items of Work included herein:

1. Protection of trees to keep the foliage canopy and branching structure clear from contact by equipment, materials and activities.

2. To preserve roots and soil conditions in an intact and non-compacted state.

3. To identify the Tree Protection Zone (TPZ) in which no soil disturbance is permitted and activities are restricted.

1.01 REFERENCES

A. Demolition shall be as per California Fire Code, Title 24, Part 9.

1.02 PROJECT SITE CONDITIONS

A. The Contractor shall be responsible to furnish and maintain all temporary barricades, warning lights, and other types of protection protect the trees noted on the plans to remain.

B. The Contractor shall be responsible to protect adjacent properties, roads, right of ways, utilities and other improvements above or below ground from damage in performing the work.

C. Comply with applicable sections of the storm water pollution prevention plan, including but not limited to, erosion control, soil, waste and maintenance areas.

D. Salvaged Materials – Contractor shall recycle or compost all tree trimmings. Contractor shall provide certification for all salvaged materials. Certifications may take the form of receipts from recycling facilities, manufacturers, or any other legitimate form of certification.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 EXECUTION

A. Establish the Tree Protection Zone (TPZ), which is defined as a radius of 10 times greater than the diameter of the tree's trunk or ten feet, whichever is greater by enclosed temporary fencing. Fence shall be a minimum of 6' high.

B. Provide tree protection as follows:

1. Trees in an open area – enclose the entire area under the canopy or TPZ, which ever is greater throughout the life of the construction project.

2. Trees in a planting strip - only the planting strip and yard side of the TPZ shall be enclosed with the required chain like protective fencing.

3. Trees in a tree well or sidewalk planter pit – wrap trees with 2-inches of orange plastic fence from the ground to the first branch and overlay with 2X thick wooden slats bound securely (ensure slats do not dig into bark). Avoid damage to any branches.

C. Provide a plastic 10-inch by 12-inch sign securely affixed to the fence at a minimum of 20-foot intervals clearly stating "Warning – Tree Protection Zone".

D. Duration – Tree fencing and signage shall be erected before demolition, grading or construction begins and remain in place until final inspection of the project except for work specifically allowed in the TPZ. Work or disturbance in the TPZ required approval by the Project Manager and Landscape Architect.

E. No Storage of materials, top soil, vehicles or equipment shall be permitted within the TPZ.

F. The ground under the tree canopy shall not be altered, unless specifically noted on the plans.

G. Trees to be retained shall be irrigated, aerated and maintained as necessary to ensure survival.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for delivery, storage, and handling of materials and equipment applicable to the product sections of this specification and necessary for the construction of the Project.

B. Related Sections:

1. Section 01 25 00 – Substitution Procedures

2. Section 01 33 00 – Submittal Procedures

1.02 GENERAL

A. Material and Equipment Incorporated into the Work:

1. Conform to applicable specification and standards.

2. Comply with size, make, type, and quality specified.

B. Manufactured and Fabricated Products:

1. Design, fabricate and assemble in accordance with the best engineering and shop practices.

2. Manufacture like parts of duplicate units to standard sizes and gages for interchangeability.

3. Two or more items of the same kind shall be identical, by the same manufacturer.

C. Reused Materials: Where the contract documents indicate that existing materials may be reused, such materials shall be cleaned and reincorporated in the work.

1. Materials to be reused shall be approved for reuse by the Inspector.

D. Supplementary materials not specifically described in each Section, but required for a complete and proper installation of the Work, shall be new, first quality of their respective kinds, and subject to review and acceptance by the District.

1.03 DELIVERY

A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation. Notify the Inspector of Record, in writing, when items are delivered to the site, so he may inspect and verify quality and quantities delivered are as intended.

B. Coordinate deliveries to avoid conflict with work and conditions at site, taking into consideration:

1. Work of the Contractors, or Owner.

2. Limitations of storage space.

3. Availability of equipment and personnel for handling products.

4. Owner's use of premises.

C. Deliver products in undamaged condition in original containers or packaging, and with identifying labels intact and legible.

D. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts, and to facilitate assembly.

E. Immediately on delivery, inspect shipment to ensure:

1. Product complies with requirements of Contract Documents and reviewed submittals.

2. Quantities are correct.

3. Containers and packages are intact and labels are legible.

4. Products are undamaged and properly protected.

F. The District reserves the right to observe delivered materials, to review the accompanying bills of lading, and to reject the following:

1. Materials not identifiable as accepted products of the accepted manufacturer.

2. Materials exhibiting shelf-lives in excess of those stipulated by the manufacturer.

3. Materials not bearing the appropriate label of Underwriters Laboratories (UL), where applicable.

4. Materials in opened or excessively damaged containers.

5. Materials exhibiting evidence of moisture, organic matter, or other adulterants.

G. In the event of damage or rejection by the District for stipulated cause, immediately make repairs and replacements necessary to the acceptance of the Architect and at no additional cost to the Owner.

1.04 STORAGE

A. Payment will not be made by the Owner for materials stored off-site, until such time as the materials are incorporated into the Work.

B. Store products immediately on delivery, store in accordance with manufacturer's instructions and as further required by the Owner's Storm Water Pollution Prevention Plan, and protect until installed in the Work.

C. Store products subject to damage by elements in weather tight enclosures.

1. Maintain temperatures within limits recommended by manufacturer's instructions.

2. Provide humidity control for sensitive products, as required by manufacturer.

3. Store unpacked products in a manner accessible for inspection.

D. Exterior Storage:

1. Provide substantial platforms, blocking, or skids to support fabricated products above ground and prevent soiling or staining.

a. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

b. Comply with requirements of Owner's, Storm Water Pollution Prevention Plan.

2. Store loose granular materials on solid paved surfaces, or provide plywood platforms to prevent mixing with foreign matter.

a. Provide surface drainage to prevent flow or ponding of rainwater.

b. Prevent mixing of refuse or chemically injurious materials or liquids.

c. Comply with requirements of Owner's Storm Water Prevention Plan.

1.05 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

1. State of storage facilities is adequate to provide required conditions.

2. Required environmental conditions are maintained on a continuing basis.

3. Surfaces of products exposed to elements are not adversely affected.

B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

1.06 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove protection materials when no longer needed, prior to completion of work.

B. Control traffic to prevent damage to equipment and surfaces.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for field engineering necessary to provide horizontal and vertical control, including:

1. Survey work required in execution of the project.

2. Civil Engineering and Land Surveying services specified or required to execute contractors construction methods.

3. Coordination with testing laboratory or agency and Soils Engineer.

4. Contractor furnished assistance.

5. Verification of conditions.

6. Reporting procedures.

B. Requirements not in this section:

1. Specific test procedures performed in accordance with Section 01 45 23 - Testing and Inspecting Services.

1.02 QUALIFICATIONS OF ENGINEER OR SURVEYOR

A. Qualifications: Registered Civil Engineer qualified to perform land surveying or licensed Land Surveyor acceptable to Contractor and Owner. Contractor shall furnish to the Owner prior to start of work the name and license or registration number issued by the State of California, Board of Registration for Professional Engineers and Land Surveyors. Contractor shall provide notice to the Owner during the course of construction should the identification of the individual responsible for this work change from time to time, and shall obtain approval of the Owner for the replacement.

B. All field engineering services furnished during the course of this project shall be under the direct supervision and control of the named individual Civil Engineer or Land Surveyor.

1.03 FIELD ENGINEERING REQUIREMENTS

A. Survey Reference Points:

1. Existing basic horizontal and vertical control points for the project are those designated on the drawings. If there are not 3 specific bench marks (BM) or temporary bench marks (TBM) shown, contractor shall identify a minimum of 3 possible TBM’s and verify horizontal and vertical location of all three hubs. All work on the plans shall be tied together and verified prior to beginning any field work.

2. Locate and protect control points prior to starting site work, and preserve permanent reference points during construction. Identify and protect survey monuments on the site discovered during construction, which are not referenced on the project drawings. Tie out such monuments and notify Architect prior to allowing them to be disturbed.

3. Replace any permanent boundary markers disturbed during construction with new permanent monuments and file the required Record of Survey or Corner Record in accordance with applicable State and County laws, at no additional cost to the Owner.

1.04 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of three permanent horizontal and vertical control points on the site, remote from the "Building Pad Area" and referenced to data established by the survey control points. Three points shall be tied together and the survey shall be closed to second order surveying standards.

1. Site Improvements:

a. Provide stakes for grading, fill and topsoil placement.

b. Locate utility lines, including, but not limited to, storm drains, sewers, water mains, gas, electric and telephone lines. Provide adequate horizontal control to locate the lines and provide vertical control in proportion to the slope of the line as required for accurate construction.

2. Provide curb stakes and elevations as required to construct paving and on and off-site concrete work.

a. Calculate and layout subgrade elevations and intermediate controls as required to provide smooth transitions between the spot elevations indicated on the plans.

b. From time to time, verify layouts of work by the same methods.

1.05 RECORDS

A. Maintain a complete, accurate log of control and survey work as it progresses.

1.06 SUBMITTALS

A. Submit name and address of Licensed Surveyor or Civil Engineer to Architect, including changes as they may occur from time to time.

B. On request of the Architect, submit documentation to verify accuracy of the field engineering work.

C. Project Record (As-Built) Drawings:

1. At the project completion, deliver to Architect, final "as-built" Record Drawings of the Work, prepared on reproducible transparencies. Clearly indicate differences between original drawings and completed work within specified tolerances.

2. Show as-built locations by coordinates of utilities on-site with top of pipe elevations at major grade and alignment changes.

3. Completed as-built transparencies shall be signed and certified as correct by the licensed Surveyor or Civil Engineer.

4. Furnish any required Engineering Survey information for all utility easements for any required document recording.

5. Submit certification of subgrade completion and building location on the building pads showing the actual elevation of the completed constructed subgrade, to the nearest hundredth of a foot 0.01 foot.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Administrative and procedural requirements for cutting and patching.

B. Related Work Specified Elsewhere:

1. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.

2. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 21 through Division 28, Sections for other requirements and limitations applicable to cutting and patching plumbing, mechanical and electrical installations.

1.02 SUBMITTALS

A. Before commencing alteration or demolition work, submit for review by the Architect and approval of the Owner, a Schedule showing the commencement, the order and the completion dates for the various parts of this work. Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching is to be performed.

B. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted. Before starting work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing building, notify the Architect and the Owner 72 hours in advance and obtain the Owner's approval in writing before proceeding with this phase of the work.

C. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure. All cutting of structural elements subject to acceptance of the Structural Engineer and approval of the Division of the State Architect prior to execution.

D. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory. Subject to approval by the Division of the State Architect.

E. All cutting and patching of existing hard scape or landscaping for installation or modification, shall be reinstalled in kind. When new utilities are shown or utility modifications are shown on the plans and specific cutting and patching notes are not shown, the contractor shall assume that the existing hardscape shall be saw cut, material removed and disposed, trenches prepared in accordance with local water district or county regulations, and all existing hardscape shall be returned to existing condition or better.

1.03 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut or notch any structural elements unless specifically detailed on the Drawings.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

D. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

Processed concrete finishes
Stonework and stone masonry
Ornamental metal
Matched-veneer woodwork
Preformed metal panels
Window wall system
Stucco and ornamental plaster
Acoustical ceilings
Terrazzo
Finished wood flooring
Carpeting
Aggregate wall coating
Wall covering
Swimming pool finishes
HVAC enclosures, cabinets or covers

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use materials that are identical to existing materials. Materials and workmanship employed in the alterations, unless otherwise shown or specified, shall conform to that of the original work, or to new construction as specified elsewhere in these specifications. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. It is intended that interior finish materials, or existing surfaces to be removed, be re-used insofar as reasonable in areas necessary to match existing surfaces. Care in removal and stockpiling shall be exercised to ensure re-use.

PART 3 - EXECUTION

3.01 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

B. Before proceeding, meet at the site with entities involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Make such explorations and probes as are necessary to ascertain required protective measures before proceeding with demolition and removal. Give particular attention to shoring and bracing requirements so as to prevent damage to existing construction.

C. Provide, erect, and maintain catch platforms, lights barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, workmen engaged in demolition operations, and adjacent construction.

D. Provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

E. Provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and new work is being done, connections made, materials handled, or equipment moved.

F. Take necessary precautions to prevent dust and dirt from rising by wetting demolished masonry, concrete, plaster and similar debris. Protect unaltered portions of the existing building affected by the operations under this Section by dustproof partitions and other adequate means.

G. Provide adequate fire protection in accordance with local Fire Departments, and with Section 01 50 00.

H. Do not close or obstruct walkways, passageways or stairways. Do not store or place materials in passageways, stairs, or other means of egress. Conduct operations with minimum traffic interference.

I. Be responsible for damage to the existing structure or contents by reason of the insufficiency of protection provided.

J. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

2. Take precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill. Provide pilot holes at corners and do not overcut.

4. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.

5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specific tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

D. Perform demolition, removal and alteration work with due care, including shoring, bracing, etc. Be responsible for damage which may be caused by such work to part or parts of existing structures or items designated for re-use. Perform patching, restoration and new work in accordance with applicable technical sections of the Specifications.

E. Materials and/or items designated to become the property of the Owner shall be as shown. Remove such items with care, under the supervision of the trade responsible for reinstallation; protect and store until required. Replace material and/or item damaged in its removal with approved similar and equal new material.

F. Materials and/or items demolished and not designated to become the property of the Owner or to be reinstalled shall become the property of the Contractor and shall be removed from the Owner's property. Storage or sale of removed items on site will not be permitted.

G. Execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.

H. Where alterations occur, or new and old work join, cut, remove, patch, repair or refinish the adjacent surfaces or so much thereof as is required by the involved conditions, and leave in as a good a condition as existed prior to the commencing of the work. The alteration work shall be performed by the various respective trades which normally perform the particular items of work.

I. Finish new and adjacent existing surfaces as specified for new work. Clean existing surfaces of dirt, grease, loose paint, etc. before refinishing.

J. Where existing equipment and fixtures are indicated to be re-used, repair such equipment and fixtures and refinish to put in perfect working order. Refinish as directed.

K. Cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.

L. Confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. Cut and fold back existing built-up roofing. Cut and remove insulation, etc. Provide temporary weathertight protection as required until new roofing and flashings are applied.

3.04 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Cleaning throughout the construction period, and final project cleaning after acceptance tour "**Punch List**" has been completed.

B. Related Work Described Elsewhere: In addition to standards specified herein, comply with requirements for cleaning as described in other sections of these Specifications.

1.02 QUALITY ASSURANCE

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 the requirements specified herein, comply with pertinent requirements of authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

A. Use cleaning materials and equipment which are compatible with the surfaces being cleaned, as recommended by the manufacturer of the material to be cleaned.

B. Do not power wash concrete/masonry surfaces.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

A. General:

1. Retain stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.

2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work. Debris shall be removed from the site and disposed of in a lawful manner. Disposal receipts or dump tickets shall be furnished to Architect upon request.

3. At least twice each month, and more often if necessary, remove scrap, debris, and waste material from the job site.

4. Provide adequate storage for items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove items to the place designated for their storage. Combustible waste shall be removed from the site. Flammable waste shall be kept in sealed metal containers until removed from the site.

2. Weekly, and more often if necessary, inspect, arrangements of materials stored on the site; restack, tidy, or otherwise service arrangements to meet the requirements specified above.

3. Maintain the site in a neat and orderly condition.

C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up scrap, debris, and waste material. Remove items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep interior spaces clean.

a. "Clean", for the 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 a handheld broom, i.e., "broom-clean".

3. As required preparatory to installation of succeeding materials, clean the structures of pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the required cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily and more often if necessary, and while work is being performed in the space in which finish materials have been installed.

a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material, i.e., "vacuum clean".

3.02 FINAL CLEANING

A. Definition: Except as otherwise specifically provided, "clean", for the purpose of the Article, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials, i.e., "scrub and polish clean".

B. General: Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste, conduct final progress cleaning as described above.

C. Site: Unless otherwise specifically directed by the Architect, water and broom clean paved areas on the site and public paved areas directly adjacent to the site. Remove resultant debris.

D. Structures:

1. Exterior: In areas affected by the work under this contract, visually inspect exterior surfaces and remove traces of soil, waste material, smudges, and other foreign matter. Remove traces of splashed material from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure.

   In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Interior: In areas affected by the 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 the cleaning materials and equipment instructed by the manufacturer of the surface material.

3. Glass: Clean glass inside and outside.

4. Polished surfaces: On surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished. Glossy surfaces shall be cleaned and shined as intended by the manufacturer.

E. Timing: Schedule final cleaning after the **Final Punch List** has been completed by the Architect to enable the Owner to accept a completely clean project.

3.03 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be determined by the Architect in accordance with the General Conditions of the Contract.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Operations and submittals required to establish Substantial Completions, Project Acceptance, and filing of Notice of Completion.

B. Contract Completion Date is the day established by the Agreement, the Special Conditions, and the Notice to Proceed as the calendar date by which all Work must be completed in accordance with the Contract Documents. Once established, the Contract Completion Date can only be altered by Change Order. If Work is not complete in accordance with the Contract Documents by the Contract Completion Date, Contractor is obligated to pay liquidated damages to the Owner. In accordance with the terms of the Contract.

C. Substantial Completion: The Date of Substantial Completion is the date on which the Architect certifies to the Owner that construction is sufficiently complete, in accordance with the Contract Documents, that the District may occupy the Project for the use intended, and all agencies and authorities have provided written acceptance of the portions of the Work over which they have jurisdiction.

D. Project Acceptance: The District will accept completion of the Contract after the entire Work shall have been completed to the satisfaction of the District and after issuance of the Certificate of Substantial Completion. The Work may only be accepted as complete by formal action of the Governing Board of the School District. Acceptance of the Project by the Governing Board establishes the formal and official Completion Date for the Project, to be compared against the Contract Completion Date. Project Acceptance must occur prior to Contract Completion Date to preclude assessment of liquidated damages.

E. Notice of Completion: The date of record for the Notice of Completion shall be the date stamped on the Notice by the County Recorder at the time the County Recorder registers the Notice (note: this is normally not the same date as the date the Owner actually files the Notice of Completion with the Recorder office).

1.02 CLOSEOUT SCHEDULE AND PROCEDURE

A. Requirements Preparatory to Project Acceptance:

1. Contractor shall deliver certifications to Architect that no new materials containing asbestos have been included in the work.

2. Temporary facilities shall be removed from site as specified in Section 01 50 00, Temporary Facilities and Controls.

3. Entire site shall be thoroughly cleaned of all construction debris.

4. Record drawings shall be completed, signed by Contractor and Inspector and submitted to Architect as specified in Section 01 78 39 – Project Record Documents.

5. Guarantees and warranties shall be submitted to Architect as specified in General conditions and Section 01 78 30 – Warranties.

6. Contractor's Final Verified Report (Form DSA-6) and other Reports and Affidavits required by the Division of State Architect shall be submitted.

7. Operating and maintenance data shall be submitted and instruction sessions completed as outlined in Section 01 78 23 – Operating and Maintenance Data and as required in CBC Section 110.3.10.2.

8. Contractor to provide a copy of cleaning and maintenance recommendations for countertops to the underneath side of furniture, in addition to requirements listed above and outlined in Section 01 78 23 – Operating and Maintenance Data.

B. Project Acceptance Requirements, Division of the State Architect:

1. Upon completion of construction of the project, the following reports are required to be submitted before the Division of the State Architect will issue a letter to certificate of compliance of the work:

   a. A copy of the Notice of Completion filed by the School District.

   b. Final Verified Report Form DSA 6 A/E certifying all work is 100% complete from the Architect, Structural Engineer, Mechanical Engineer and the Electrical Engineer.

   c. Contractor’s Documents and Field Reports:

      1) Final Verified Report Form DSA 6, certifying all work is 100% complete, from the Contractors (or Contractors), the Inspector of Record, and Special Inspector(s).

      2) Verified Reports of Testing and Inspection as specified on the approved drawings an specifications (i.e., Final Laboratory Report, Welding, Glued-laminated Timber, etc.).

      3) Weighmaster’s Certificate (if required by approved drawings and specifications).

      4) If responsibility was changed in any area during construction, the change must be supported by appropriate documentation and termination reports filed by the individuals originally charged with responsibility.

C. Procedure for Project Acceptance:

1. Contractor shall complete all Work as required by the Contract Documents, to the best standards of the industry and the trades involved. It shall be the Contractor's responsibility to provide a new, complete, properly operating, professionally finished, detailed, cleaned, high-quality project. There shall be no loose, untrue, or ill-fitting materials, unsightly gaps, voids, or holes, misalignments, mis-adjustments, shoddy workmanship, or damaged, missing, inoperable, or incomplete work. Work shall be free of smudges, spots, stains, dirt, nicks, tears, cracks, scratches, paint runs, flaws, over sprays, and all other unsightly blemishes.

2. Completion lists and correction lists for items described in the paragraph above, as opposed to short lists of a few minor corrective items that may have inadvertently been missed by the Contractor, shall be the responsibility of the Contractor, and not the Architect, Inspector, or District. By entering into this Contract, Contractor agrees that quality control is the responsibility of the Contractor. "Punch" list generated by the Architect is under no circumstances to be considered a vehicle to compel subcontractors to complete contract work.

3. Contractor shall prepare a comprehensive and complete list of corrective items for himself and his subcontractors, and shall verify that these items have been corrected prior to notifying the Architect of completion. Copies of the Contractor's list(s) shall be made available to the Architect and Inspector upon request.

4. Contractor shall notify the Architect *in writing* when Contractor, with concurrence of Inspector, feels the project is one-hundred percent complete and is ready to leave the Project. Architect shall then commence the construction review and prepare a "Punch List", or list of minor corrective items to be issued to Contractor. For convenience, reviews may be phased for various portions of the work, as each distinct portion becomes one-hundred percent (100%) complete.

5. Architect will arrange for Engineering Consultants to make their construction reviews, to be completed before Architect will make his construction review. Contractor and his principal superintendent, authorized to act in behalf of the Contractor, as well as principal subcontractors that the Architect may request to be present, shall accompany the Architect/Engineers during the construction reviews.

6. Excessive amounts of corrective ("punch list") items, as judged by the Architect, shall be grounds to terminate the construction review until such time as the Contractor is deemed sufficiently complete to once again start the review. As a rule of thumb, more than four minor items per typical room will be considered excessive.

7. If Owner elects to occupy the Project after the Contract Completion Date, but before the Contractor has completed the Work, Architect must make a comprehensive construction review prior to Owner's occupancy. Contractor shall reimburse Architect and Engineers for their time in conducting such review, and for the time of their clerical staffs in preparing the review documents, at the Architect's/Engineer's standard hourly rates for extra services. Contractor will be billed at the time of Contractor's Application for Payment. Payments to the Architect not received within 30 days will be deducted from subsequent Contractor's Applications for Payment in accordance with the General Conditions.

8. After completion of "Punch List" work, Contractor shall notify Architect in writing to perform an acceptance tour. Notice shall be issued at least seven (7) days in advance of the time the acceptance tour is to be performed.

9. Contractor and his principal superintendent, authorized to act in behalf of Contractor, as well as principal subcontractors that Architect may request to be present, shall accompany Architect and Inspector on acceptance tour.

    a. If work has been completed in accordance with Contract Documents, and no further corrective measures are required, Architect will issue a

Certificate of Substantial Completion, and recommend that Owner accept Project and file Notice of Completion.

b. If work is judged to be substantially completed in accordance with Contract Documents, and only a few corrective measures are required, Architect will issue a Certificate of Substantial Completion, (Article 64 of the General Conditions), and recommend that Owner conditionally accept Project and file Notice of Completion. Owner may conditionally accept project and withhold amount for completion per Article 64 of the General Conditions, Contractor shall issue a written notice of intent to complete the corrective measures by a specific named date agreed to by District.

c. If work has not been substantially completed in accordance with Contract Documents, and several or many corrective measures are still required, Architect will recommend that Owner not accept project and not file Notice of Completion. Instead, based on information gathered from acceptance tour, Contractor will be required to complete corrective measures and then call for another project acceptance tour following procedure outlined above. Contractor will compensate Architect and Inspector for additional acceptance tour and deduct amount paid from final payment to Contractor.

10. After Substantial Completion, Contractor shall issue an Application for Payment in accordance with Specification Section 01 29 00, Part 1.03, H. All administrative actions and submittals, including conditions, outlined therein outlined must be complete prior to Owner's release of payment, **and MUST BE COMPLETED PRIOR TO AGENDIZING FOR PROJECT ACCEPTANCE BY THE OWNER'S GOVERNING BOARD.**

11. Upon Contractor completing all administrative actions and submittals, and meeting all conditions, Owner will agendize acceptance of the Work for the next official meeting of the Governing Board. Official action by the Governing Board shall constitute Project Acceptance. Upon acceptance, Contractor shall immediately remove trailers and other remaining temporary facilities.

12. District shall file Notice of Completion with the County Recorder as soon as practicable following Project Acceptance. The date of record for the Notice of Completion shall be the date stamped on the Notice by the Recorder at the time the County Recorder registers the Notice.

13. The date stamped on the Notice of Completion by the County Recorder shall be the date for commencement of all warranties and guarantees, and the date the Owner becomes responsible for security, maintenance, heating and cooling, utilities, damage to the work (unless done by Contractor's forces working on corrective items), and insurance.

Contractor shall remain responsible for these items prior to this date.

The Owner will inform the Contractor by letter immediately after receiving confirmation in writing from the Recorder's office of registration of the Notice of Completion. Contractor is hereby notified that the process of registering, stamping, and receipt of confirmation from the County has been known to take as much as four weeks from the time of filing.

14. Upon acceptance of Project by Owner, Contractor shall submit his request for final payment in accordance with Specification Section 01 29 00 – Payment Procedures, Part 1.03, I. Payment of retention will not be made by Owner until 35 days after Notice of Completion has been registered by the County Recorder.

    In addition, retention payment will not be made until Contractor has filed the required Form DSA 6 with Division of the State Architect, with copy to the Architect.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY:

A. Related Documents: Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specifications Sections, apply to this section, and including all Technical Specifications Sections, and the Operating and Maintenance Requirements of Division 21 through Division 28.

B. Section Includes:

1. Compilation of product data and related information appropriate for Owner's maintenance and operation of products and equipment furnished under the Contract per CBC Section 110.3.10.2.

2. Instruction of Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.02 SUBMITTAL PROCEDURES

A. Preliminary: Submit one copy of proposed manuals to Architect at least 15 days prior to final inspection or acceptance.

B. Final: Following the indoctrination and instruction of the Owner's operating and maintenance personnel, review proposed revisions to the manual with the Architect.

1. Submit three copies of accepted data in final form 10 days after final inspection. Approval of submittal is a pre-requisite at Substantial Completion prior to Owner's agendizing project for acceptance by the Governing Board.

PART 2 - PRODUCTS

2.01 FORMAT

A. Size: Minimum 4 inch, three-ring binders for 8-1/2" x 11" punched pages, completely clear plastic covered for insertion of labels on spines and covers.

B. Provide identifying tabbed pages. Classify by Division and by Section. All tabbing shall be in numerical order.

C. Drawings:

1. Provide reinforced punched binder tab. Bind drawings with text.
2. Fan fold larger drawings to size of text pages, for easy foldout.

D. Cover: Identify each volume with typed or printed label, List:

1. Title of Project
2. Identity of separate structures as applicable.
3. Identity of general subject matter covered in the manual.

E. Spine: Identify each volume with typed or printed label stating OPERATING AND MAINTENANCE INSTRUCTIONS, GUARANTEES AND SERVICE CONTRACTS and the following information:

1. Title of Project.
2. Divisions and Sections included within volume.
3. Volume number (i.e. "1 of 4")

PART 3 - EXECUTION

3.01 CONTENT OF MANUAL

A. Table of Contents:

1. List of each product indexed to the content of the volume.

2. List with each product the name, address, and the telephone number of:

a. Subcontractor and installer.
b. Maintenance contractor, as appropriate.
c. Local sources of supply for parts and replacement.

B. Product Data: Annotate each sheet to clearly identify the data applicable to the installation. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with Drawings as necessary to illustrate the following:

a. Relationship of component parts of equipment and systems.
b. Control and flow diagrams.

2. Do not include Project Record Drawings as maintenance drawings.

D. Instructions: Provide written text, as required to supplement product data for the particular installation.

E. Warranties, Guaranties, Bonds, and Service Contracts: Include a copy of each warranty, guaranty, bond, and service contract issued.

1. Provide information sheet for Owner's personnel describing the following:

a. Proper procedures in the event of failure or emergencies.

b. Circumstances under which the validity of warranties, guaranties, or bonds might be compromised.

3.02 MANUAL FOR MATERIALS AND FINISHES

A. Instructions for Care and Maintenance: Include Manufacturer's data as follows:

1. Recommendations for types of cleaning agents and methods.

2. Cautions against cleaning agents and methods which are detrimental to the product:

3. Recommended schedule for cleaning and maintenance.

B. Energy Conservation Features:

1. Provide a list of energy conservation features, materials, components, and mechanical devices installed in the building.

3.03 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Content, for each unit of mechanical equipment and system, as appropriate:

1. Description of unit and component parts:

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data, and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Operating Procedures:

a. Start-up, break-in, routine, and normal operating instructions.
b. Regulation, control, stopping, shut-down, and emergency instructions.
c. Summer and winter operating instructions.

3. Maintenance Procedures:

a. Routine operations.
b. Guide to "trouble-shooting".
c. Disassembly, repair, and reassembly.
d. Alignment, adjusting, and checking.

4. Servicing and lubrication schedule including list of lubricants required.

5. Manufacturers’ printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacture's parts list, illustrations, assembly drawings, and diagrams required for maintenance, including:

a. Predicted life of parts subject to wear.
b. Items recommended to be stocked as spare parts.

8. Control diagrams by manufacturer of controls as installed in project.

9. Coordination drawings and color coded piping diagrams.

10. Charts of valve tag numbers, with the location and function of each valve.

B. Content, for each electric and electronic system as appropriate.

1. Description of system and component parts:

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data, and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Circuit directories of panelboards:

a. Electrical service.
b. Controls.
c. Communications.

3. As-installed color coded wiring diagrams.

4. Operating procedures:

a. Routine and normal operating instructions.
b. Sequences required.
c. Special operating instructions.

5. Maintenance procedures:

a. Routine operations.
b. Guide to "trouble-shooting."
c. Disassembly, repair and reassembly.
d. Adjustment and checking.

6. Manufacturer's printed operating and maintenance instructions.

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

3.04 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment, and systems installed in project.

1. Provide services of factory trained instructors from the manufacturer of each major item of equipment or system.

2. Provide for each instruction session or "in-service", a DVD Camcorder operator and **DVD Camcorder** to record the session. DVD recordings shall be clearly labeled as to project, subject, and date. Submit DVDs in triplicate.

B. Operating and maintenance manual shall constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operation and maintenance.

2. Review instructions on how to efficiently use state required energy conservation features, materials, components, and mechanical devices.

END OF SECTION

SECTION 01 78 30

WARRANTIES, GUARANTEES, AND BONDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for written warranties, guaranties, and bonds required by the Contract Documents.

B. Referenced Sections:

1. Section 01 77 00 – Closeout Procedures: Submittal of Final Verified Reports and Notice of Completion, as a condition of project acceptance and payment.

2. Section 01 78 39 – Project Record Documents as a condition of project acceptance and payment.

3. Section 01 78 23 – Operation and Maintenance Data: Incorporation of warranties, guaranties, and bonds into instruction manuals.

C. **Approval of the warranties, guaranties, and bonds by the Owner is a prerequisite to payment at Substantial Completion and agendizing for acceptance by the Governing Board of the Owner.**

1.02 TIME PERIOD

A. Deliver manufacturers' warranties, guaranties, and bonds required by Contract Documents, with Owner named as beneficiary. Where manufacturers' warranty or guaranty extends for a longer time period than the Contractor's warranty and guaranty, deliver manufacturer's warranties or guaranties in same manner.

1.03 WARRANTY/GUARANTY FORM

A. Submit written warranties and guaranties, except manufacturer's standard printed warranties and guaranties, on the Contractor's, subcontractors', material suppliers', or manufacturers' own letterhead, addressed to Owner, in the form attached to this Section.

B. Submit warranties and guaranties in duplicate, and in the form indicated, signed by cognizant entities, and by Contractor in every case, with modifications as approved by Owner to suit the conditions pertaining to the warranty or guaranty.

1.04 SUBMITTALS

A. Collect and assemble written warranties and guaranties into bound booklet form, and deliver bound books to Architect for delivery to Owner for final review and approval.

1. See Sections 01 77 00 and 01 78 23 for additional submittal requirements.

ATTACHMENT: Warranty/Guaranty Form

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WARRANTY/GUARANTY FORM

FOR _____ WORK

We, the undersigned, do hereby warranty and guaranty that the parts of the work described above which we have furnished or installed for:

(PROJECT NAME)

are in accordance with the Contract Documents and that all said work as installed will fulfill or exceed all the Warranty and Guaranty requirements. We agree to repair or replace work installed by us, together with any other work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or operation within a period of _____ ( ) year(s) from the date Notice of Completion is registered with the San Diego County Recorder, ordinary wear and tear and unusual neglect or abuse excepted.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time period determined by the Owner, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the Owner to have said defective work repaired and/or replaced and made good, and agree to pay to the Owner upon demand all moneys that the Owner may expend in making good said defective work, including all collection cost and reasonable attorney fees.

Date: _____ _____

(Subcontractor, Sub-subcontractor, Manufacturer or Supplier)

By:_____

Title: _____

State License No: _____

Local Representative: For maintenance, repair, or replacement service, contact:

Name: _____

Address: _____

Phone Number _____

END OF SECTION

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SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for Record Documents.

B. Throughout progress of the work of the contract, maintain an accurate record of changes in the Contract Documents, as described below.

C. Upon completion of the work of this Contract, transfer the recorded changes to a set of Record Documents, as described herewith.

1.02 QUALITY ASSURANCE

A. General: Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as accepted in advance by the Architect.

B. Accuracy of Records: Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of drawings and other documents where such entry is required to properly show the change. Accuracy of records shall be such that future searches for items shown in the Contract Documents may reasonably rely on information obtained from the accepted Record Documents.

C. Timing of Entries: Make entries within 24 hours after receipt of information.

1.03 PAYMENT WITHHELD

A. The Architect reserves the right to withhold certification of payment requests for failure on the part of the Contractor to maintain Record Drawings in conformance with this Section.

1.04 SUBMITTALS

A. General: The Architect's review of the current status of Record Documents will be a prerequisite to the Architect's review of requests for progress payment and request for final payment under the contract.

B. Progress Submittals: Prior to submitting each request for progress payment, secure the Architect’s review of the Record Documents as currently maintained.

C. Final Submittal: Prior to submitting request for final payment, submit the final Record Documents to the Architect and secure his acceptance.

1.05 PRODUCT HANDLING

A. Maintain the job set of Record Documents protected from deterioration and from loss and damage until completion of the work and transfer of the recorded data to the final Record Documents.

B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect's acceptance; such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials and, in such case, replacements shall be to the standards originally specified in the Contract Documents.

PART 2 - PRODUCTS

2.01 RECORD DOCUMENTS

A. Job Set: Secure from the Owner, at no charge to the Contractor, one complete set of Documents comprising the Contract.

B. Contractor shall provide the architect a pdf copy of all as-builts after the project is completed. As-builts shall include all posted CCDs and RFIs and any other documents issued during construction. As-builts shall be maintained during construction on a daily basis. Any adjustments in location of any item on the plans shall be accurately recorded on the as-built plans.

C. Before commencing backfilling of utilities or any other underground pipes, ducts, conduits, or structures, take photographs showing relationship of below ground utilities to structure(s) or other physical reference point. Provide three-ring binder containing 3-1/2" x 5" mounted and numbered prints of photos, plus the negatives, categorized by locations and indicating utilities shown. Provide a photo(s) of all connections, crossings, stubs, or other critical points. If the Contractor neglects to take such photographs, Contractor shall uncover, at the Contractor's expense, the area(s) so neglected in order to provide the requisite photos.

Provide a hard copy and pdf copy composite Utility Site Plan with the number of each photograph placed on the plan at the location the photo was taken from, and a mark indicating which way the camera was pointed. All numbers and marks shall be in ink, and shall be clear, legible, and neatly done. Photo binder and photo plan shall be considered part of the Record Documents.

PART 3 - EXECUTION

3.01 MAINTENANCE OF JOB SET

A. Identification: Upon receipt of the job set, identify each of the documents with a title "RECORD DOCUMENTS-JOB SET".

B. Preservation:

1. Considering the contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set for the review of the Architect.

2. Use the job set for no purpose other than entry of new data and for review by the Architect, until start of transfer of data to final Record Documents.

3. Maintain the job set at the site of work as that site is designated by the Architect.

C. Making Entries on Drawings: Using an erasable colored pencil (not ink nor indelible pencil), clearly describe the change by note and by graphic line, as required. Date entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes. In the event of superseding changes to any area of the drawing, erase only that portion of the preceding change that is affected by the subsequent change before entering the subsequent change.

D. Making Entries on Other Documents:

1. Where changes are caused by directives issued by the Architect, clearly indicate the change by note in ink, colored pencil, or rubber stamp, and reference Division of the State Architect approved addenda and change orders.

2. Where changes are caused by Contractor originated proposals reviewed by the Architect, including inadvertent errors by the Contractor which have been accepted by the Architect, clearly indicate the change by note in erasable colored pencil.

3. Make entries in the pertinent documents as reviewed by the Architect.

4. Reference specifications section 01 77 00, Closeout Procedures, 1.02 (Closeout Schedule and Procedure) paragraph 4. Project Acceptance Requirements, Division of the State Architect for list of documents required at closeout.

E. Conversion of Schematic Layouts:

1. In most cases on the Drawings, arrangement of conduits and circuits, piping, ducts, and other similar items, is shown schematically and is not intended to portray precise physical layout. Final physical arrangement shall be as determined by the Contractor, subject to the Architect's review. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items and location of utilities which are shown only schematically on the Drawings.

2. Show on the job set of record Drawings, by dimension accurate to within 1 inch, the centerline of each run of items such as are described in the preceding paragraph above. Clearly identify the item by accurate note such as "cast-iron drain", "galvanized water pipe", etc. Show, by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed", etc.). Make identification sufficiently descriptive that it may be related reliably to the Specifications.

3. The Architect may waive the requirements for conversion of schematic layouts where, in the Architect's judgment, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.

4. Timing of Entries: Be alert to changes in the work from how it is shown in the Contract Documents: Promptly, and in no case later than 24 hours after the change has occurred and been made known to the Contractor, make the entry or entries required.

F. Accuracy of Entries: Use means necessary, including proper instruments or tools for measurement, to determine actual locations of the installed items.

3.02 FINAL RECORD DOCUMENTS

A. General: The purpose of the final Record Documents is to provide factual information regarding the work, both concealed and visible, which will enable future modification of design to proceed without lengthy and expensive site measurement, investigation, and examination.

B. Review of Recorded Data Prior to Transfer: Following receipt of the pdf as-builts described here-in-above, and prior to start of transfer of recorded data thereto, secure a review by the Architect of recorded data. Make required revisions.

C. Transfer of Data to Drawings: Carefully transfer change data shown on the job set of Record Drawings to corresponding sepias, coordinating the changes as required, and clearly indicating at each affected detail and other drawing the full description of changes made during construction and the actual location of items described above. Call attention to each entry by drawing a cloud around the area or areas affected. Make change entries on the as-builts neatly, consistently, and in ink or crisp black pencil.

D. Transfer of Data to Other Documents: If the documents other than drawings have been kept clean successfully during progress of the work, and if entries have been sufficiently orderly thereon and reviewed by the Architect, the job set of those documents (other than drawings) will be accepted by the Architect as the final portion of the record documents. If any such document is not so accepted by the Architect, secure a new copy of that document from the Architect at the Architect's usual charge for reproduction carefully transfer the change data to the new copy and obtain the acceptance of the Architect.

E. Review and Approval: Submit the completed total set of Record Documents in both hard copy and in pdf format to the Architect as described above. Participate in review meeting or meetings as required by the Architect, make required changes in the Record Documents, and promptly deliver the final Record Documents to the Architect.

3.03 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor shall have no responsibility for recording changes in the work subsequent to acceptance of the work by the Owner, except for changes resulting from replacements, repairs, and alterations made by the Contractor as a part of his guarantee. No changes will be allowed without approval of the Division of the State Architect.

END OF SECTION

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Owner's Project Requirements (OPR) and Basis of Design (BoD) documentation are included by reference. These documents are for information only and will be furnished upon request.

1.02 SUMMARY

A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

B. Related Sections:

1. Division 1 Section "Operations and Maintenance Data" for requirements for documentation for operation and maintenance of commissioned systems and equipment.

2. Division 1 Section "Sustainable Design Requirements (CHPS)" for additional information related to required commissioning processes and activities.

1.03 DEFINITIONS

A. BoD: Basis of Design. A document 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.

B. CHPS: Collaborative for High Performance Schools a non-profit organization.

C. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

D. CxA: Commissioning Authority.

E. EDR: Energy Design Resources (EDR) is an organization funded by California utility customers under the auspices of the California Public Utilities Commission. They offer decision-making tools and resources that help make it easier to design, build and operate more energy-efficient buildings in California.

1. EDR's software commissioning assistant, " Cx Assistant," is available at the following web site:

a. http://www.energydesignresources.com/Resources/SoftwareTools/CommissioningAssistant.aspx.

F. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. Address HVAC, lighting, indoor environment, energy efficiency, site, water use and other factors affecting the environmental responsiveness of the facility.

1. Design Intent Documents (DID): Shared meaning element with OPR; may be used interchangeably.

G. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of 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.

a. The CxA, as an independent third party, may not be a member of the design team for the project.

2. Representatives of the facility user and operation and maintenance personnel.

3. Architect and engineering design professionals.

1.05 OWNER'S RESPONSIBILITIES

A. Provide the OPR documentation, prepared by the Commissioning Team and approved by Owner, to the CxA and Contractor for information and use.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

C. Provide the BoD documentation, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.06 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

3. Attend commissioning team meetings.

4. Integrate and coordinate commissioning process activities with construction schedule.

5. Review and accept construction checklists provided by the CxA.

6. Complete paper construction checklists as Work is completed.

    a. Provide completed checklists to the Commissioning Authority not less than weekly.

7. Review and accept commissioning process test procedures provided by the Commissioning Authority.

8. Complete commissioning process test procedures.

1.07 CxA'S RESPONSIBILITIES

A. Administrative: Organize and lead the commissioning team.

B. Provide commissioning plan.

C. Commissioning Meetings: Convene, attend and direct commissioning team meetings. At the discretion of the Architect, these meetings may be combined with the job progress meetings. Commissioning meetings shall be scheduled weekly.

D. Construction Checklists: Provide Project-specific construction checklists and commissioning process test procedures.

E. Issues Log: Prepare and maintain the Issues Log.

F. Check List Log: Prepare and maintain completed construction checklist log.

G. Independent Verification: Witness systems, assemblies, equipment, and component startup.

H. Quality Control: Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

I. Final Commissioning Report: Compile test data, inspection reports, and certificates; include them in either the systems manual or the commissioning process report. List each commissioned system and assembly, and include the following items, as a minimum:

1. CxA's statement of the system's or assembly's compliance with the OPR.
2. Description of the OPR.
3. Description of the project specifications.
4. Verification of installation (construction checklist disposition).
5. Functional performance testing and forms.
6. Operations and maintenance data evaluation.
7. Training program evaluation.
8. Value of the commissioning process.
9. Outstanding issues.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

02 00 00

SITE WORK

SANTEE SCHOOL DISTRICT

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Project site and building demolition work to prepare for addition of new improvements, as indicated on the Drawings and specified herein. General and Special Conditions and Division 1 specification sections apply to this section.

B. Related Sections:

1. Section 01 73 29, Cutting and Patching
2. Section 01 50 00, Temporary Facilities and Controls
3. Section 01 77 00, Closeout Procedures
4. Section 31 20 00, Earth Moving
5. Section 33 44 19, Utility Storm Water Treatment
6. Section 32 91 00, Planting Preparation

1.02 DEFINITIONS

A. “Remove”: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner’s property.

B. “Removed and Salvaged”: Items to remain the Owner’s property shall be removed, cleaned, and packed or crated to protect against damage.

1. Identify contents of containers and deliver to Owner’s designated storage area.

C. “Existing to Remain” Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

D. “Remove and Reinstall”: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

E. Salvaged Materials (not wanted by Owner): Items which the Owner does not want and is of salvable value to Contractor may be removed from structure as work progresses. Owner and CBC require a minimum of 50% (by weight) of all non-hazardous construction materials be recycled, composted and/or salvaged. Salvage shall conform to the following:

1. Contractor shall submit salvage plan showing how all materials are to be sorted, salvaged and recycled. Plan must include all final destinations for each type of material.

2. Salvaged items must be transported from site as they are removed, unless materials are to be reused on site.

3. Storage or sale of removed items on site will not be permitted, unless materials are to be reused on site.

4. Contractor shall provide certification for all salvaged materials. Certifications may take the form of receipts from recycling facilities, manufacturers, or any other legitimate form of certification. Certification types shall be outlined in salvage plan and approved by Owner.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition by the Contractor(s) in a legal disposal area appropriate to the materials being disposed.

1.04 SUBMITTALS

A. Submit each item in this Article according to the Conditions of the Contract and Specifications Section 01 33 00, unless otherwise indicated.

B. Proposed Dust Control Measures.

C. Proposed Noise Control Measures.

D. Schedule of demolition activities indicating the following:

1. Detailed sequence of demolition, salvage, and removal work, with starting and ending dates for each activity.

2. Dates for shutoff, capping, and continuation of utility services.

E. Salvage Plan - Inventory of items to be removed and salvaged. Salvage plan shall show how all materials are to be sorted, salvaged and recycled. Plan must include all final destinations for each type of material.

F. Inventory of items to be removed and salvaged and deliver to Owner's designated storage area.

G. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and improvements that might be misconstrued as damage caused by demolition operations.

H. Record drawings at project closeout according to specifications section 01 77 00 - Closeout Procedures shall identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition work similar to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Pre-demolition Conference: Conduct conference at Project site with Owner, Architect and Construction Manager.

1.06 PROJECT CONDITIONS

A. Building, where partial wall will be demolished, will be vacated and its use discontinued before start of the Work.

B. Conditions, existing at time of inspection for bidding purpose, will be maintained by Owner as far as practical.

C. Hazardous Materials: If applicable, a Hazardous Materials Study was performed on site and a specification for removal of said materials is incorporated into the project documents.

1.07 SCHEDULING

A. Arrange demolition and salvage schedule so as not to interfere with Owner's on-site operations.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicted to determine extent of demolition required.

C. Inventory and record the conditions of items to be removed and reinstalled and items to be removed and salvaged.

D. Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

E. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.02 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner, and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

C. Provide not less than 72 hours notice to Owner if shutdown of service is required during changeover.

D. Utility Requirements: Refer to Division 21 through Division 26 sections for shutting-off, disconnecting, removing, and sealing or capping utility services. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

A. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways.

2. Protect existing site improvements, appurtenances, and landscaping to remain.

C. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to remain.

1. Strengthen or add new supports when required during progress of demolition.

3.04 EXPLOSIVES

A. The use of explosives will not be permitted.

3.05 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not create hazardous or objectionable conditions, such as flooding, and pollution, when using water.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

3.06 DEMOLITION

A. Demolish partial building wall, concrete and/or asphalt paving, interior finishes, fixtures and accessories, as required to prepare for new construction, and remove from the site.

B. Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

C. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.

D. Fill below-grade areas and voids resulting from demolition of building elements and pavements and soil materials according to requirements specified in Section 31 20 00 – Earth Moving and/or geotechnical report.

E. Promptly repair damages to adjacent facilities caused by demolition operations.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning demolished materials is not allowed.

C. Transport demolished materials off Owner's property and legally dispose of these materials.

END OF SECTION

03 00 00

CONCRETE

SANTEE SCHOOL DISTRICT

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Completion of subgrade preparation, formwork, ties, shoring, bracing, anchorage and blockouts as indicated on the Drawings and specified herein.

B. Related Sections:

1. Curbs, Gutters, Sidewalks and Driveways; refer to Section 32 16 00.
2. Concrete Reinforcing; refer to Section 03 20 00.
3. Cast-in-Place Concrete; refer to Section 03 30 00.
4. Rough Carpentry; refer to Section 06 10 00.

1.02 REFERENCED STANDARDS

A. Refer to Section 01 42 19 for information concerning availability and use of references.

ACI 117-90 - Tolerances for Concrete Construction & Materials

ACI 347R-94 - Formwork for Concrete

ANSI/AHA A135.4 - Basic Hardboard

ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous types)

CRD-C-572-74 - Polyvinyl chloride Waterstops

DOC PS-1-95 - Construction and Industrial Plywood

WCLIB Std. No. 17. - Grading Rules for West Coast Lumber

WWPA - Western Lumber Grading Rules 2011 with Supplements

B. Conform to the requirements of Section 01 45 23 – Testing and Inspection Services.

C. Construct and erect formwork in accordance with ACI 318 and 347, and Section 1905A of the California Building Code (CBC) 2016, Title 24, Part 2.

D. Design forms and falsework to adequately support live and dead loads, including equipment, concrete drops, pressures of foundations, etc.

E. Follow recommendations of ACI 318 and 347.

F. Title 24, Parts 1 and 2, California Building Code.

1.03 ARCHITECT'S REVIEW

A. Architect will review formwork for architectural suitability where exposed concrete finish occurs. Contractor shall be responsible for design of formwork for structural stability and sufficiency.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Earthen Forms: Provide earthen forms for footings only where the soil is firm and stable and the concrete will not be exposed, and subject to approval of the Division of the State Architect. Cut earthen forms square, neat and accurate to size. Clean bottoms of excavations.

B. Wood Forms: Provide wood forms**,** based on PS 1-95 Plywood or B-B Class I exterior, high density overlaid one side for forms, sound, undamaged, and clean, 5/8-inch thick minimum for exposed concrete work.

1. Lumber: Provide Douglas fir, construction grade lumber for framing, studding and bracing.

2. For site walls provide HDO or HDO 7 layer minimum grade B-B for all exposed walls.

C. Exposed Architectural Concrete: HDO or HDO B-B 7 Ply minimum for a smooth architectural finish. Seal all joints and edges.

2.02 COMPONENTS

A. Formed Construction Joints: Provide minimum 24 gage galvanized steel foam filled type, with release tape sealed slots, bent tab anchors, securable to formwork.

2.03 ACCESSORIES

A. Provide accessories and anchorages required, of sufficient strength, length and character to maintain formwork during pouring operations.

B. Use anchors and hangers which do not leave exposed metal at surface.

C. Use snap-off, removable, or adjustable type metal ties, hot-dip galvanized. Provide standard metal form clamp assembly, spreader type leaving no metal within 1 inch of concrete exposed face. Leave inner tie rod within concrete when forms are removed.

D. Provide colorless mineral oil type form coating, non-grain raising and non-staining type, Nox-Crete Company Nox-Crete Form Coating, or other approved equal.

E. Rigid foam plastic fillets may be used for chamfered corners.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to commencing work, inspect the work of others and verify that such work has been properly completed and installed to allow for proper installation of materials and methods required of this section.

B. Inspect forms in accordance with Title 24, Part 2, Section 1705A.3.5, California Building Code.

3.02 PREPARATION

A. Earthen Forms: Trench earthen forms at least two inches wider than footing widths shown on drawings. Construct wood edge strips at each side of trench at top to secure reinforcing and prevent trench from caving. Form sides of footings where earth caves. Tap form and clean debris and loose materials in earthen forms before depositing concrete.

B. Design of forms and shoring in excess of 3 feet in height, shall be by a California State registered Civil Engineer.

C. Verify accuracy of lines, levels, and centers.

D. All embedded items must be installed prior to placement of concrete - *NO EXCEPTIONS*.

3.03 APPLICATION

A. Construct formwork and appurtenances to meet design and code requirements. Construct of sound materials, of correct shape and dimensions, mortar tight, and of sufficient strength to prevent sagging, buckling, movement and failures. Provide adequate shores of wood or metal to safely carry imposed loads and adjustable to prevent displacements during the work.

B. Align joints and make them watertight.

C. Set reinforcing accurately and ensure secure placement.

D. Maintain tolerances of ACI 347, within 1/8-inch in 10 feet and ¼" maximum deviation from theoretical dimensions. Exposed concrete may require tighter specifications.

E. Assist in setting and placing blockouts and sleeves for materials and products to be embedded in and passing through concrete.

F. Set screeds and establish levels for tops of concrete for finish surfaces. Shape surfaces as indicated on drawings.

G. Screed supports for concrete over waterproof membranes or vapor barriers shall be of a cradle, pad, or base type which will not puncture membrane.

H. Wet formwork prior to placing concrete and keep wet during concrete curing process.

3.04 PROTECTION

A. Do not remove formwork, shoring and bracing until such time as masonry and concrete has gained sufficient strength to carry its own weight, and construction and design loads which are liable to be imposed upon.

1. Verify strengths by compressive strength test results. Loosen forms carefully. Do not wedge pry bars, hammers or other tools against masonry and concrete surfaces.

B. In addition to California Building Code Section 1905A, the following are minimum times for forms and shoring to remain in place prior to removal:

1. Footings and grade beams - 5 days.
2. Walls and columns - 14 days.
3. Beam sides - 10 days.
4. Beam and slab soffits - 28 days - Add temporary reshoring requirement.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Completion of reinforcing steel bars, welded wire fabric, support chairs, bolsters, bar supports and spacers as indicated on the drawings and specified herein.

B. Related Sections:

1. Curbs, Gutters, Sidewalks and Driveways; refer to Section 32 16 00.
2. Concrete Forming and Accessories; refer to Section 03 10 00.
3. Cast-in-Place Concrete; refer to Section 03 30 00.

1.02 QUALITY ASSURANCE

A. Conform to the testing and inspection requirements of Section 01 45 23 – Testing and Inspection Services.

B. Perform reinforcing work in strict conformance with Chapter 19A, Title 24, California Building Code (CBC) 2016, and CRSI, 2009, unless specified otherwise or required otherwise by local code jurisdiction.

1.03 REFERENCES STANDARDS

A. Refer to Section 01 42 19 – Reference Standards for information concerning availability and use of references.

ACI SP-66(04) - Detailing Manual

ACI 318-08 - Building Code Requirements for Structural Concrete

ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement

ASTM A185 - Steel Welded Wire Reinforcement, Plain, for Concrete

ASTM A497 - Steel Welded Wire Reinforcement, Deformed, for Concrete

ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A706 - Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

CRSI MSP, 28th Edition, 2009 - Manual of Standard Practice

AWS A5.1: 2004 - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS A5.5: 2006 - Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding

AWS D1.4: 2011 - Structural Welding Code---Reinforcing Steel

B. In addition to CRSI specifications, follow ACI 315 and 318, AWS welding codes and qualifications, and ASTM A185, A615 and A706.

C. Testing of bars in accordance with Title 24, Section 1913A and 1913A.4, Part 2.

1.04 TESTING

A. Comply with Title 24, Section 1913A

B. Where samples are taken from bundles as delivered from the mill, with the bundles identified as to heat number, and provided that the mill analysis accompany the report, then one tensile test and one bend test shall be made from a specimen from each 10 tons or fraction, of each size of reinforcing steel

C. Where positive identification of the heat number cannot be made or where random samples are to be taken, then one series of tests shall be made from each 2-1/2 tons or fraction, of each size of reinforcing steel.

D. Testing Laboratory shall perform chemical analysis of reinforcing for suitability for welding prior to welding. Welding reinforcing bars shall comply with ASTM A706.

1.05 SUBMITTALS

A. The Contractor shall be responsible for providing steel reinforcing as indicated on the Drawings for concrete reinforcing and as specified herein. Prepared Shop Drawings shall be reviewed by the Architect or Structural Engineer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Do not allow reinforcing materials to have direct contact with the ground. Cover materials adequately to prevent rusting, and contact with materials or construction injurious to proper bonding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: Deformed billet steel reinforcing bars, ASTM A615, plain finish (except ASTM A706 for welded bars where called for), see Drawings for grade.

1. When welding is required, provide reinforcing bars conforming to ASTM A706, including the additional requirements of AWS D1.4, as modified by 2016 CBC Standard Chapter 19A.

2. Where called for, provide ASTM A706.

2.02 ACCESSORIES

A. Welded Wire Fabric: Provide plain type, ASTM A185, in coiled rolls, plain finished, void of rust, dust, scale, paint, grease and other coatings.

B. Provide minimum 16 gauge galvanized annealed tie wires, and chairs, bolsters, bar supports, and spacers sized and shaped for strength and support of reinforcing. Plastic accessories may be acceptable if approved by Architect prior to use.

2.03 FABRICATION

A. Fabricate in accordance with details shown.

B. Accurately bend, cut and place bars as shown on Drawings and in accordance with the requirements of Title 24, Part 2, Section 1905A and ACI 318. Bend bars cold; heating of bars is not permissible. Do not bend or straighten bars in any manner that will injure materials.

C. Welding: Reinforcing to be welded shall comply with the requirements of Title 24, Part 2, Section 1903A.8 and ACI 318. Perform welding, where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using E90 series low hydrogen electrodes., except E80 for ASTM A706, GRW reinforcing. Preheat 6 inches each side of joint. Protect joints from drafts during cooling process; accelerated cooling is prohibited. Do not tack weld bars. Clean metal surfaces to be welded of all loose scale and foreign materials. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds found defective, with chisel, and replace with proper welding.

1. Employ only experienced certified welding operators.

2. Prequalification of welds are to be in accordance with code and carbon equivalent of reinforcing not exceeding 0.75.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to commencing work of this section, inspect work of others and verify that such work has been properly completed and installed to allow for proper installation of all materials and methods required of this section.

3.02 INSTALLATION

A. Fabricate reinforcing in accordance with ACI 315. Locate reinforcing splices not shown on drawings, at points of least stress. Where shown or required, weld reinforcing bars in accordance with AWS D1.4.

B. Place reinforcing supported and secured against displacement. Do not deviate from true alignment.

C. Ensure that reinforcing used is clean, free of scale, dirt, dust, rust and other matter.

D. Provide lap splices for bars noted as "cont.". Provide a Class “B” lap splice in concrete. Wire all laps and splices in welded wire mesh and provide side and end laps of at least 6 inches.

1. Spacing - minimum center-to-center distance between parallel reinforcing bars is to be in compliance with that shown on drawings, or in the absence of such information on drawings, the clear spacing is to be one bar diameter, but in no case less than 1-1/2 inch, nor less than 1-1/3 times the maximum size of

aggregate.

2. Where possible, stagger splices of adjacent vertical bars.

E. Only splice reinforcing where shown or noted. Splices at other locations must be approved by the Architect. Provide continuous reinforcement between splice locations in vertical walls. No splices of vertical wall reinforcing may occur except at foundations, unless specifically approved by Division of the State Architect, and the Architect.

1. Securely tie reinforcing with 16 gage tie wire at all splices and intersections, and as may be directed.

2. Point ends of wire ties away from forms.

F. Stagger splices in adjacent horizontal wall reinforcing bars a minimum of 4 feet.

G. Provide dowels in footings and/or grade beams the same size and number as vertical wall or column reinforcing. Provide a minimum dowel projection equal to Class “B” lap splices unless noted otherwise.

1. Securely tie dowels in place before depositing concrete. Install No. 3 bars for securing dowels where no other reinforcement is provided.

H. Provide the minimum coverage of reinforcing by concrete:

MINIMUM COVER:
Inches (mm)

1. Cast against and permanently exposed to earth……. 3 (76)

2. Concrete exposed to earth or weather:

No. 6 through No. 18 bar…… 2 (51)
No. 5 bar, W31 or D31 wire, and smaller……1-1/2 (38)

3. Concrete not exposed to weather or in contact with ground: Slab, walls, Joists:

No. 14 and No. 18 bar…… 1-1/2 (38)
No. 11 bar and smaller…….. 3/4 (19)

4. Beams & Columns:

Primary reinforcement, ties, stirrups, spirals……. 1-1/2 (38)

I. Reinforcing bars shall not be re-bent.

3.03 APPLICATION

A. Correction during concreting: Maintain capable steel workers during placement of concrete for properly resetting reinforcement displaced by runways, workers, or other causes.

B. Reinforcement: As a minimum for slab reinforcement, provide 6 x 6 W4.0 x W4.0 wire mesh ASTM A185, if no other reinforcement is indicated.

3.04 DEFECTIVE WORK

A. The following reinforcing work will be considered defective and may be ordered by Owner to be removed and replaced at no additional expense to Owner:

1. Bars with kinks or bends not shown on Drawings.
2. Bars injured due to bending or straightening.
3. Bars heated for bending.
4. Reinforcement not placed in accordance with Drawings or Specifications.
5. Rusty or oily reinforcement.

3.05 FIELD QUALITY CONTROL

A. Refer to Section 01 45 23 - Testing and Inspection Services for requirements.

B. Prior to pouring concrete, notify all parties to the inspections, that reinforcing is ready for inspections. Secure approvals by testing laboratory and inspector before concrete operations commence.

3.06 CURING

A. Concrete (other than high-early-strength) shall be maintained above 50 degrees F. and in a moist condition for at least the first seven (7) days after placement, except when cured in accordance with Section 1905A, 2016 CBC.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Completion of sand bed, vapor barrier, cast-in-place concrete, and finishes as indicated on the drawings and specified herein.

B. Related Sections:

1. Curbs, Gutters, Sidewalks and Driveways; refer to Section 32 16 00.

2. Concrete Forming and Accessories; refer to Section 03 10 00.

3. Formwork, Earthen forms: See Section 03 10 00 Concrete Forming and Accessories.

4. Concrete Reinforcing: See Section 03 20 00.

5. Miscellaneous steel, see Section 05 12 00 Structural Steel Framing.

1.02 QUALITY ASSURANCE/SUBMITTALS

A. Conform with the requirements of Section 01 45 23 - Testing and Inspection Services.

B. Perform concrete work in accordance with ACI 301 and 318, unless specified otherwise. Provide continuous inspection and testing for concrete placement in accordance with Sections 1701A and 1913A Title 24, Part 2, California Building Code.

C. Sample Panels: When and where instructed to do so, provide on-site sample panel with specified finishes. Construct additional panels as may be necessary to gain approval of finishes desired. After rejection of panel, remove from site immediately. Approved and reviewed panel is to be left in place at site for project duration as a project standard.

D. Testing Laboratory Services:

1. Owner will employ and pay for an Independent Testing Laboratory to review the various concrete mixes required to produce concrete of the strengths required for the project. Submit and obtain approvals before proceeding with the work. Concrete mix shall be designed per Title 24, Part 2, Section 1904A.2

2. Separately, Owner will employ and pay for a testing laboratory to perform tests and inspections, but the cost of subsequent and additional testing and inspections due to failed items will be backcharged to the Contractor.

E. Submit design mixes to Architect for Structural Engineer, and Testing Lab review and approval. Contractor shall pay for review of more than two (2) designs for each strength required.

F. Submit shrinkage test for each design minimum. Perform the following shrinkage tests for lightweight concrete, for each 150 cubic yards and fraction:

1. Specimens - 4-inch x 4-inch and 11 inch long bars, cured for seven (7) days in a moist room and as specified in ASTM C157. Make measurements at 7 day intervals until 35 days of curing has elapsed.

2. Allowable shrinkage of lightweight concrete used on project is not to exceed 0.05 percent after the 35 days of curing has elapsed.

1.0 REFERENCE STANDARDS

A. Refer to Section 01 42 19 – Reference Standards for information concerning availability and use of references.

ACI 318 - Building Code Requirements for Structural Concrete and Commentary

ASTM C33 - Standard Specification for Concrete Aggregates

ASTM C94 - Standard Specification for Ready-Mixed Concrete

ASTM C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement

ASTM C156 - Standard Test Method for Water Loss [from a Mortar Specimen] through Liquid Membrane-Forming Curing Compounds for Concrete

ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete

ASTM C227 - Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)

B. All work under this section shall be in accordance with applicable provisions of CBC, 2016, Title 24, Part 2, Chapter 19A.

C. Refer to the following information for compliance of materials, products, and installation techniques: ASTM C33, C94, C150, C260, C494 and ACI 301, 304R-00 and 305R-99.

D. Handling and Placing: Concrete transported and placed as per ACI 318. Concrete shall be thoroughly compacted and worked into forms around reinforcing steel using suitable equipment. Vibrating of formwork will not be permitted.

E. Where conditions make placing difficult or reinforcing is congested, batches containing the same proportions of sand and cement used in the concrete plus a maximum of 50 percent of coarse aggregate shall be used.

F. Inspections: Notify the Architect, Structural Engineer, and the Division of the State Architect (DSA) at least forty-eight hours in advance of the first pour of concrete and sufficiently in advance of subsequent pours, see 1704A, Title 24, Part 2, California Building Code and chapter 7, section 7-145, Title 24, Part 1, California Administrative Code.

G. Testing: The Inspector will take at least four cylinders of concrete from each day's run of 50 yards, or 2,000 sq. ft. of surface area for slabs, or fractional part thereof, per ACI 318. Field specimens of concrete taken and tested in accordance with 2016 CBC Standard. Label each cylinder with job name, date, number, result of slump test, and the point in the pour in the structure from which the sample was taken noted thereon. One cylinder shall be tested at seven days and two at 28 days. The fourth cylinder shall be stored for 56 days unless instructed otherwise. Core test to comply with ACI 318 if cylinder tests indicate deficiencies.

H. Embedded Items: Pipes and conduit in concrete, located, sized and if required, sleeved in accordance with the requirements of ACI 318. Bolts and anchorage devices embedded in concrete to fastened sills, tie-down columns and other structural and framing members to concrete installed and secured in place before concrete is placed.

1. Concrete shall be placed in a continuous operation between predetermined joint locations. Location of construction joints shall be as shown on the drawings or at locations approved by the Engineer and the Division of the State Architect.

2. Joints shall be straight, exactly horizontal or vertical and the surface of the concrete shall be level wherever a run is stopped. Reinforcement shall be extended through joints or dowels to develop the full strength of the reinforcement. Construction joints shall be per ACI 318.

1.04 TESTING

A. Provide free access to work. Provide laboratory design mix. No substitutions will be accepted. Cement and aggregates shall be tested.

B. Cement: Test Portland cement in accordance with Sections 1913A.1, Title 24, Part 2, and Section 3.2, ACI 318.

C. Core Tests: Take and test composite construction cores in accordance with Section 1913A.4, Title 24, Part 2

D. Batch Plant Inspection: Provide in accordance with Section 1705A.3.2, Title 24, Part 2.

E. Placing Record: Keep records of placing in accordance with Section 1705A.3.6, Title 24, Part 2.

F. Cylinder Test: Provide in accordance with Section 1913A.4, Title 24, Part 2.

G. Slump Test: Provide in accordance with ASTM C143 for each set of test cylinders.

H. Placing Inspection: Provide in accordance with ACI 318.

I. Moisture Testing: All slabs to receive flooring materials other than ceramic tile shall be calcium chloride dome tested at least 54 days after placement. Readings exceeding requirements of flooring manufacturer (generally 3 lbs. per 1,000 s.f. per 24 hours) will require retesting prior to installation of flooring. Readings in excess of 5 lbs. per 1000 s,f, will require testing by Owner using petrographic analysis to determine water/cement ratio at time of placement.

1. All tests in areas where concrete was placed with a water/cement ratio in excess of .45 will be paid for by Owner, but may be back charged to Contractor.

J. Compaction Testing: Provide in accordance with ASTM D689.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: For site walls – Colton II - Provide ASTM C150 TYPE II/V conforming to requirements of 1903A.3, Title 24, Part 2. If aggregates contain reactive substances, reactive with cement alkalies they may not be used.

B. Aggregates:

1. Base and Aggregate base shall conform to the State of California, Department of Transportation (CALTRANS) Standard Specifications, Current Edition. All base, whether called out as aggregate base or base shall be in conformance with CALTRANS Section 26 for Class 2 Aggregate Base, 3/4-inch maximum. The maximum percentage of recycled material allowable shall not exceed 50% of the total volume of aggregate used.

2. Base and Aggregate Base shall be provided by a licensed commercial materials supplier. Certifications shall be submitted with each submittal. Use of on-site asphalt materials in aggregate base or base is strictly prohibited. The use of Crushed Miscellaneous Base is strictly prohibited.

3. Aggregates: ASTM C33, 1-inch maximum conforming to CBC 2016, Title 24, Part 2, 1903A.4 Aggregates and ACI 318.

C. Curing Materials:

1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per square yard, complying with AASHTO M182, Class 2.

2. Moisture-Retaining Cover: One of the following, complying with ASTM C171:

a. Curing paper
b. Polyethylene film
c. Burlap Polyethylene-coated

3. Liquid Membrane-Forming Curing Compound: Liquid type non-wax membrane-forming curing compound complying with ASTM C309, Type I, Class B. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal/ product shall be compatible with finishes to be applied to concrete.

a. Products: Subject to compliance with requirements, provide one of the following:

"2000 Kure 1315"	BASF Building Systems.
"Kurez W Vox"	Euclid Chemical Co.
"Sealtight 1100-Clear"	W.R. Meadows, Inc.

b. Surface Treatment for Slabs Receiving Wood Flooring, Sheet Vinyl, or Resilient Flooring including Sheet vinyl and Vinyl Cementitious Tile, Carpet with a Vinyl, Rubber or Unitary Type Backing: Waterproof, Seal and Cure Application, CS 2000 by Creteseal (800) 278-4273, or equivalent, Floor Seal Technology, Inc. (800) 572-2344.

4. Warranty: 15 years Labor and Materials backed by a $1,000,000 Insurance Policy

   a. A trained applicator shall apply CS 2000, or a technician must be on site during the spraying applications for verification to receive the 15 year warranty on floor coverings.

   b. When a floor covering system is installed on a slab treated with the product according to manufacturer's instructions, the manufacturer shall warrant the floor covering system against delamination due to negative, ground originated moisture migration or moisture-born contaminates for a period of ten years from the date of original installation.

      The warranty shall cover labor and materials necessary to repair or replace the floor covering system if repair cannot be made.

5. After pouring, placing, bullfloating, final finishing, soft cutting, and the surface of the concrete has hardened sufficiently to sustain foot traffic, CS 2000 Sealer shall be applied.

6. Apply CS 2000 Concrete Sealer at the rate of 200 square feet per gallon coverage. If puddling or bird bathing occurs, lightly broom product evenly over the substrate.

7. Continue brooming the product evenly over the substrate until the CS 2000 product has penetrated into the concrete.

8. Provide one of the following, or other approved equal:

   Creteseal CS 2000.
   Ashford Formula
   Kure N Harden – By BASF

D. Water: Provide clean water free from injurious substances, per Section 3.4, ACI 318.

E. Vapor Barrier: Provide Stego Industries, 15-MIL Specifications, comply with ASTM E 1745, Class A, requirements.

F. Admixtures: *(No Calcium Chloride)* Admixtures to be used in concrete shall be subject to prior approval by the IOR and the Division of the State Architect, CBC 2016.

1. Water Reducing: Reduce water 5 percent minimum, increase 28 day compressive strength, decrease 21 day drying shrinkage, ASTM C494.

2. Provide one of the following, or other approved:

   BASF The Chemical Co. Pozzolith 300 R.

3. Acceleration or Retarding: ASTM C494.

4. Air Entraining: 4 percent minimum, 6 percent maximum air content by volume, ASTM C260.

5. Admixtures shall be in accordance with Title 24, Part 2, 1903A.6 and Section 3.6 ACI 318.

6. Concrete Sealer: Dayton Superior “Cure & Seal 309 J18”, W.R. Meadows "VOCOMP®-25", or Sonneborn® Products "Kure-N-Seal W" as manufactured by BASF.

   a. For site walls use Sinak HLQ 125.
   b. 3000 psi concrete 3/8” – 1/2” aggregate.

7. Non-Slip Surface: Trowel finish aluminum oxide grains, at exterior stairs and where indicated on the Drawings.

8. Add shrinkage reducing agent, such as “Eclipse®” as manufactured by Grace Construction Products or Peramin® SRA as manufactured by Peramin.

2.02 COMPONENTS

A. Non-Shrink Grout: Premixed compound consisting of non metallic aggregate, cement, water reducing and plasticizing agents, capable of developing non-shrink characteristics in both the horizontal and vertical direction with minimum compressive strength of 4,800 p.s.i. in two (2) days, and 6,000 p.s.i. in twenty-eight (28) days.

   1. Provide Embeco Grout as manufactured by BASF, or other approved by Five Star, Dayton Superior, or Sika.

B. Cement Grout and Drypack: Precision support grout shall be BASF Masterflow® 713 Grout as manufactured by Master Builders, Cleveland, Ohio consisting of a hydraulic cementitious system, specially graded and processed natural fine aggregate and additional technical components. Other products will only be acceptable providing written approval of the Engineer is obtained prior to bidding. Acceptance will be granted only upon satisfactory evidence proving that the substitute material meets the following requirements, conforming to CRD C-621 Corps of Engineers.

   1. Free of gas producing or releasing agents.

   2. Free of oxidizing catalysts.

   3. Free of inorganic accelerators, including chlorides.

   4. Drypack: Pre-mixed grout shall be used. Use only enough water to make a stiff mix consistency. Pre-mixed grout shall be used under base plates per manufacturer's recommendations, and packed solid under pressure treated mudsills, per Structural Details, so as to obtain a continuous bearing. Minimum compressive strength of 6000psi.

C. Joint Materials: Provide tooled joints or plastic control joints.

1. Construction Joints: Provide metal keyed dividers for cold joints, subject to review and approval by Architect.

2. Expansion Joint Fillers:

a. 1/2-inch asphalt impregnated fiber conforming to ASTM D545 Type 5, where slab abutts wall or other vertical elements.

b. Where joint will be finished with sealant, set expansion strip with a 1/2-inch deep removable expansion strip cap.

D. Under Slab Vapor Barrier: 15 mil Stego Wrap, Fortifiber Building Systems, or W.R. Meadows, or equal, over 2" compacted sand. Refer to plans and Geotechnical Report for installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Certifications: Provide legible copies of the delivery tickets of each load of concrete with the following information:

1. Name and location of plant.
2. Serial number of ticket.
3. Date and truck number.
4. Name of contractor.
5. Name of project.
6. Type of class of concrete and how to be used.
7. Amount of concrete.
8. Time loaded, time of arriving and unloading at project site.
9. Water added at site and total water content.
10. Type, name and amount of admixtures.
11. Name and signature of person making slump tests.
12. Testing number of test cylinders.

3.02 PREPARATION FOR PLACEMENT

A. Remove foreign debris and matter which may have accumulated within forms, and close ports and openings left in formwork.

B. Thoroughly clean tools used in transportation, placing and consolidating concrete immediately after each pour.

C. Ensure that required inspections have taken place prior to pour.

3.03 APPLICATION

A. Mixes: The minimum concrete ultimate twenty-eight (28) day compressive strength to be per structural drawings and shall be controlled by the following method:

1. Designed Mix: Concrete mixes shall be based upon previously proven mixes and material tests made by a recognized testing agency. The design of such

mixes shall be based on the ultimate strength of the concrete assumed in the design of the structure and shall take into consideration both the workability of the mix and the durability of the concrete. Refer to Sections 1903A.1 and ACI 318.

2. When strengths in excess of 3,000 pounds per square inch are required, or special aggregates not having a record of satisfactory performance are used, or admixtures are used to reduce the cement content, ACI 318, shall be used to determine the mix.

3. Where design criteria in Title 24, Part 2, chapter 19A and ACI 318 Section 5.2, provide for the use of a splitting tensile strength value of concrete as a modifier, laboratory tests shall be made in accordance with the CBC to establish the value of fct corresponding to the specified value of f'c.

4. Tensile-splitting tests of field concrete shall not be used as a basis for acceptance.

5. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement not less than 1 inch and not more than 4 inches.

6. The maximum water to cement ratio shall not exceed 0.5 (50%).

7. Project specific shrinkage test. Perform test using actual proposed mix with some aggregates used in the project. Limit 28-Day shrinkage to 0.045 percent.

B. Control Density Fill: Provide batch plant design mix of 4000 p.s.i., flowable concrete composed of 3000 lbs aggregate, 45 gals water, 50 lbs of cement and 400 lbs of flyash. Adjust proportions for materials as necessary and submit to Architect, for information.

3.04 CONVEYING

A. Handle concrete from mixer to location of placing as rapidly as practical, avoiding separation or loss of ingredients and rehandling. Use carts, wheelbarrows, concrete pumps, conveyors or buggies to deliver concrete to location of placement.

B. Do not permit a free fall of more than 4 feet when placing concrete.

C. Use elephant trunk spouts for placing concrete in vertical elements. Space so that concrete does not exceed 4 foot flow horizontally.

3.05 PLACEMENT

A. In general, place concrete in accordance with ACI 301, and in the presence of the inspecting personnel required.

B. Ensure that anchors, seats, plates, and other items to be cast into concrete are placed, held securely, and will not cause hardship in placing concrete.

C. Maintain records of poured concrete. Record date, location, quantity, air temperatures, and test samples taken.

D. Ensure that reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

E. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.

F. Pour concrete continuously between predetermined construction, control and expansion joints. Pour in a checkerboard pattern, unless otherwise directed.

G. Excessive honeycomb and embedded debris is not acceptable.

H. Conform to ACI 305R-10 when concreting in hot weather.

I. Install vapor barrier in widest widths possible, under interior slabs on grade. Place at center of 4 inches of sand (minimum of 2 inches of sand top and bottom) lapping joints at least 18 inches and sealing joints, taping pipe penetrations.

J. Screed slabs and concrete bases level to a tolerance of 1/8-inch in 10 feet. Vary slab thickness as required to maintain top of slab elevation as design. Maintain top of slab elevation within ± 3/8" of intended elevation. Continually survey top of concrete elevations during concrete pour.

K. Inspect concrete surfaces immediately upon removal of forms. Patch imperfections.

L. Modify or replace concrete not conforming to required lines, details, shapes and elevations. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of Architect.

M. Provide smooth rubbed finish on concrete surfaces to be left exposed such as concrete walls, columns, beams, and joists, except as otherwise indicated.

N. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete. Moisture cure for seven (7) days minimum all interior slabs.

O. Drypack shall be packed solid under baseplates and thoroughly packed under pressure treated mudsills, per Structural Details, so as to obtain a continuous bearing.

3.06 CONSTRUCTION JOINTS

A. Provide construction joints in slabs in accordance with ACI 318.

1. For slabs-on-grade, place control joints at 15 feet maximum on center in each direction, unless shown otherwise on Drawings.

B. The surface of horizontal construction joints shall be cleaned and roughened by removing the entire surface and exposing clean aggregate solidly embedded in mortar matrix, in accordance with the following procedure:

The contact surface shall be thoroughly cleaned by chipping or sand-blasting the entire surface not earlier than 5 days after initial pour, or by an approved method that will assure equal bond, such as a thorough hose-washing of the surface not less than two or more than four hours after the concrete is placed (depending on setting time), wash water and chalk-like material being entirely cleaned from the surface.

In the event that the contact surface becomes coated with earth, sawdust, etc.

after being cleaned, the entire surface so coated shall be re-cleaned.

A mix containing the same proportion of sand and cement used in the concrete, plus a maximum of 50 percent of the coarse aggregate, shall be placed on horizontal joints before proceeding with the regular specified mix. A delay at least until the concrete in columns and walls is no longer plastic must occur before casting or erecting beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system, and shall be placed monolithically therewith.

3.07 FIELD QUALITY CONTROL

A. Testing: Comply with CBC, 2016, Title 24, Part 2, Section 1903A.

B. If compressive strength tests of cylinder specimens fail to show strengths assumed in design, take 4 inch diameter cores at representative locations throughout structure as designated by Inspector. Take cores in accordance with ASTM C42. The strength level of the concrete shall be considered satisfactory if the average strengths of the area or panel equals or exceed the specified strength at 28 days, with no individual strength test of such area or panel less than 5 percent below that specified. Concrete that does not meet or exceed these criteria shall be removed by the contractor and replaced with concrete that conforms to these criteria. Remove and replace defective concrete at no additional cost to Owner. Be financially responsible for repair and replacement of other in-place materials affected by such removal and replacement.

Costs of taking core samples and performing tests required will be paid by Owner if tests prove satisfactory. If test fail to show required strengths, concrete contractor will be held financially responsible.

C. If the strength of the molded test cylinder falls below the minimum ultimate compressive strength assumed in the design, adjust the proportions of the mix for the remaining portion of the structure to give concrete of the assumed minimum strength.

D. Concrete will also be deemed defective which is not formed properly as indicated, is not true to intended alignment, is not plumb or level where so intended, is not true to intended grades, has sawdust or other debris embedded within it, or does not fully conform to other provisions of these specifications. As directed, remove and replace with concrete complying with these specifications.

3.08 CONCRETE FINISHES

A. Slab Levels: Surfaces shall finish true to 1/8-inch in 10 feet on a straight-edge and in direction with maximum high and low variance occurring in not less than 20 feet and with 1/16-inch maximum tolerance in one running foot. Particular care shall be taken to finish troweling around the edges of the slabs so finish surface edges shall be at same elevations as the rest of the top surface of the slab. Slabs shall be surveyed continuously during pour.

B. Concrete Sealer: Concrete floors not indicated in the schedule to receive other finish shall receive two coats of sealer specified this section. Concrete to receive sealer shall be cured with specified concrete sealer that functions also as cure. Use the same material for each application.

C. Steel Trowel Finish: Interior slabs shall receive a monolithic steel trowel finish. Surfaces shall be screeded, wood floated, and steel-troweled. Finish shall be a smooth, hard, dense, impervious surface, free of defects. Finishers shall work from knee boards laid flat upon the surface. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use, but finishing shall be by hand troweling.

1. Slabs to receive tile, carpet or adhered finishes shall receive light/medium broom finish to create "tooth" for adhesive.

2. Unfinished exposed to view slabs in service closets, mechanical, electrical, stairs, ramps, and similar spaces shall receive a medium/heavy broom finish. See Section 32 16 00 for site flatwork.

D. Depressed slabs shall be finished by tamping slab with an open grid tamper, screeding with a straightedge and wood floating to a true and uniform surface, true to tolerance of 1/4-inches in 10 feet.

3.09 CONCRETE CURING AND PROTECTION

A. General: At slabs that do not receive concrete sealer, per 2.01D, provide the following: Concrete Curing per Section 5.11, ACI 318. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Concrete shall be maintained above 50 degrees and continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Slab Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover during, and by combinations thereof, as herein specified. Provide Moisture-Curing by the following Methods:

1. Keep concrete surface continuously wet by covering with water. Continuous water-fog spray, for seven (7) days minimum.

2. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof type of adhesive. Immediately repair holes or tears during curing period using cover material and waterproof tape, for seven (7) days minimum.

3. Provide Curing and Sealing Compound to exterior slabs, walks, and curbs, as follows:

a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application.

b. Maintain continuity of coating and repair damage during curing period.

c. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, such as liquid floor hardener, waterproofing, damp proofing, membrane roofing, ceramic or quarry tile, vinyl composition tile (VCT), glue-down carpet, painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

d. Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

4. Curing Unformed Surfaces:

a. Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of moisture curing method.

b. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

5. Sealer and Dustproofer: Apply two (2) coats of specified curing and sealing compound to Interior slab surfaces not receiving any other finish.

6. Concrete (other than high-early-strength) shall be maintained above 50 degrees F. and in a moist condition for at least the first seven (7) days after placement, except when cured in accordance with Section 5.11, ACI 318.

3.10 PROTECTION

A. Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Exposed Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

1. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

2. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

3. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

C. Concrete Surface Repairs: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

D. Repair of Formed Surfaces:

1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

2. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

E. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

2. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

3. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

4. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

5. Site walls: Remove cracked, honeycombed or defective concrete as required by the Architect from joint to joint. Patching, calking, filling or repairing will not be permitted.

F. Repair Defective Areas:

1. Repair defective areas, except random cracks and single holes not exceeding 1 inch diameter, by cutting-out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance around.

2. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

4. Site walls: Remove cracked, honeycombed or defective concrete as required by the Architect from joint to joint. Patching, calking, filling or repairing will not be permitted

5. Perform structural repairs with prior approval of Architect of Structural Engineer for method and procedure, using specified epoxy adhesive and pressure grouting.

6. Repair method not specified above may be used, subject to acceptance of Architect.

G. Mitigation of Unacceptable High Moisture Emission Levels: Interior slabs-on-grade tested at levels in excess of 5.0 lbs/1000 s.f. shall be further evaluated with additional calcium chloride tests. Once levels are established, additional preparation measures shall be employed (depending on the magnitude of moisture levels) using one or both of the following products:

2 coats of Super-Krete
2 coats of Rust-Oleum 6000 system.

END OF SECTION

SECTION 03 39 23.13

SPECIAL COATINGS VAPOR EMISSION TREATMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Multiple component Vapor Emission Treatment System specification for on or below-grade horizontal concrete surfaces.

B. Repairs and preparation of on or below-grade horizontal concrete surfaces.

C. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete.

1.02 SYSTEM DESCRIPTION

A. Vapor Emission Treatment System: Primary component is a penetrating potassium silicate which react with the soluble calcium compounds in the concrete to form additional insoluble silicate and silica structure within the concrete. The secondary component of the system contains two options; the cementitious option is a polymer-modified Portland cement-based material which is applied by means of a squeegee or trowel in 2 coats to a thickness of approximately 1/16 inch. The epoxy option is water-based epoxy.

1.03 QUALITY ASSURANCE

A. The finished system shall demonstrate a reduction of moisture vapor emission to a level satisfactory to the manufacturer of the finish flooring materials.

B. The manufacturer of each product shall supply written proof of at least 5 years use of their product.

C. Each manufacturer shall have been in current business for a minimum of 5 years and supply written proof of same.

D. Applicator shall supply written proof of General Liability Insurance coverage in an amount not less than $1,000,000.00, and current Worker's Compensation Insurance coverage.

E. EPA - Environmental Protection Agency: All components must be V.O.C. compliant to current requirements.

F. Applicator shall have received factory training and be confirmed as certified and competent by the manufacturer of each component on the Vapor Emission Treatment System. Applicator shall provide written verification of such certification upon submittal of their proposal.

G. Applicator shall provide upon request a valid Contractor's License issued for the Floorcovering or Waterproofing/Painting trade, in the State in which this work will be performed. In California, a C-15, C-61, or C-33 license is required.

1.04 SUBMITTALS

A. Applicator shall furnish for approval, immediately upon request, material specifications together with catalogues, MSDS reports and supporting data for each component intended for use in the Vapor Emission Treatment System.

B. Owner and/or Architect reserves the right to accept or reject the system in whole or in part as it may deem necessary for compliance with information given in the Bid Documents.

C. Alternates for any of the specific products mentioned below must be approved in writing by Architect and Owner.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Application of all components in the Vapor Emission Treatment System shall meet with all current environmental laws as prescribed by all governing agencies.

B. Provide adequate ventilation during application within an enclosed space.

C. Disposal of containers and materials and all costs thereof shall be the responsibility of the Applicator.

1.06 TESTING

A. The extent of concrete moisture vapor emission shall be determined by the use of prepackaged calcium chloride dome test kits, administered by independent laboratory or competent (more than 5 years experience in moisture vapor emission treatment) contractor. Results of such tests must be expressed in pounds of moisture vapor emitted per 24 hours in a 1,000 square foot area.

B. In addition, measurement of the relative humidity of the area(s) being tested by the calcium chloride dome test must be documented. The best method is by use of a hygrometer, which shall be place in contact with the floor.

C. Since this testing requires 60 - 72 hours, such time must be planned into the schedule.

D. The Owner will retain the option of testing the concrete for water/cement ratio as originally placed, by means of Petrographic Analysis.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Vapor Emission Treatment System Primer:

1. Primer shall be a clear, penetrating, non-toxic, non-silicone, non-acrylic, water based potassium silicate material that can document a minimum of 5 years performance of an average 50% reduction in vapor transmission when tested in accordance with the Calcium Chloride Dome test method.

   Product name: Sinak Sealers S-102, manufactured by Sinak Corporation, San Diego, California. Equal products must prove they have no VOC's and meet the meet the IEQ section of CHPS.

B. Vapor Emission Treatment System Membrane:

1. The Architect will choose either the cementitious option or the epoxy option, depending upon the severity of the moisture condition and/or the surface finish desired. Based upon the results of the tests as described in 1.06 of this Section, the Architect will determine the level of remediation required.

   Parameters for such decision are available from any of the manufacturers whose products are specified herein.

2. The cementitious option of the membrane shall consist of the application of two coats of trowelled or squeegee applied polymer modified portland cement-based underlayment.

   Product Name: Super-Krete S-10,000 by Super-Krete Products, El Cajon, CA 92020. Phone: (619) 401-8282 or (800) 995-1716.

3. The epoxy option shall consist of the application of 2 coats of water-based epoxy.

   Product Name: Concrete Saver Water Based Epoxy 6000 System by Rust-Oleum.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Cracks, joints, low spots and bumps shall be repaired as recommended by manufacturers of the products to be used in this System.

B. Verify that surfaces are solid, free of loose particles, cracks, pits, rough projections or foreign matter detrimental to maximum adhesion of the Vapor Emission Treatment System.

C. Foreign materials detrimental to the System (such as curing compounds, sealers, paint, or other coatings or old adhesive residue) shall be removed using a self-contained shot-blast apparatus.

D. Do not apply System to damp, frozen, or dusty surfaces.

E. Clean and prepare surfaces in accordance with the manufacturer's written installation/application instructions.

3.02 APPLICATION

A. Applied work shall be in strict accordance with the manufacturers' currently published specifications, and only by Certified Applicator of each product in the System.

B. Primer:

1. If primer is used alone, 14 days cure time is required before covering with finished flooring materials.

2. When used in conjunction with the secondary component described below, 7 days cure time is required before application of the membranes described below.

C. The cementitious option of the membrane shall consist of the application of two coats of troweled or squeegee applied polymer modified Portland cement-based underlayment. This squeegee or troweled coat shall be approximately 1/16-inch thick with a maximum 10 mils deviation. Note that this application is not intended to be a self-leveling application and can be expected to conform to the contours of the substrate. Allow 7 days cure time prior to application of the finished flooring materials.

D. The epoxy option shall consist of the application of 2 coats of water-based epoxy, applied as per the manufacturer's instructions. The first coat shall be thinned approximately 20% with water to ensure maximum penetration into the surface of the concrete. The second coat shall be applied without thinning. Allow 2 - 4 hours between coats. After completion, allow 16 hours for light foot traffic and 72 hours for vehicle traffic.

3.03 PROTECTION

A. Contractor shall be responsible for protection of the system until acceptance of the Project by the Owner, in accordance with provision of Division 1 of these Specifications.

END OF SECTION

05 00 00

METALS

SANTEE SCHOOL DISTRICT

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Furnish and Installation of structural framing members, complete in place with required bracing, weld washers, nuts, shims, anchor bolts, and baseplates as indicated on the Drawings and specified herein.

B. Related Sections: Metal Fabrications; refer to Section 05 50 00.

1.02 REFERENCE STANDARDS

A. Refer to the following for information regarding materials and installation methods necessary:

1. California Building Code (CBC) 2016, Chapters 22A and 35, as adopted by Title 24, and Chapter 7, Section 704 Fire-Resistance Ratings of Structural Members.

a. Refer to Drawings for details, design numbers, and ratings.

2. On-Site Welding Requirements, Sections 2204A, 1704A and 1705A, Title 24, Part 2, California Building Code, 2016.

3. American Society for Testing and Materials: Specifications A36, A123, A307, A370, A501, A572 and A992.

4. American Institute of Steel Construction (AISC).

5. American Welding Society: AWS D1.1 and AWS D1.4

6. Steel Structures Painting Council (SSPC).

1.03 SUBMITTALS

A. Submit Shop and Erection Drawings Prior to Fabrication: Prepare erection drawings by State registered Structural Engineer. Show welded connections, lengths of welds, profiles, sizes, spacing and locations of members, attachments, anchorages, framed openings, size and type of fasteners, cambers and live loads. Contractor shall be responsible for reviewing and verifying all dimensions on shop Drawings.

1. Splices and Deviations: Splices will be permitted only where and as shown on Drawings. Deviations from design drawings desired or required by fabricator are to be indicated on shop drawings by providing a heavy line around the feature on which deviation approval is being requested, showing complete detail and describing deviation proposed. Provide detail with a note specifically requesting approval of deviation by fabricator. Deviations or changes shall not be made without the approval of the Division of the State Architect, as a Change Order.

a. Refer to Section 01 33 00 – Submittal Procedures, Paragraph 3.04A.2. (Revisions) Cost of such changes shall be borne by the Contractor.

B. Erection and Bracing Plan and Procedure: Refer to Section 2205A, Title 24, Part 2,

California Building Code. Employ a California State licensed Structural Engineer to prepare erection and bracing plan and erection procedure for structural steel including columns, beams, and girders, who will be responsible for compliance. Follow plan and procedure exactly. Maintain a copy at project site. Pay for costs involved.

C. Scrap collection and recycling plan: Contractor shall prepare and submit a scrap collection and recycling plan for all miscellaneous and structural steel.

1.04 QUALITY ASSURANCE

A. Tests and Inspections: Testing for steel shall be done in accordance with Title 24, Part 2, Section 1705A.2. Inspection shall be in accordance with Title 24, Part 2, Section Table 1705A.2.1.

B. If structural steel can be identified by heat or melt numbers and is accompanied by mill analysis and test reports (identified stock shall not be tested), testing shall be in accordance with Title 24, Part 2, Section 2203A.1

C. If structural steel cannot be identified or its source is questionable, make not less than one tension and one bend test for each 5 tons or fraction thereof. Also, it shall be tested to meet minimum chemical and mechanical requirements of the ASTM standard appropriate for the steel specified for the structure.

D. Furnish test specimens from steel fabricator and take them under the direction of the Testing Agency. Machine each test specimen by Testing Agency to dimensions required by ASTM A370.

E. Have testing agency pick up test specimens and make required tests.

F. Costs of tests of identified stock will be paid for by Owner, unless tests fail to comply with the specifications, in which case the Owner will pay for testing, but back charge the Contractor. Costs of tests for unidentified stock will be paid for by the contractor.

G. Complete a 4-sided inspection of steel. Such inspection shall be paid for by the Owner. The Inspector of structural steel which is not fabricated within 25 miles of the project site, shall also be paid for by the Owner, but the Contractor shall pay for travel expenses.

H. After fabrication and inspection, costs associated with re-inspection of defective or replaced materials shall be paid for by the Owner, but backcharged to the Contractor.

I. Provide labor, equipment and facilities necessary for moving and handling materials to be inspected.

J. Provide and pay for supervision by a registered Inspector of welding operations of frames with joints, including inspection for quality, penetration, and conformity of Drawings, and a report verifying that welding is adequate and was done in conformity of project requirements.

1. Visually inspect welds, and have inspector present to approve welding and high strength bolting whether performed in fabricator's shop or at project site, and inspect erection. Ensure testing laboratory compliance with regulations of the Division of the State Architect and certify in writing, upon completion of work, that welding and high strength bolting has been performed in accordance with Drawings and these Specifications. Inspect grouting of column base plates.

2. Have testing laboratory check bolt tightness on not less than 10 percent of bolts

selected at random in each high strength bolt connection. Follow procedures of ASTM A325 and A490.

3. Inspect all complete penetration welds and partial penetration welds by ultrasonic or other approved nondestructive tests. Inspect first pass of multi-pass welds and groove welds.

4. Perform ultrasonic testing by specially trained, qualified technicians who operate equipment, examine welds and maintain a record of welds examined, defects found and disposition of each defect. Repair defective welds and retest.

5. Ultrasonically test welds at rate of 100 percent to establish welder qualifications. If rejectable defect rate is less than 5 percent, frequency may be reduced to 25 percent. If rate increases above 5 percent, continue 100 percent testing until rejectable defect rate again drops below 5 percent. Calculate percentages by individual welder.

6. Submit all preliminary, working and final documents required by subsection 1.04K.

7. Inspect all seam welds at HSS steel member.

K. Comply with California Building Code (CBC) Title 24, Part 2, Sections 2213A and 1705A.2.

L. Results of tests, together with identified copies of the Mill Analysis and inspection reports shall be submitted to the Division of the State Architect, and to the Architect and Structural Engineer. Arrange for continuous inspection of Shop and field welding in accordance with Title 24, Part 2 Section 1705A.2.2.1 and Table 1705A.2.

1.05 PROJECT CONDITIONS

A. Verify measurements, lines, grades, locations and details at project site. Conform to existing field conditions.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Structural Steel Members: Shall conform to the requirements of ASTM A6 and shall be fabricated according to AISC Practice and Specifications for Building.

B. Structural plates, bars, etc., shall conform to ASTM A36 and ASTM A572. Structural wide flange beams and columns shall conform to ASTM A992, Grade 50.

C. Pipe columns shall conform to ASTM A53, Grade B

D. Tube members shall conform to ASTM A500, Grade B.

E. All welding shall be done using the shielded electric arc process by AWS certified welders using AWS A5.1, E70XX electrodes.

F. All welds used in primary members and connections in the lateral force systems shall be made with a filler metal that has a minimum Charpy V-notch toughness of 20 ft.-lbs. at minus 20 degrees F., as determined by AWS classification.

G. Continuous inspection is required for all field and shop welding by an Inspector approved by the Division of the State Architect.

H. Bolts shall conform to ASTM A325, unless noted otherwise.

I. Structural Steel Shop Drawings shall be reviewed by the Structural Engineer prior to fabrication.

J. Light gauge steel members shall conform to ASTM A653, Grade A.

K. Recycled Content – Provide products with an average recycled content of steel so postconsumer recycled content plus one-half of postconsumer content is not less than 50%

2.02 LIGHT STRUCTURAL STEEL

A. Standard specifications for Hot-Formed Welded and seamless Carbon Steel Structural Tubing, ASTM A500 Grade B.

2.03 WELDING ELECTRODES

A. Conform to AWS, Latest Edition, AWS 1.1.

1. Required strength of weld shall comply with CBC Title 24, Part 2, Sections 2212A.2.3 and 2213A.

2.04 GALVANIZING

Galvanize all structural steel exposed to weather, unless otherwise noted on plans.

A. Provide hot-dip galvanizing in accordance with ASTM A123, Grade 90.

B. Field Galvanizing: Provide ZRC, or other approved.

2.05 PRIMER

A. Exterior Primer - Provide Tnemec Series 10, a zinc-chromate, or other approved. Primer shall have a VOC content of 100 g/l (0.83 lb/gal) or less when calculated according to 40 CRF 59, Subpart D (EPA method 24).

B. Interior Primer – Provide interior primer 734149X red oxide by Rodda Paint Co., or equal. Primer shall have a VOC content of 100 g/l (0.83 lb/gal) or less when calculated according to 40 CRF 59, Subpart D (EPA method 24).

C. Clean, prepare and shop prime exterior members in accordance with SSPC-Paint 20 or SSPC-Paint 29 and compatible with top coats indicated on plans. Do not prime specific surfaces to be welded or which will be in direct contact with concrete or other cementitious materials.

D. Clean, prepare and shop prime interior members in accordance with SSPC-Paint 23 and compatible with top coats indicated on plans. Do not prime specific surfaces to be welded or which will be in direct contact with concrete or other cementitious materials.

2.06 WELDED STUDS

A. All welded studs shall be Nelson shear connector studs (ICC ER-2856) or equal.

B. See Drawings for welded stud locations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Surface Conditions: Prior to commencing work of this section, inspect the work of others and verify that such work has been properly completed and installed to allow for proper installation of materials and methods required of this section.

3.02 FABRICATION AND ERECTION

A. Fabricate and assemble work by skilled workers using sizes and weights shown. Connections are to develop at least strengths shown, unless approved otherwise beforehand. Allow no splices except where shown.

1. Ultrasonic material inspection - ultrasonically test column materials thicker that 1-1/2 inch for laminations within 1 foot (6 inches either side) of a direct groove weld from girder flange connections and column splices.

B. Drilling, Punching and Reaming: Hole burning to make or enlarge previous holes is not allowed. Prepare required holes in structural steel members for attachment or passage of work of other trades. Where allowed, steel may be punched 1/16-inch larger than the nominal diameter of the bolt when thickness of the steel is equal to or less than the diameter of the bolt plus 1/8-inch. Where the steel is thicker than the diameter of the bolt plus 1/8-inch, the holes must be drilled or sub-punched and reamed. Diameter of the sub-punched holes, and the drill for sub-drilled holes, is to be 1/16-inch smaller than the nominal diameter of bolt to be installed. Precisely locate finished holes to ensure passage of bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection of work.

C. Welding: Comply with the requirements of Title 24, Part 2, Sections 1705A.2 and 2204A.1. Perform welding by the electric shielded arc process. Cut out defective welds with a chisel. Clamp or hold materials securely in position for welding. Upon completion, remove slag and clean welds for inspections and painting. Groove and multi-pass welds are required to be continuously inspected.

1. Storage and Care of Electrodes: Ensure that coatings of low hydrogen type electrodes are thoroughly dry when used. Use electrodes taken from hermetically sealed packages within four hours of the time the package is opened. Electrodes not used within this time period, and electrodes which have been exposed more than one hour to air having a relative humidity of 75 percent or greater, are to be dried for at least two (2) hours at 200 to 250 degrees F. before used, or are to be reconditioned according to manufacturer's printed recommendations. Electrodes dried or reconditioned, which are not used within four hours after drying is completed, are to be re-dried before use. Electrodes of any classifications that have been wet are not to be used under any conditions.

2. Preparation: Clean surfaces to be welded of paint, grease, scale, and foreign matter. Clean welds each time electrode is changed. Chip entire area of hand guided and controlled flame cut edges before welds are deposited. In general, surfaces made by automatic or mechanically guided and controlled equipment need not be ground or chipped before welded.

3. Procedures: During assembling and welding, hold components of a built-up member with sufficient clamps or other adequate means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening has been set up.

4. Characteristics of Welds: After being deposited, brush welds and ensure they exhibit uniform section, smoothness of weld metal, feather edges without undercuts or overlays, and freedom from porosity and clinkers. Ensure through visual inspection at edges and ends of fillet welds there is good fusion and penetration into base metal.

D. Bolting:

1. Common Bolts: Make connections with common bolts only where indicated.

E. Erection:

1. Erect structural steel by professional riggers, using proper hoists and equipment, carefully planned and laid out so that cutting shall not be necessary. Erect the work plumb, square and true to line. Provide temporary bracing and guys where necessary to provide for loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation, and leave in place as long as necessary to safeguard parts of the work.

2. Temporary Connections: Securely bolt work to maintain the steel in proper position while bolting and welding is being performed. Align, plumb and level work prior to welding and final bolting.

3. Set column base plates in exact position as to alignment, level and elevation and support on steel wedges or equivalent until grout has properly set. Center of each base is to be true to the column center within 1/16-inch and adjusted to its elevation to 1/32-inch. Exactly level plates on both axes.

4. Sequence: Carry out the erection of steel in the proper sequence with the work of others. Frame, bed and anchor to concrete and related work in accordance with detailed drawings and setting diagrams.

5. Erection Tolerance: Follow AISC except as follows:

a. Vertical dimensions measured from top of beams at their connections at any one column, not varying more than 1/4-inch plus or minus per story or, when accumulative from floor to floor, not exceeding 3/8-inch per story exclusive of column shortening due to dead load.

b. Floor level is considered level if floor framing members on any one floor measured from top of column connections do not vary by more than 1-1/2 inch plus or minus.

c. Plumb displacement center line of columns from established column line, no more than 1 inch toward or away from established center line.

d. Horizontal dimension variances governed by column displacement.

6. Perform erection with suitable equipment, of adequate capacity and design with due regard for personnel and public safety and as not to deflect or stress members beyond reasonable limits. Maintain erection and temporary bracing plan at project site in accordance with Title 8, California Code of Regulations.

7. Damaged members during erection: Straighten or replace members which are bent, twisted or damaged as directed. If heating is required in straightening, perform heating by methods which ensure uniform temperatures throughout entire member. When directed, remove members which are damaged to an extent impairing their appearance, strength or serviceability and replace with new members at no additional cost to Owner.

8. Anchor Bolts: Provide with setting drawings and instructions. Verify position of bolts prior to delivery of steel; report errors or deviations for adjustment.

F. Erection Bracing: Provide erection bracing immediately upon erection of members and leave in place until members are braced by balance of building.

3.03 PROTECTION

A. Protection of Floors and Temporary Flooring:

1. Exercise caution to protect floor surfaces and adjacent work from damages. Do not overload floors. Provide only pneumatic mobile equipment with tires, for moving steel. Do not place steel members directly on concrete floors. Pads, timbers, or other materials for cushioning shall be used.

2. Provide necessary planking, scaffolding and temporary flooring in connection with erection of steel or support of erection machinery as part of the work. Conform use of temporary floors or steel deck to governing codes and regulations.

3. Temporarily tack weld steel deck to supports where used as a working platform. Distribute concentrated loads from welding machines or other heavy machinery by planking or other equivalent means. Replace steel deck damaged in using as working platform at no additional cost to Owner.

3.04 CLEANING

A. Shop Priming:

1. Clean surfaces according to SSPC and AISC recommendations, and apply specified primer to minimum 1.0 dry mil thickness. Ensure that primer is worked into joints.

2. Steel to be embedded into cementitious materials, permanently concealed steel surfaces, contact surfaces of high-strength bolted connections, and surfaces to receive fireproofing are not to be primed.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Completion of miscellaneous metal fabrications such as angles, plates, sheet goods, castings, railings, nosings, ladders, and stairs as indicated on the drawings and specified herein.

B. Substrates to which fabrications are to be attached or embedded.

C. Related Sections:

1. Finish painting, see Section 09 90 00.

1.02 REFERENCE STANDARDS

A. In addition to mandatory compliance with governing bodies and codes having jurisdiction over the project, provide materials complying with the following standards and industry recommendations: ASTM A36, A47, A48, A53, A108, A283, A307, A312, A314, A325, A475, A500, A554, A653, A743, A1008 A1011, B108, B209, B221, SSPC, NAAMM, AND AA.

B. Materials shall conform to 2016 CBC, Title 24, Part 2, Chapter 22A.

C. All welding and other hot work shall comply with 2016 CFC, Chapter 35, including but not limited to the following:

1. Section 3504 for Fire Safety Requirements

2. Section 3506 for Electric Arc Hot Work

1.03 SUBMITTALS

A. Submit fabrication shop drawings on items to be provided.

B. Where other than mill finishes are specified, provide samples of required finish which will be reviewed for color, texture, style, and finish.

C. Submit mill test reports and chemical analyses of materials bearing heat numbers not required to be tested, in accordance with other sections of these specifications.

D. Submit testing results in accordance with other sections of these specifications.

1. Provide one tensile, and elongation test, and one bend or flattening test for each five tons or fraction, of each shape and size, for unidentified material.

2. The Owner reserves the right to reject materials, installed or not, which exhibit defects or do not pass inspections or tests.

E. Scrap collection and recycling plan: Contractor shall prepare and submit a scrap collection and recycling plan for all miscellaneous and structural steel.

1.04 SOURCE QUALITY CONTROL

A. Inspection and Testing:

1. Testing for steel, welding and fabrication shall be in accordance with California Building Code (CBC), 2016, Title 24, Part 2, Section 1705A.2.
2. Welding inspection shall be in accordance with Title 24, Part 2, Section 1705A.2.

3. Shop Welding: Ensure that shop welding is performed in an approved, licensed shop. Continuous inspection shall be required as noted in Table 1705A.2.

4. Field Welding: Stress-carrying welds are to be inspected by a qualified welding inspector. Inspections will be paid for by Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Structural steel shall comply with ASTM A6 and requirements of Title 24, Part 2, Chapter 22A.

B. Steel Plates, Shapes and Bars: ASTM A36.

C. Steel Plates to be Bent or Cold-Formed: ASTM A283, Grade C.

D. Steel Bars and Bar-Sized Shapes: ASTM A36.

E. Steel Tubing (Cold-Formed, Welded or Seamless): ASTM A500, Grade B.

F. Cold-Finished Steel Bars: ASTM A108, grade selected by fabricator.

G. Cold-Rolled Carbon Steel Sheets: ASTM A1011.

H. Galvanized Carbon Steel Sheets: ASTM A653, G90 zinc coating.

I. Gray Iron Castings: ASTM A48, Class 30.

J. Malleable Iron Castings: ASTM A47, grade as selected.

K. Steel Pipe: ASTM A53, type as selected, Grade B, black finish, standard weight Schedule 40.

L. Steel Wire Rope: ASTM A475, zinc coated steel wire strand, size and number of wires required, common grade with Class B zinc coating.

M. Expanded Aluminum Grating: ASTM B209, alloy 5052.

N. Aluminum Extrusions: ASTM B221, alloy 6063-T5 except alloy 6063-T6 for pipe.

O. Aluminum Sheet or Plate: ASTM B209, alloy 6061-T6, mill finish.

P. Aluminum Castings: ASTM B108, alloy 214.

Q. Stainless Steel Castings: ASTM A743, CF8 or CF20.

R. Stainless Steel Pipe: ASTM A312.

S. Stainless Steel Tube: ASTM A554, Type 302/304.

T. Stainless Steel Bars: ASTM A314, Type 302/304.

U. Shop Primer: Tnemec Series 10, or other approved.

V. Field Galvanizing: Provide ZRC, or other approved.

W. Arc Welding Electrodes: ASTM A743.

X. Bolts and Nuts: ASTM A307

2.02 FABRICATION

A. Verify actual field dimensions prior to fabrication.

B. Fabricate items with joints neatly fitted and properly secured.

C. Fit and shop assemble in largest practical sections for delivery to site.

D. Welding shall comply with CBC 2016 Title 24, Part 2, Section 1705A.2. Employ certified welders in accordance with AWS D1.1 and D1.3. Grind exposed welds smooth and flush with adjacent finished surfaces. Defective welds must be cut out and replaced per AWS D1.1.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts unobtrusively located, consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints flush butt type hair-line joints where mechanically fastened.

G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified or shown.

H. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to prime painting and galvanizing.

I. Galvanize all exterior miscellaneous ferrous metal fabrications. Prime and paint, where directed in other specifications or in plans. Do not shop prime surfaces in direct contact with concrete or other cementitious materials, or requiring field welding. Shop prime in two coats. Provide minimum G90 galvanized coating where galvanizing is required. In locations where field welding has been completed, zinc coat all surfaces prior to priming and painting.

2.03 MANUFACTURED UNITS

A. Ladders: Meet or exceed OSHA.

1. Steel: As Detailed on Drawings - 2 1/2-inches by 3/8-inch side rails and braces; 3/4-inch round rungs. Galvanized after fabrication.

B. Equipment Support System: Provide Unistrut, or other approved.

1. Main Runner: P5500 channel at 8 foot centers.

2. 1/2-inch hanging rods at 48 inches on centers and hanger clamps.
3. Cross Runner: P3000 channel at 4 foot centers.
4. P3047 "U" shaped fittings.
5. Provide and size pipe clamps as required.
6. Provide hardware and accessories as required.

C. Floor Door: Provide exterior type single-leaf, extruded aluminum floor door, equal to Dur-Red Products, Model No. SEA, 24-inches by 24-inches in size.

1. Door Leaf: 1/4-inch thick diamond pattern floor plate with reinforcing strips, to support 150 pounds per square foot.

2. Frame: 1/4-inch thick extruded aluminum angle frame, fully welded, with anchor straps.

3. Hardware: 1/4-inch thick heavy stamped hinge bolted to frame, torsion bars, one-point latch, inside and outside handles, and automatic hold-open arm with vinyl grip.

4. Finish: Prime coat applied to aluminum frame and leaf.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Surface Conditions: Inspect surfaces and work in place by others, and verify that such work is in a condition appropriate to receive work of this section. Do not apply or install work of this section until unsatisfactory work of others is in a condition which will ensure the correct installation of materials and products of this section.

3.02 INSTALLATION

A. Obtain approval of Architect prior to site cutting or making adjustments which are not part of intended work, or are not shown on shop drawings.

B. Install items square and level, accurately fitted and free from distortion and defects.

C. Make provisions for erection stresses by temporary bracing. Keep work in alignment.

D. Replace items damaged during installation.

E. Perform field welding in accordance with AWS D1.1.

F. After installation, touch-up field welds and scratched and damaged paint, or coated surfaces. Use primer and paint consistent with shop finish.

G. Supply and assist with setting items requiring to be cast into concrete, or embedded in masonry, complete with necessary setting templates.

3.03 CLEANING

A. Clean site after work of this section.

B. Remove weld splatters.

C. Use galvanizing repair coating specified, then re-prime areas of materials damaged during installation and other construction activities, and leave in condition for subsequent finish painting or application of additional finish materials provided by others.

END OF SECTION

06 00 00

WOODS, PLASTICS, AND COMPOSITES

SANTEE SCHOOL DISTRICT

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Wood framing, miscellaneous furring for wall finishes, miscellaneous blocking and rough hardware.

B. Related Sections:

1. Finish Hardware, see Section 08 71 00 – Door Hardware.
2. Millwork and other finish carpentry.

1.02 REFERENCE STANDARDS

A. Softwood Lumber: PS 20 - American Softwood Lumber Standard.

B. NFPA - National Forest Products Association, National Design Specifications for Stress Grade Lumber and its Fastening.

C. West Coast Lumber Inspection Bureau (WCLIB), Standard No. 17 Grading Rules for West Coast Lumber.

D. Chapter 23, Part 2, Section 2303, Title 24, California Building Code, 2016.

E. Chapters 7, 23 and 35, California Building Code, 2016.

F. Plywood: U.S. Product Standard PS 1-09.

G. Lumber: U.S. Product Standard, PS 20-10.

1.03 QUALITY ASSURANCE

A. Provide lumber with visible grade stamp of an approved agency certified by NFPA.

1.04 DELIVERY, STORING AND HANDLING

A. Deliver and store materials at job site in a safe area, out of traffic and shored up, off ground surface.

B. Identify framing lumber by grades and store grades separately from each other.

C. Protect products with adequate waterproofing.

D. Exercise care in off-loading lumber to prevent damages, splitting and breaking.

E. Seasoning:

F. Deliver materials at earliest date possible to allow maximum; drying time on site.

G. Pile and strip lumber at site to allow free circulation of air with pile protected from sun and moisture.

H. Air-season lumber for at least 60 days before covering with finish materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber: PS 20 and WCLIB Standard Number 17; Douglas Fir/Larch; graded in accordance with NFPA Grading Rules; maximum moisture content of 19 percent, grades as scheduled on drawings.

1. Douglas fir shall bear WCLIB grade stamp.

2. Pressure treated Douglas fir shall be No. 2 minimum and bear the AWPA quality mark. Cuts and holes shall be treated per AWPA Standard U1 (statements such as "or to refusal" are not permitted).

3. Comply with provisions of Title 24, CBC, 2016, Part 2, Section 2303.

B. Plywood:

1. Plywood for Roofs, Walls, and Floor Sheathing: PS 1-09 Structural I grade, APA C-D, exterior glue, except B-D for electrical and telephone panels.

2. Comply with CBC, 2016, Section 2303.

3. Roof and shearwall plywood shall be nominally 4 ft. x 8ft. in size. Do not use sheets less than 8 square feet, nor less than dimensions noted in paragraph 3.08 Plywood Placement.

2.02 ACCESSORY MATERIALS

A. Nails, Spikes, and Staples: Common (with standard lengths), except as otherwise indicated, galvanized for exterior locations, high humidity within conditioned spaces, and treated wood; plain finish for other interior locations; size and type to suit application.

B. Steel Hardware and Stock Framing Products by Connectors: ASTM A36 steel, galvanized for exterior applications, Simpson Strong-Tie Company. Products by KC Metal Products, or other approved manufacturer, may be substituted if equal. Comply with CBC, 2016, Title 24, Part 2, Chapter 23.

C. Lag Bolts: ANSI/ASME B18.2.1 and ASME B18.18.1.

D. Wood Preservative: Wolmanizing treatment at least two weeks prior to delivery to site. Treatment shall meet or exceed AWPA P5.

E. Machine Bolts: ASTM A307.

F. Pressure Treatment: Sills and plates in contact with concrete or masonry within 48 inches of the ground, and wood posts and columns bearing directly on concrete shall be water-borne preservative pressure treated in accordance with paragraph, CBC 2016, Title 24, Part 2, Chapter 23.

1. At cuts, holes, notches and other field operations which expose a surface not factory treated with preservative, field apply preservative material compatible with original material shall bear mark AWPA Standard U1.

2. Meet local Air Quality Control Board Standards for field applied preservative treatment.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Selection of Lumber: Carefully select members. Ensure that exposed members are free of heart center. Select members so that knots and obvious defects will not interfere with placement of bolts, proper nailing or making proper connections, and not impair achievement of proper finished appearances where to be exposed.

B. Cut out and discard defects which will render a piece unable to serve its intended function. Lumber may be rejected by Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

3.02 GENERAL FRAMING

A. In addition to framing operations normal to fabrication and erection indicated on drawings, install wood backing required for work of other trades, and for casework, chalkboards, toilet partitions and etc. as required. Wood backing to be installed in high traffic and high impact areas.

B. Set horizontal and sloped members with crown up.

C. Non-bearing stud walls, sills, and trimmers may be anchored to concrete per Structural Drawings.

D. Wall and partition studs and mullions shall be continuous from sill to plates. Run at least two studs on each side of openings in stud walls for openings in exterior walls and in partition openings larger than 5 feet, and partitions from sill to plate. In addition, place one stud trimmer to support each end of lintels over openings, unless shown otherwise.

E. Provide double plates with joints staggered and lapping at least four feet, and splice. Nail as required on Drawings.

F. Install nailing blocks and backing necessary for attachment of grounds, finishes, trim, fixtures, and do required cutting, furring, and backing for plumbing and heating pipes, fixtures, etc., as detailed in the Drawings or approved by the Structural Engineer and approved by the Division of the State Architect, Office of Regulations Services.

G. Frame stud partitions, furring and walls containing fire extinguisher cabinets, electric panels, plumbing, heating, or other pipes to give proper clearance. Cutting of studs in bearing partitions and shear walls is prohibited unless specifically detailed.

H. Do not place pipes exceeding 1/3 of plate width in partitions used as bearing or plywood-sheathed walls, but place them in furring completely clear of studs, unless detailed otherwise. Place approved piping in center of plates using neat hole. No notching is allowed. In no case allow pipes to pass through plates less than 5-1/2 inches wide.

I. Unless otherwise indicated provide 2 inch by 6 inch studs at 16-inches on centers. Refer to Structural Drawings for Simpson Metal Strap Ties, strap length, nail size and nail spacing where plates are broken.

J. Provide cross-bridging at 10 feet on centers maximum for all joists and rafters more than 10-inches deep. Use wood 2 inch by full depth of joist or rafter or approved metal type bridging. Nail metal bridging.

K. Provide isolated posts with connections at top and bottom; Simpson CC caps or CB base unless specifically detailed otherwise.

L. Double joists under parallel partitions with solid blocking between joists over points of support.

M. Provide a Simpson "CB" Steel Base Plate for untreated wood posts where they are or will be in contact with concrete.

N. Framing for horizontal plaster assemblies shall comply with the requirements of CBC 2016, Title 24, Part 2, Section 2504.2.

3.03 FIRE BLOCKING

A. Fire blocking shall conform with the requirements of CBC 2016, Title 24, Part 2, Chapter 7, Section 713.

B. Ensure that no fire stop is less than nominal 2 inches thick and no less in width than enclosed space within partition.

C. Provide stud wall and partitions with continuous rows of bridging or fire stops which will form a complete and effective separation in entire width of partitions, placed in such a manner that there will be no concealed air spaces greater than 8 feet in vertical dimension. Intermediate stops may be in line with opening headers. Provide furred space between stud walls and partitions with continuous fire stops at same elevation as those in the enclosing walls which must be installed horizontally, thus forming a solid stop from outside to outside of studs. At concealed draft passages or shafts including furring spaces, ensure that maximum dimension is no more than 8 feet. Provide fire stop partitions at suspended ceilings.

3.04 BEARINGS

A. Make bearings full unless shown otherwise.

B. Finish bearing surfaces on which structural members are to rest so as to give sure and even support. Where framing members slope, cut or notch ends as required to give uniform bearing surface.

3.05 SHIMMING

A. Do not shim framing member except where specifically shown or required by drawings.

3.06 BLOCKING

A. Install blocking required to support items of finish and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor.

3.07 ALIGNMENT

A. On framing members to receive a finished surface, align finish sub-surface to vary not more than 1/8-inch from plane of surface of adjacent framing and furring members.

3.08 PLYWOOD PLACEMENT

A. All installed plywood shall be in 4' x 8' sheets except where restricted by boundaries or changes.

B. Minimum Plywood Panel Sizes shall be as follows:

1. In horizontal plywood diaphragms, no panel less than 24 inches wide or 48 inches long shall be used.

2. In vertical plywood diaphragms, no panel less than 16 inches wide shall be used.

C. Center joints accurately over support unless otherwise shown on Drawings. Provide gapping of plywood substrate of 1/8-inch at abutting joints at all wall.

D. Protect plywood from moisture until succeeding component or materials are installed to cover plywood. Delaminating plywood shall be removed and replaced.

3.09 FASTENING

A. Use only common wire nails or spikes of standard lengths and gages as specified Table 2304.9.1, of the California Building Code, 2016.

B. For conditions not covered on drawings, Contractor to request clarification or provide penetration into piece receiving point not less than 1/2 length of the nail or spike, provided that 16d nails may be used to connect two pieces of nominal 2 inch thickness as specified by the Architect, and/or Structural Engineer and approved by the Division of the State Architect.

C. For bolts, drill holes 1/32-inch to 1/16-inch larger in diameter than bolts being used. Drill straight and true from one side only.

D. Bolt threads shall not bear on wood. Use washers under head and nut where both bear on wood. Use washers under nuts.

E. For lag-screws, and wood screws, pre-bore holes in accordance with CBC 2016, Title 24, Part 2, Chapter 23.

F. Screw, do not drive, lag screws and wood screws.

G. Nailing schedule shall be per CBC 2016, Title 24, Part 2, Chapter 23.

3.10 HOLLOW METAL FRAME GROUTING

A. At all exterior hollow metal jambs, drypack/grout the bottom 6-inch space between the hollow metal and 6-inch concrete curb at the wall. The intent is to fill solid the void between the frame and concrete curb. Install drypack/grout before any finishes are applied to the studs.

END OF SECTION

SECTION 06 18 13

GLUED-LAMINATED BEAMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Glued-laminated beams as indicated on the Drawings and specified herein.

B. Related Sections:

Anchorage angles cast in masonry as required for glued-laminated structural units as specified in Structural Drawings, Structural Steel Framing, see Section 05 12 00.

1. Metal Fabrications; refer to Section 05 50 00.
2. Rough Carpentry; refer to Section 06 10 00.

1.02 REFERENCE STANDARDS

A. ANSI/AITC Standard A190.1 and ASTM D3737- Structural Glued-Laminated Timber and Structural Glued-Laminated Timbers, Softwood and Hardwood Species.

B. Code: Members fabricated and inspected in accordance with the requirements of California Building Code (CBC) 2016, Title 24, Part 2, Chapter 23.

C. Inspection: Continuous inspection by an inspector specially approved for this purpose by the Division of State Architect will be required during fabrication of structural glued laminated lumber. Eligibility for approval will be based on examination of the Inspector's knowledge and experience in glued laminated construction. "All structural glued laminated timber shall be continuously inspected during fabrication by inspector specially approved by the Division of the State Architect (DSA). An AITC Certificate will not meet this requirement." Comply with California Building Code (CBC) 2016, Title 24, Part 2, Chapter 23.

1.03 QUALITY ASSURANCE

A. Certification: Each structural glued-laminated member will be stamped with an identifying number accompanied by a certificate of inspection showing the grade and species of lumber, type of glue and other information as required. Certificates will bear a signed statement by the Inspector, that the work has been executed in strict accordance with the Approved Drawings and Specifications.

1.04 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures of these specifications.

B. Shop Drawings:

1. Indicate pertinent dimensions camber, grades, shop applied finishes, cuts and drilled holes, fasteners, erection details and connection materials and finishes.

2. Prepare shop drawings under the seal of a professional Structural Engineer licensed/ registered in the State of California.

C. Certificates: Certify compliance with AITC 110-2001, ANSI/AITC Standard A190.1 and ASTM D3737.

1.05 DELIVERY, STORAGE AND HANDLING

A. Arrange delivery of glued-laminated members in accordance with construction schedule to avoid double handling.

B. Deliver members to site with opaque wrappings, for protection. Maintain in place until immediately prior to installation of roof deck.

C. If double handling is necessary, store members well off ground and separate to allow complete air circulation. Cover members with an opaque moisture resistant membrane.

D. Use padded, non-marring slings when handling members.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products from Standard Structures, Inc., or approved equal.

2.02 MATERIALS AND COMPONENTS

A. Species: Glued-lams Not Exposed to View or Weather: Douglas Fir, Industrial appearance grade. Service Grade 24F-V8. Simple span beams may be 24F-V4 DF/DF.

1. Exposed to View: Alaskan Yellow Cedar glued-lam 20F-V12 made from all hardwood.

B. Glued-laminated Members: Laminating stock and adhesive of type to suit service grade 24F-V8 and 24F-V4.

3. It is assumed that each lamination is graded on the basis of the requirements of the nominal size of the individual lamination. When lumber is resawn, regrade on the basis of the new size at no expense to the Owner. Comply with Chapter 23, Title 24, Part 2, of the California Building Code 2016.

1. Joints: End joints pre-glued, plain scarf joints. Portions of scarfs in adjacent laminations separated by a minimum of 6 inches. Strength reducing defects such as wane are not permitted in or near an end joint. The sum of knots, which appear in the beveled surface of a scarf, not to exceed one-fourth the nominal width of lamination when the laminations are 1-5/8 inches in thickness.

2. Standard "Peg-Scarf" and "Finger Joints", type are not approved by the Division of State Architect and may <u>not</u> be used.

3. Pre-glued edge joints together edgewise when used in the top and bottom laminations for exterior use and for lamination when the direction of load is parallel to the wide face of the lamination.

4. Other laminations may consist of two or more pieces placed side by side provided longitudinal edge joints in adjacent laminations are staggered at least 2 inches laterally.

5. Moisture Content: Not less than 7 percent or more than 16 percent at time of gluing. Range of moisture content of various laminations assembled into a single member not to exceed 5 percent. Comply with, California Building Code, 2016, Title 24, Part 2, Chapter 23.

   a. Change 16% to 10% when the project is in an area with desert climate.

6. Adhesives: Use exterior type adhesives for mixing, spreading, storage life, pot life, working life and assembly life in accordance with ANSI/AITC Standard A190.1. Dry adhesive shall not be used.

C. Hardware and Connections: Structural Steel as detailed and indicated on the Drawings and specified in Sections 05 12 00 and 05 50 00.

D. Bolts, Nuts and Washers: As detailed and indicated on the Structural Drawings and specified in Sections 05 12 00 – Structural Steel Framing and 05 50 00 – Metal Fabrications.

2.03 FABRICATION

A. Fabricate glued-lams structural members in accordance with American Institute of Timber Construction (AITC) appearance grades as follows:

1. Glued-lams Not Exposed to a View or Weather: Douglas Fir, industrial appearance grade. Service Grade 24F-V8, and 24F V4 DF/DF.

2. Exterior Glued-lams Exposed to a View or Weather: Architectural appearance grade heart Alaskan Yellow Cedar. Service Grade 20F-V12.

3. Interior Glued-laminates Exposed to View: Architectural appearance grade Douglas Fir. Service Grade 24F-V8.

B. Laminated machine finished, but not sanded, to a smooth surface and to a uniform thickness with a maximum allowable variation of 1/64-inches. Warp, twist, or other characteristics which will prevent intimate contact of adjacent glued faces or interfere with uniform bending to a required curvature when under clamping pressure are not permitted. Surfaces to be glued must be clean and free from oil, dust and other foreign material detrimental to satisfactory gluing.

C. Employ clamping methods which provide uniform pressure over entire surface area. Nailing in lieu of clamping for pressure is not permitted. Clamping may start at point but must progress to an end or ends. Apply sufficient gluing pressure to assure close contact of the surfaces and provide a uniformly thin glue line; minimum pressure 100 p.s.i. Maintain pressure until adhesive has set. Clamping time and gluing process in strict accordance with adhesive manufacturer's recommendations.

D. Handling or erection tools, equipment and methods designed to prevent scarring the corners and faces or otherwise injuring the member. Sharp instruments or unprotected wire rope or chain slings are not permitted.

E. Fabricate steel hardware and connections with joints neatly fitted, welded and ground smooth.

F. Strength shall meet the requirements of CBC, 2016, chapters 16A and 23.

G. Clean, prepare, and shop prime steel hardware and connections. Provide minimum G60 galvanized coating.

H. Glued-laminated beams exposed to weather must be protected by DSA approved pressure treatment which will not compromise structural integrity of the member, or of a species accepted by Division of the State Architect for use exposed to weather.

2.04 FINISHES

A. Exposed glued-laminated beams are to receive a fire retardant coating specified in Section 09 90 00 – Painting and Coating.

PART 3 - EXECUTION

3.01 ERECTION

A. Set structural laminated members level and plumb and in correct positions.

B. Provide temporary bracing and anchorage required to hold members in place until permanently secured.

C. Fit members together properly and accurately without trimming, cutting, or other unauthorized modification. Report discrepancies to Architect immediately upon discovery.

D. As soon as members are set, attach permanently to supports. Do not attempt temporary fastenings. In general follow recommendations as specified in AITC 111, and the AITC Timber Construction Manual.

END OF SECTION

SECTION 06 41 00

ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Furnish and install complete, plastic laminate countertops, laminated plastic casework, shelves, open shelving, fixture work and miscellaneous millwork and hardware required for this work as indicated on the Drawings and that is required, and as specified herein. Includes delivery to rooms, unpacking, setting in place, leveling and fastening to walls and floors as required.

B. Related Sections:

1. Rough Carpentry; refer to Section 06 10 00.

1.02 REFERENCE STANDARDS

A. NEMA LD3 - High Pressure Decorative Laminates.

B. Woodwork Institute, 1ST Edition, 2009 Architectural Woodwork Standards:

C. Title 24, California Code of Regulations, 2016.

D. Operable parts for all accessible casework shall comply with CBC Section 11B-309.

1.03 QUALITY ASSURANCE

A. Millwork shall be manufactured in accordance with the standards in the latest edition of the Architectural Woodwork Standards of the Woodwork Institute in the grade or grades hereinafter specified or shown on the Drawings.

B. Before delivery to the job site, the millwork supplier shall issue a Woodwork Institute Certified Compliance Certificate indicating the millwork products he will furnish for this project,and certifying that they will fully meet the requirements of the grade or grades specified.

C. Each elevation of casework shall bear the Certified Compliance label.

D. Each countertop shall bear the Certified Compliance label.

E. Operable parts for all accessible casework shall comply with CBC Section 11B-309.

1.04 SUBMITTALS

A. Before delivery to the jobsite, the millwork supplier shall issue a W.I. Certified Compliance Certificate indicating the millwork products he will furnish for this job, and certifying that they will fully meet the requirements of the grade or grades specified.

B. Upon completion of the job, submit a Woodwork Institute Certified Compliance Certificate for Installation.

C. Submit shop drawings and product data under provisions of Section 01 33 00 – Submittal Procedures, and in accordance with Woodwork Institute, Architectural Woodwork Standards “Section 1 – Submittals”.

D. Shop drawings shall bear the Woodwork Institute Certified Compliance label on the first page of the Drawings.

E. Submit minimum 18" wide sample portion of casework unit showing typical construction including representation of all finished hardware proposed for use. Sample unit shall be typical base unit including drawer, door, top, splash and sidesplash, and interior shelf.

F. Submit literature and data sheets as necessary to establish "formaldehyde free" nature of the proposed materials.

G. Where required or necessary, submit samples of standard color choices for Architect's selection.

H. Installed cabinets shall meet the requirements of CBC, 2016, Title 24, Part 2, Chapter 16A**.**

I. Submit VOC content of all glues and adhesives.

1.05 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in undamaged condition, stored in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity, as recommended by Woodwork Institute, Architectural Woodwork Standards “Section 2 – Care and Storage”.

B. In the event of damage, immediately make necessary repairs or replacements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grades:

1. Wood (Section 10 Casework, WI)

a. Exposed Materials: Premium Grade

b. Semi-Exposed Materials: Custom Grade

c. Door and Drawer Front Style: Flush Overlay, Style “A”

d. Current doors to be W.I. Type 1, with black colored resilient plastic “Tee” on door meeting style only; other sides to have solid banding to match door.

2. Provide plastic covered casework in accordance with Woodwork Institute "Architectural Woodwork Standards", (Section 10 Casework), for Premium Grade. Premium Grade for library shelving, and display cases, except at custodian storage, storage, and food service rooms, where Custom Grade is acceptable.

a. Provide scribe mold at junctions with walls and ceilings.
b. Provide plywood core construction laminate finish. Medium density fiberboard cores will not be acceptable.
c. Provide stainless steel corner guards at all exposed casework corners.

3. Construction Style Required: Style A Frameless.

4. Construction Type: Type I Multiple self-supporting units, rigidly joined together.

B. Casework construction shall be entirely of formaldehyde free products. Manufacturer to submit published data sheets for casework materials for Architect's approval. So called "Low-emitting" formaldehyde containing products will not be allowed. Burden of proof rests with the casework manufacturer.

C. Exposed Materials: Vertical and Horizontal Surfaces (cabinet bodies and wall paneling): Surface material shall be high pressure laminate: 0.028-inch minimum thickness at vertical surfaces conforming to ANSI/NEMA LD-3. Flame spread: 40. Smoke developed: 155. Provide matte finish standard colors by Wilson Art, Formica or Nevamar; color to be selected by Architect.

D. Semi-Exposed Materials: High pressure laminate as specified for exposed materials. Color at top, bottom and front edge of shelves to match casework laminate, typical for all casework, except as follows: Custodial, and storage rooms with semi-exposed casework surfaces shall receive low pressure decorative Melamine overlay. Masonite Class I made with formaldehyde free substrate, or approved equivalent; white in color at Custodial and storage rooms only. Top and bottom of shelves shall match exposed materials in material and color. Front edge of all shelves to match casework laminate.

E. Door and Drawer Front Style: Flush overlay with high pressure laminate, per exposed materials, with 3mm thick PVC edge banding on edges, 1mm thick PVC edge banding on case bodies. All edge banding shall be machine applied. Edge banding at outside edges shall be "eased" so as to eliminate sharp edges. Submit manufacturer's standard edge banding colors for Architect's selection.

F. Exposed Wood: Species –, veneer cut-rotary

G. Laminated Plastic Countertops and Splashes:

1. Surface material shall be high pressure, low luster, laminated plastic conforming to NEMA LD-3, 0.042-inch thickness post forming grade for tops and 0.028-inch thickness for wall paneling.

2. Laminated plastic countertops and splashes shall be Woodwork Institute Premium Grade. Scribe tops and splashes to walls. There shall be no joints between walls and countertops or splashes larger than 1/16". Caulk all gaps with caulk to match color of countertop, or as approved by Architect.

3. Provide splashes at all countertops. Provide end splashes with square butt joints. Back splash shall have a rolled edge at the top with an integral cove at the junction of the countertop and splash. Front edge of all countertops shall be a rolled "waterfall" edge, self edge countertops are unacceptable. Provide a non-drip bullnose edge at all countertops with sinks.

H. Fasteners:

1. Screws: Straight shank double thread particle board screws.

I. Glues: Type 3 adhesives throughout with less than 20 g/L VOC content.

2.02 ACCESSORIES

A. Finish Hardware: Provide all required finish hardware for casework in accordance with the Architectural Woodwork Standards, 1st Edition, except as modified below:

1. Hinges: Screwed in, fully concealed self-closing with 120-degree opening angle. Blum European Style Hinge, or equal. Heavy Duty.

2. Pulls: U-shaped metal. Amerock Solid Brass – 4" AME 19549 dull chrome wire pulls. Pulls to be glued and screwed in place.

3. Catches: Magnetic, Amerock 3473PT, and IVES #2 Elbow Catch, or equal for all doors; for inactive leaf of pairs of doors with locks. Omit where self-closing hinge provides latch function. Elbow catches to be installed maximum 1-1/2 inch from front edge of door.

4. Drawer Slides: Provide 100 pound capacity, full extension slides, Accuride model number C3017 or equivalent.

5. Keyboard Drawer Slide: Accuride variable height keyboard slide with 3/4-inch plastic laminate tray, model number 2109, 20 inches long. Provide one (1) keyboard slide and tray at each knee space, typical.

6. File Drawer Slides: Heavy duty, full extension, three section slide, .63-inch slide space, 200-pound load capacity, Accuride model number C3640 or equivalent.

7. Shelf Clip: 32mm system, earthquake proof shelf clip in accordance with ANSI/BHMA A156.9.

8. Guides for Sliding Glass Cabinet Doors: KV P1092 or equal. Locks for sliding glass doors: KV #965 CHR.

9. Door and Drawer Locks: Olympus Lock series 500 DR and 600 DW. Provide with lip or escutcheon to completely cover hole in casework. Color: chrome finish. All doors and drawers shall be provided with locks. Provide two (2) keys for each room with casework. Key cabinets in each room alike, each room different.

   a. Provide locks at all casework doors and drawers. Provide two (2) keys in each room alike; each room different and Master keyed.

   b. Metal Strike Plates: Provide Cabinet door and drawer locks with metal strike plates to protect against particle board rip-out.

10. Countertop Grommets: Doug Mockett MM4, 2-1/2-inches clear diameter black plastic with snap-on cover, provide one grommet per knee space compartment. Grommet to be 3/4-inch deep to completely conceal raw inside edges of countertop hole. Submit sample for approval. Provide trim grommet for computer paper access-slot where shown on Drawings. Grommets to be located in field by Architect.

11. Display Cases: Complete assembly for sliding 1/4-inch clear tempered glass doors:

a. Knape & Vogt #P992 ZC.

b. Standards and Brackets: Knape & Vogt #80, and 12" deep bracket #180.

c. Locks: KV #963 CHR,

d. Pulls: EPC-GP17 – stainless steel

e. Glass Shelves: 5/16-inch tinted light bronze float plate, tempered.

f. Anodized Aluminum Extrusions.

g. Sliding or Hinged Doors

h. Tackable Back Panel

i. Fluorescent Down Lighting

B. Cabinet hardware shall be installed by casework fabricator.

C. Products:

1. Polyvision
2. Claridge
3. ABC School Equipment

2.03 FABRICATION

A. General: Fabricate the casework to the shape indicated on the Drawings and in strict accordance with the Woodwork Institute grade specified.

B. Field Verification: Contractor shall field verify finish dimensions prior to fabrication of casework.

C. Compliance: The Architect reserves the right to require an inspection by a representative of the Woodwork Institute, to determine whether fabrication and installation was in accordance with the specified standard.

PART 3 - EXECUTION

3.01 PREPARATION

A. Conform to requirements of Woodwork Institute "Architectural Woodwork Standards," for casework construction details.

3.02 INSTALLATION

A. Woodwork Institute Certified Installation is required. Install work in this section as specified in Woodwork Institute "Architectural Woodwork Standards" 1ST Edition.

B. All components of casework which are notched, chipped, dinged, scratched, scuffed, or otherwise damaged or marred during course of construction shall be replaced with a matching "like new" component, to the satisfaction of the Architect. Components which

are incorrectly cut or drilled shall not be used.

C. All cabinet backs shall be fully trapped (dadoed & glued).

D. Joints between countertop sections shall not be installed over knee spaces or other open span.

3.03 CLEANING

A. Upon completion of installation *in each room*, remove debris, sawdust, excess materials, packages, equipment and trash which may have accumulated from this work. DO NOT ALLOW SAWDUST OR DEBRIS TO FALL ON CARPET SURFACES. Casework installer shall clean any sawdust on carpets to the satisfaction of the Architect.

B. Cabinets and adjacent surfaces shall be left clean and acceptable for final approval.

C. Contractor to provide a copy of cleaning and maintenance recommendations for countertops and casework to the underneath side of furniture, in addition to requirements listed above and outlined in Section 01 78 23 – Operating and Maintenance Data.

3.04 WARRANTY

A. Provide ten (10) year warranty for material defects from date of substantial completion. Provide two (2) year warrant against installation defects.

END OF SECTION

07 00 00

THERMAL AND MOISTURE PROTECTION

SANTEE SCHOOL DISTRICT

SECTION 07 10 00

DAMPPROOFING AND WATERPROOFING

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Waterproofing membrane systems for below-grade, vertical and horizontal applications, around pits, and beneath finish flooring systems over occupied, or to-be-occupied areas, as indicated on the drawings and specified herein.

B. Related Sections:

1. Roofing: see Division 7 – Thermal and Moisture Protection.
2. Traffic membranes

1.02 GUARANTEE

A. Provide a (10) ten-year unconditional guarantee against defects of materials and workmanship which allows water or moisture into areas of the structure which were to be protected by this membrane. Pay for costs of repairing or replacing the defective membrane, as well as all costs of exposing and recovering membrane, and consequential damages to persons and property resultant of defective materials or workmanship.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Horizontal Locations:

1. Provide a fluid applied, self-leveling, polyurethane system such as Sonneborn® HLM 5000 manufactured by BASF, Vulkem 201L manufactured by Tremco, or Perma-Gard III manufactured by Neogard.

2. Horizontal Protection Course: Sonneborn Protection Course II manufactured by BASF, or "Sealtight PC-2" by W.R. Meadows.

B. Vertical Below-Grade (Liquid applied not permitted):

1. Provide CCW MiraDRI by Carlisle, Bituthene 4000 by W.R. Grace, or MEL-ROL by W.R. Meadows.

2. Below grade provide 1/2-inch thick fiberboard, 1/2-inch polystyrene insulation or 1/8-inch asphaltic hardboard protection course. Provide 1/4-inch asphaltic board at planter areas.

3. Provide min. 3” PVC perforated pipe at fiberboard bottom, in 1-foot diameter ¾” gravel and Mirafi 140N by Tencate down length of vertical surface. Connect pipe to nearest storm drain.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install systems using waterproofing installers. Roofing trades will not be acceptable to perform this work.

B. Install systems in strict accordance with manufacturer's specifications. Obtain manufacturer's approval of substrate conditions prior to installing materials.

C. Filter Fabric Installation:

1. Install the filter fabric facing out toward the backfill (the direction from which the water will come).

2. Panels shall be lapped by a minimum of 2 rows of dimples (2 inches) on all edges. Both the core and the filter fabric should be shingled in the direction of the water flow.

3. Attach the drain using a general construction grade adhesive, pressure -sensitive adhesive, or a mastic used for membrane applications. The membrane and drain core should be clean and dry. Care should be taken that the adhesive is compatible with the damp-proofing material or waterproofing membrane and the drain core.

4. At the footing, place the core behind the perimeter drain tile and wrap the filter fabric around it and up behind the drain core.

5. The drain shall be cut with a sharp knife or shears.

6. Tuck the filter fabric behind the core to cover exposed edges.

7. Tears or punctures in fabric shall be covered with new filter fabric.

8. Backfill as soon as possible taking care not to over compact.

D. Provide reinforcing strips, and backer rods necessary for joints and cracks.

E. Flood Testing Drains: Flood test each drain for leaks, after completing roofing and flashing but before overlying construction is placed. Plug or dam drains, and flood with potable water.

1. Flood to an average depth of 1-1/2 inches not exceeding a depth of 2.5 inches.
2. Flood each area for 24 hours.
3. After flood testing, repair leaks, repeat flood tests and make further repairs until roofing and flashing installations are watertight.

F. Additional Testing: Set a sprinkler on the roof and run for approximately 1 hour, then move to a new section. Provide an observer below the roof substrate to identify any water intrusion.

1. After flood testing, if water intrusion is noted, repair leaks, repeat flood tests, and make further repairs until drain and flashing installations are watertight.

3.02 FIELD QUALITY CONTROL

A. Tests: Once systems (except horizontal protection course) are installed, applications shall be water tested. Perform in such a way that watertight integrity is fully demonstrated with standing water for at least 24 hours. Allow Architect and Owner to witness this test. Correct defects, then re-test. Continue this procedure until no leaks exist.

END OF SECTION

SECTION 07 13 00

SHEET WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Extent of sheet membrane waterproofing work as shown on the Drawings and is hereby defined to include all sheet materials applied with sealed joints and flashings as needed to form concealed waterproof membranes.

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit specifications, installation instructions and general recommendations from waterproofing manufacturer, for sheet membrane waterproofing.

1.03 QUALITY ASSURANCE

A. Manufacturer: Obtain primary waterproofing materials of each type required from a single manufacturer to greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Installer: Shall have not less than 3 years of successful experience in installation of waterproofing sheets similar to requirements for this project, and which is acceptable to, or licensed by, manufacturer of primary waterproofing materials.

1.04 PROJECT CONDITIONS

A. Substrate: Proceed with work of this section only after substrate construction, openings, and penetrating work have been completed.

B. Weather: Proceed with waterproofing an associated work only when existing forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

1.05 SPECIAL PROJECT WARRANTY

A. Provide written warranty agreeing to replace/repair defective materials and workmanship. Warranty includes responsibility for removal and replacement of other work which conceals sheet waterproofing.

1. Warranty period is 5 years after date of Notice of Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use the following product, except on horizontal surface where water test is required. Do not use the 'bentonite' type.

1. Asphalt/Polyethylene Sheet Waterproofing: Self-adhering membrane of rubberized asphalt integrally bonded to polyethylene sheeting, formed into uniform flexible sheets of no less than 56 mils thickness, in widths of no less than

36 inches, and complying with the following:

a. Tensile Strength (ASTM D412): 250 psi minimum

b. Ultimate Elongation (ASTM D412): 200% minimum

c. Brittleness Temperature (ASTM D746)" -25 degrees F. (-32 degrees C.)

d. Hydrostatic Head Resistance: 75 feet minimum

e. Water Absorption (ASTM D570): Not more than 0.5% weight gain for 48 hours of immersion at 70 degrees F. (21 degrees C.).

f. Products/Manufacturers: Provide one of the following, or approved equal:

Bituthene®: W.R. Grace & Co.
Polyguard 650: Polyguard Products, Inc.
MEL-ROL: W.R. Meadows, Inc.

2.02 ACCESSORIES

A. Adhesives: Provide types of adhesive compound and tapes recommended by waterproofing sheet manufacturer, for bonding to substrate (if required), for waterproof sealing of seams in membrane, and for waterproofing sealing of joints between membrane and flashings, adjoining surfaces and projections through membrane.

B. Primers: Provide type of concrete primer recommended by manufacturer of sheet waterproofing material for applications required.

C. Flashing Materials: Except as otherwise indicated, provide types of flexible sheet material recommended by waterproofing sheet manufacturer for flashing.

D. Protection Course: Provide type recommended by waterproofing sheet manufacturer, include adhesive recommended by Manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect substrate and conditions under which waterproofing work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prior to installation of waterproofing and associated work, meet at project site with Waterproofing Materials Manufacturer's Representative, and Inspection and Testing Agency Representative (if any), for purpose of reviewing material selections and procedures to be followed in performing work.

B. On concrete decks, immediately before placement of waterproofing sheet, grind surface lightly with terrazzo grinder or similar device, to ensure removal of projections which might penetrate sheet. Clean deck of loose material.

C. Apply primer to concrete and masonry surfaces at rate and when recommended by manufacturer of primary waterproofing materials. Prime only area which will be covered by waterproofing membrane in same working day; reprime areas not covered by waterproofing membrane within 24 hours.

3.03 INSTALLATION

A. Comply with manufacturer's instructions for handling and installation of sheet waterproofing materials, except where more stringent requirements are shown or specified.

B. Coordinate installation of waterproofing materials and associated work to provide complete system complying with recommendations of manufacturer. Schedule installation to minimize period of exposure of sheet waterproofing materials.

C. Extend waterproofing sheet and flashings as shown to provide complete membrane over area indicated to be waterproofed. Seal to projections through membrane and seal seams. Bond to vertical surfaces and also, where shown or recommendations by manufacturer, bond to horizontal surfaces.

D. Install protection course of type indicated over completed membrane, complying with manufacturer's recommendations for both waterproofing sheet and protection course materials.

E. Flood Testing Drains: Flood test each drain for leaks, after completing roofing and flashing but before overlying construction is placed. Plug or dam drains, and flood with potable water.
1. Flood to an average depth of 1-1/2 inches not exceeding a depth of 2.5 inches.
2. Flood each area for 24 hours.
3. After flood testing, repair leaks, repeat flood tests and make further repairs until roofing and flashing installations are watertight.

F. Additional Testing: Set a sprinkler on the roof and run for approximately 1 hour, then move to a new section. Provide an observer below the roof substrate to identify any water intrusion.
1. After flood testing, if water intrusion is noted, repair leaks, repeat flood tests, and make further repairs until drain and flashing installations are watertight.

3.04 PERFORMANCE REQUIREMENTS

A. It is required that waterproof membranes be watertight and not deteriorate in excess of limitations published by manufacturer.

B. In-Place Testing: Before completed membranes on horizontal surfaces are covered by protection course or other work, test for leaks with 2-inch depth of water maintained for 24 hours. Repair all leaks revealed by examination of substructure and repeat test until no leakage is observed.

3.05 PROTECTION

A. Institute all required procedures for protection of completed membrane during installation of work over membrane and throughout remainder of construction period. Do not allow traffic of any type on unprotected membrane.

END OF SECTION

SECTION 07 14 00

FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

General and Supplementary Conditions and Division 1 – General Requirements applies to his section. Provide fluid applied waterproofing as indicated, specified & required

A. Work in this section - principal items include:

1. Fluid applied waterproofing on buildings, planter and site retaining walls.
2. Between slab waterproof membrane

B. Related work not in this section:

1. Excavation and backfilling.
2. Parge coat on masonry to receive waterproof membrane.
3. Mortar beds or concrete toppings over waterproof membranes.
4. Latex waterproofing.
5. Damp-proofing.
6. Flashing and sheet metal.
7. Joint sealers.
8. Soil sterilant.
9. Drainage

1.02 QUALITY ASSURANCE

A. Waterproofing contractor/applicator shall be trained and approved by waterproof membrane manufacturer, CETCO Liquid Boot Company (CLB). A pre-installation conference shall be held prior to application of waterproof membrane to assure proper substrate and installation conditions, to include contractor, applicator, architect/engineer and special inspector.

1.03 SUBMITTALS (Refer to Division 1, Section 01 30 00 for procedures)

A. Project Data - Submit manufacturer’s product data and installation instructions for specific application.

B. Samples - Submit representative samples of the following for approval:

1. Waterproof membrane material.
2. Protection Board and/or Protection Mat.
3. Prefabricated Drainage Mat.
4. Geotextiles.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in original unbroken packages bearing manufacturer’s label showing brand, weight, volume and batch number. Store materials at site in strict compliance with manufacturer’s instructions. Do not allow materials to freeze in containers.

1.05 JOB CONDITIONS

A. Protect all adjacent areas not to be waterproofed. Where necessary, apply masking to prevent staining of surfaces to remain exposed wherever membrane abuts to other finish surfaces.

B. Perform work only when existing and forecasted weather conditions are within manufacturer's recommendations for the material and product used.

C. Minimum clearance of required for application of product:

1. 90° spray wand- 2 feet
2. Conventional spray wand- 4 feet.

D. Ambient temperature shall be within manufacturer's specifications. If winter conditions apply, we recommend the use of space heaters and necessary cover (i.e. Visqueen) to bring the ambient temperature to at least +45ºF until the protection course and structural slab rebar or a mudslab protection course has been placed.

E. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproof membrane shall be positively secured in their proper positions and appropriately protected prior to membrane application.

F. Waterproof membrane shall be installed before placement of reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by General Contractor prior to membrane application.

G. Expansion joints must be filled with a conventional waterproof expansion joint material.

H. Surface preparation shall be per manufacturer's specification.

1.06 PRODUCT WARRANTY

A. CETCO Liquid Boot Company (CLB) warrants its products to be free of defects. This warranty only applies when the LIQUID BOOT® is applied by CETCO Liquid Boot Company Approved Applicators and that the required respective products (such as LIQUID BOOT® UltraDrain, LIQUID BOOT® UltraShield, LIQUID BOOT® BaseFabric and LIQUID BOOT® GeoVent) are used. As factors which affect the result obtained from this product, including weather, equipment utilized, construction, workmanship and other variables -are all beyond the manufacturer's control, CLB warrants only that the material conforms to its product specifications. Under this warranty CLB will replace at no charge any product not meeting these specifications within 12 months of manufacture, provided it has been applied in accordance with CLB's written directions for use recommended as suitable for this product.

Warranties are available for a longer period upon request and mutual written consent. This warranty is in lieu of any and all other warranties expressed or implied (including any implied warranty of merchantability or fitness for a particular use), and CLB shall have no further liability of any kind including liability for consequential or incidental damages resulting from any defects or delays caused by replacement or otherwise.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fluid applied waterproofing system - LIQUID BOOT®; a single course, high build, polymer modified asphaltic emulsion. Water borne and spray applied at ambient temperatures. A minimum thickness of 80 dry mils, unless specified otherwise. Non-toxic and odorless. LIQUID BOOT® Trowel Grade has similar properties with greater viscosity and is trowel applied. Manufactured by CETCO Liquid Boot Company, Santa Ana, CA (714) 384-0111.

B. Fluid applied waterproofing physical properties:

WATERPROOFING	**TEST METHOD**	**VALUE**
Soil Burial	ASTM E154-08a	Passed
Water Penetration Rate	ASTM D2434	<7.75 x 10-9 cm/sec
Water Vapor Permeability	ASTM E96	0.24 perms
Water Vapor Transmission	ASTM E96	0.10 grains/h-ft2

GAS VAPOR MEMBRANE	**TEST METHOD**	**VALUE**
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Benzene, Toulene, Ethylene, Xylene, Gasoline, Hexane, Perchloroethylene	ASTM D543, D412, D1434 (tested at 20,000 ppm)	Passed-gas permeability & weight change
Sodium Sulfate (2% water solution)	ASTM D543, D412, D143	Passed-gas permeability & weight change
Acid Exposure (10% H2SO4 for 90 days)	ASTM D543	Less than 1% weight change
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
Bonded Seam Strength Tests	ASTM D6392	Passed
Micro Organism Resistance (Soil Burial)- average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D4068-09	Passed

GAS VAPOR MEMBRANE	TEST METHOD	VALUE
Methane Permeability	ASTM 1434-82(2009)e1	Passed
Oil Resistance Test- average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D543-06	Passed
Heat Aging- average tensile strength change, average tensile stress change, average elongation change, bonded seams	ASTM D4068-09	Passed
Dead Load Seam Strength	City of Los Angeles	Passed
Environmental Stress-Cracking	ASTM D1693-08	Passed
PCE Diffusion Coefficient	Tested at 6,000 mg/m3	2.74 x 10-14 m2/sec
TCE Diffusion Coefficient	Tested at 20,000 mg/m3	8.04 x 10-14 m2/sec

PORTABLE WATER	TEST METHOD	VALUE
Toxicity Test	**22 CCR 66696**	Passed. CCR Bioassay-Flathead Minnow
Potable Water Containment	NSF/ANSI 61	NSF Certified for tanks >300,000 gal

GENERAL INFORMATION	TEST METHOD	VALUE
Coefficient of Friction-with geotextile both sides	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. No cracking at –25°F
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. No spalling or disbondment
Accelerated Weathering & Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 p.s.i

GENERAL INFORMATION	TEST METHOD	VALUE
Elongation	ASTM D412	1,332% Ø reinforcement, 90% recovery
Elongation- with 8oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Tensile Strength	ASTM D412	58 p.s.i. Ø reinforcement
Tensile Strength-8oz. non-woven geotextile both sides	ASTM D751	196 psi (same as geotextile tested separately)
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft2 uplift force
Puncture Resistance-8oz. non-woven geotextile both sides	ASTM D4833	286 lbs. (probe travel=.756 in., same as geotextile tested separately)
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Electric Volume Resistivity	ASTM D257	1.91 x 1010 ohms-cm

C. Agency Approvals

1. City of Los Angeles Research Report – RR 24860 – Approved for "LIQUID BOOT® Spray Applied Membrane for Below-Grade Waterproofing and Gas Barrier"

2. United States Navy – Approved for "LIQUID BOOT® for use World Wide to Waterproof Earth-Covered Steel Ammunition Storage"

3. County of Kern Environmental Health Services Department – Approved for "LIQUID BOOT® as a Methane Barrier"

4. NSF International – NSF/ANSI 61 approved for "Drinking Water System Components – Health Effects"

5. Canadian Construction Materials Board – Approved for "Waterproofing and Dampproofing"

6. County of Los Angeles Department of Public Works – Approved for "LIQUID BOOT® Application as a Methane Gas Barrier"

D. LIQUID BOOT® 500 (Contact CLB before specifying/bidding LB 500 to insure it is appropriate for the project)

1. LIQUID BOOT® 500 may be used in lieu of LIQUID BOOT® (described in section 2.01 B. above) where the membrane is not exposed to hydrostatic head pressure. The Agency Approvals in section 2.01 C above do not apply to LIQUID BOOT® 500. The physical properties for LIQUID BOOT® 500 are as follows:

a. Note: LIQUID BOOT® 500 may tend to sag on vertical surfaces at higher ambient temperatures. When this condition occurs, use LIQUID BOOT® at these locations.

WATERPROOFING	**TEST METHOD**	**VALUE**
Elongation	ASTM D412	800%
Bond Seam Strength Tests	ASTM D6392	Passed
Methane Permeability	ASTM D1434	None detected
Water Vapor Permeability	ASTM E96	0.18 perms
* Agency Approval- City of Los Angeles Research Report-RR 25549-Approved for "LIQUID BOOT® 500 Spray Applied Membrane for Below-Grade Waterproofing and Gas Barrier"		

E. Protection - On vertical surfaces, use LIQUID BOOT® UltraShield P-100 or other protections as approved by the manufacturer, project architect or engineer. On horizontal surfaces, use LIQUID BOOT® UltraShield G-1000 or other protections as approved by the manufacturer, project architect or engineer. Due to the diverse jobsite conditions, all protection materials must be approved by the membrane manufacturer, including the use of the LIQUID BOOT® UltraShield products.

F. Prefabricated Drain Mat - On vertical surfaces, use LIQUID BOOT® UltraDrain 6200. On horizontal surfaces, use LIQUID BOOT® UltraDrain 9000

G. Adhesive system for LIQUID BOOT® UltraShield and LIQUID BOOT® UltraDrain: Use LIQUID BOOT® UltraGrip.

H. Base Geotextile – LIQUID BOOT® BaseFabric T-40 non-woven geotextile, unless otherwise specified and approved by membrane manufacturer. The heat-rolled side shall be used as the application surface. Some projects may require a heavier geotextile (LIQUID BOOT® BaseFarbic T-60.)

I. Cold Joints, Cracks, and Form Tie Holes: Covered with Hardcast CRT 1602 Tape 3" wide.

PART 3 - EXECUTION

3.01 EXAMINATION

A. All surfaces to be waterproofed shall be inspected and approved by the applicator at least one day prior to commencing work.

3.02 SURFACE PREPARATION

A. Provide 24-inch minimum clearance out from surfaces to receive the waterproof membrane. The application surface shall be prepared and provided to the applicator in accordance with manufacturer's specifications listed below:

1. Concrete/Shotcrete/Masonry

a. Concrete surfaces shall be light broom finish or smoother, free of any dirt, debris, loose material, release agents or curing compounds. Fill all voids more than 1/4-inch-deep and 1/4 inch wide. Masonry joints, cold joints, and form joints shall be struck smooth. All penetrations shall be prepared in accordance with manufacturer's specifications. Provide a 3/4-inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. Allow to cure overnight before the application of LIQUID BOOT®. All form ties holes must be completely grouted from the inside to outside of wall with non-shrink grout as approved by engineer. All cracks or cold joints greater than 1/16 inch must be completely grouted with non-shrink grout as approved by engineer. Install Hardcast reinforcing tape over all cold joints, cracks and form tie holes (after holes and cracks are grouted).

2. Dirt & Gravel

a. The sub-grade shall be moisture conditioned and compacted to a minimum relative compaction of 90 percent or as specified by civil/geotechnical engineer. The finished surface shall be smooth, uniform, free of debris and standing water. Remove all stones or dirt clods greater than 1/4 inch. (NOTE: Aggregate sub-base surfaces shall be rolled flat, free from any protruding sharp edges). Final sub-grade preparation shall not precede the membrane application by more than 72 hours. All penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be of rebar, which shall be bent over and left in the slab. Trenches shall be cut oversize to accommodate waterproof membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or sloped back, free of

roots and protruding rocks. Specific sub-grade preparation shall be designed by a qualified civil or geotechnical engineer. If organic materials with potential for growth (ie: seeds or grasses) exist within the subbase, spray apply soil sterilant at the sterilant manufacturer's recommended rate.

3. Lagging

   a. Lagging shall be held securely in place. All sharp edges and nails shall be removed or protected so as not to penetrate the membrane.

3.03 INSTALLATION

A. INSTALLATION ON CONCRETE/SHOTCRETE/MASONRY (Follow the procedures below carefully)

1. Refer to section 3.03.30, "Sealing Around Penetrations", for procedures to seal around penetrations.

2. Provide a ¾" minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. Allow to cure overnight before the application of LIQUID BOOT®.

3. Delineate a test area on site with a minimum dimension of 10 feet by 10 feet (3m by 3m). Apply LIQUID BOOT® to a thickness of 60 mils and let it cure for 24 hours. Observe for blisters. If minor or no blistering occurs, proceed to the next step. (See note regarding blisters). If significant blistering does occur, apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst to the entire concrete surface and allow to cure before proceeding. (See also information regarding blister repair).

4. Spray-apply LIQUID BOOT® to a 60-mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

5. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. It is the responsibility of the General Contractor to ensure that the membrane and the protection system are not penetrated.

6. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

   NOTE: If water testing or inspection is to be performed, conduct before placing protection course.

7. NON-HORIZONTAL SURFACES: Spray on non-horizontal surfaces should begin at the bottom and work towards the top. This method allows the product to adhere to the surface before hitting catalyst runoff.

   NOTE: Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With

time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane. A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples meet the required membrane thickness (80 mils minimum), then the remaining blisters should not be punctured or cut; if the samples have less than the minimum 80 mils, then the area can either be re-sprayed to obtain the proper thickness, or the blisters can be cut out and the area re-sprayed or patched with LIQUID BOOT® Trowel Grade.

B. INSTALLATION ON DIRT SURFACES AND MUDSLABS

1. Roll out LIQUID BOOT® BaseFabric geotextile on sub-grade with the heat-rolled side facing up. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam and overlap to a thickness of 80 mils minimum. Line trenches with geotextile extending at least six inches (6") onto adjoining sub-grade if slab and footings are to be sprayed separately. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam and overlap to a thickness of 80 mils minimum.

2. Refer to section 3.03.40, "Sealing Around Penetrations", for procedures to seal around penetrations.

3. Spray apply LIQUID BOOT® onto geotextile to an 80-mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

4. Do not penetrate membrane. Keep membrane free of dirt, debris and traffic until a protective cover is in place. It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.

5. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer’s instructions.

   NOTE: If water testing or inspection is to be performed, conduct before placing protection course.

C. INSTALLATION ON LAGGING

1. Attach subsurface LIQUID BOOT® UltraDrain 6200 or, securely nail LIQUID BOOT® UltraShield G-800 over lagging and soldier piles keeping geotextile tight to lagging wall. Overlap seams a minimum of six inches (6").

2. Roll out LIQUID BOOT® BaseFabric T-60 geotextile vertically with the heat-rolled side facing out and staple to lagging using 3/8 long staples 12" on center. Overlap seams a minimum of six inches (6"). Spray LIQUID BOOT® within the seam overlap to a thickness of 80 mils minimum. Do not staple top layer of geotextile at overlap.

3. Refer to section 3.03.40, "Sealing Around Penetrations", for procedures to seal around penetrations.

4. Provide a 3/4-inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other

inside corners of 120° or less. Allow to cure overnight before the application of LIQUID BOOT® membrane.

5. Spray-apply LIQUID BOOT® to a minimum thickness of 80 mils (100 mils if installing shotcrete walls). Remove any standing water.

6. Do not penetrate membrane. Keep membrane free of dirt and debris until concrete is in place. It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.

D. SEALING AROUND PENETRATIONS

1. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

2. For applications requiring LIQUID BOOT® BaseFabric geotextile, roll out geotextile on sub-grade with the heat-rolled side facing up, overlapping seams a minimum of six inches (6"). Cut the geotextile around penetrations so that it lays flat on the sub-grade. Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam and overlap to a thickness of 80 mils minimum.

3. At the base of penetration install a minimum 3/4-inch-thick membrane cant of LIQUID BOOT®, or other suitable material as approved by manufacturer. Extend the membrane at an 80-mil thickness three inches (3") around the base of penetration and up the penetration a minimum of three inches (3"). Allow to cure overnight before the application of LIQUID BOOT® membrane. (SEE MANUFACTURER'S STANDARD DETAIL)

4. Spray apply LIQUID BOOT® to an 80 mils minimum dry thickness around the penetration, completely encapsulating the collar assembly and to a height of one-and one-half inches (1 1/2") minimum above the membrane as described in 3.03.40 C above. Spray-apply LIQUID BOOT® to surrounding areas as specified for the particular application. (SEE MANUFACTURER'S STANDARD DETAIL)

5. Allow LIQUID BOOT® to cure completely before proceeding to step "G".

6. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze the cured membrane collar.

E. FLOOD TESTING DRAINS: Flood test each drain for leaks, after completing roofing and flashing but before overlying construction is placed. Plug or dam drains, and flood with potable water.

1. Flood to an average depth of 1-1/2 inches not exceeding a depth of 2.5 inches.
2. Flood each area for 24 hours.
3. After flood testing, repair leaks, repeat flood tests and make further repairs until roofing and flashing installations are watertight.

F. ADDITIONAL TESTING: Set a sprinkler on the roof and run for approximately 1 hour, Then move to a new section. Provide an observer below the roof substrate to identify any water intrusion.

1. After flood testing, if water intrusion is noted, repair leaks, repeat flood tests, and Make further repairs until drain and flashing installations are watertight.

3.04 FIELD QUALITY CONTROL

A. Field Quality Control is a very important part of all LIQUID BOOT® applications. Applicators should check their own work for coverage, thickness, and all-around good workmanship before calling for inspections. Applicators and Inspectors should check membrane for holes, shadow shrinkage, and any other membrane damage when reviewing the membrane. When thickness or integrity is in question the membrane should be tested in the proper manner as described below. However, over-sampling defeats the intent of inspections. Inspectors should always use visual and tactile measurement to guide them. Areas suspected of being too thin to the touch should be measured with the gauges to determine the exact thickness. With practice and by comparing tactile measurements with those of the gauges, fingers become very accurate tools.

B. ON CONCRETE / SHOTCRETE / MASONRY & OTHER HARD SURFACES

1. Membrane may be checked for proper thickness with a blunt-nose depth gauge. Record the minimum reading. Mark the test area for repair, if necessary.
2. If necessary, test areas are to be patched over with LIQUID BOOT® to an 80 mils minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

   NOTE: Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or by water temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane. A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples meet the required membrane thickness (80 mils minimum), then the remaining blisters should not be punctured or cut; if the samples have less than the minimum 80 mils, then the area can either be re-sprayed to obtain the proper thickness, or the blisters can be cut out and the area re-sprayed or patched with LIQUID BOOT® Trowel Grade.

C. ON DIRT AND OTHER SOFT SUBSTRATES

1. Samples may be cut from the membrane and geotextile sandwich to a maximum area of 2 square inches. Measure the thickness with a mil-reading caliper. Deduct the plain geotextile thickness to determine the thickness of LIQUID BOOT® membrane. Mark the test area for repair.

2. Voids left by sampling are to be patched with geotextile overlapping the void by a minimum of two inches (2"). Apply a thin tack coat of LIQUID BOOT® under the geotextile patch. Then spray, or trowel apply, LIQUID BOOT® to an 80 mils minimum dry thickness, extending at least three inches (3") beyond geotextile patch.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Thermal, fire, and acoustical insulation and isolation materials as indicated on the Drawings and specified herein.

B. Related Sections:

1. Framing to which insulation is to be attached, see Division 5 and Division 6.
2. Roofing: see Division 7.

1.02 REFERENCE STANDARDS

A. Ensure installation compliance with CBC, Title 24.

B. ASTM C553 and E84.

1.03 SUBMITTALS

A. Submit manufacturer's product literature and installation instructions for each type of insulation material required.

B. Submit certified test reports showing compliance with performance values, including r-ratings (aged for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

C. Submit CHPS or LEED certification for recycled content and low emitting materials.

1.04 QUALITY ASSURANCE

A. Provide a certification of insulation and post on project, stating that work of this section conforms to the requirements of this section of specifications and Title 24.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Batt Insulation at Horizontal Locations:

1. Provide CertainTeed Corporation, CertaPro Batts, Kraft Faced, or Foil Faced, flanged, in thicknesses necessary to meet aged R-30 value (unless otherwise noted), expressed as average in and out value. Chips certified for low emitting and recycled content.

2. Flame Spread Rating: 25 or less in accordance with ASTM E84.

3. Smoke Density Developed Rating: 50 or less in accordance with ASTM E84.

B. Batt Insulation at Vertical Locations:

1. Provide CertainTeed Corporation, CertaPro Batts, Kraft Faced, or Foil Faced, flanged (or approved equal), in thickness necessary to meet aged R-19 value (unless otherwise noted), expressed as average in and out value. Chips certified for low emitting and recycled content.

2. Flame Spread Rating: 25 or less in accordance with ASTM E84.

   Note: Specified R-values are for materials only and are not to include installation values.

3. Smoke Density Factor: Not to exceed 450.

C. Acoustical Insulation:

1. Provide CertainTeed Corporation, CertaPro Batts, Plain, fiberglass batts (or approved equal), minimum of 3-1/2 inches thick, installed as specified in indicated assemblies.

2. Flame Spread Rating: 25 or less in accordance with ASTM E84.

3. Smoke Density Factor: Not to exceed 450.

4. Provide acoustical insulation in all interior partitions and extend insulation to underside of roof structure.

D. Rigid insulation over metal deck: Provide preformed, double layer, roofing insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thickness, to provide a complete roofing assembly of 0.033 minimum U-Value.

1. Provide preformed, tapered insulation boards. Verify with structure and roof plan if roof slope is provided by tapered insulation or structure slope. Provide tapered insulation for crickets where roof slope is provided by structure. Provide tapered insulation for roof slope where structure is not sloped. Slope to drain and fabricate with the following taper:

   a. 1/4-inch per 12 inches (1:48), unless otherwise indicated.

2. Polyisocyanurate Board Insulation: Rigid, cellular Polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents complying with ASTM C1289, classified by facer type as follows:

   a. Facer Type: Type II, felt or glass-fiber mat on both major surfaces.

3. Insulation Accessories: Furnish roofing insulation accessories recommended by insulation manufacturer for intended use and compatible with roof deck and sheet roofing materials.

   a. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470, designed for fastening roofing insulation to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

4. Insulation Attachment: Secure first layer of Polyisocyanurate Board insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roofing insulation to deck type indicated. Install subsequent layer of 1 inch thick board of insulation in a solid mopping of hot roofing asphalt.

    a. Fasten insulation according to requirements of FM's "Approved Guide" for specified Windstorm Resistance Classification, and the roofing system manufacturers' written instructions.

D. Fire Safing: Provide USG Thermafiber® Fire Safing Insulation, or other approved, where fire safing material is shown, or required. Thermafiber® Safing™ resists temperatures to 2,000ºF. (1.093ºC) and is noncombustible.

2.02 COMPONENTS

A. Acoustical Isolators: Provide isolating and acoustical clamps and sleeves manufactured by Specialty Products & Insulation Company, or other approved, as approved by local codes.

2.03 ACCESSORIES

A. Sag Wires: At all types of batt insulation, provide 18 gage galvanized wire at 16 inches on center. Staple wire at wood structure or sheet metal screw to metal structure to underside of structure, minimum three (3) per connection. Sag wires are not required where gypsum board is attached to the underside of roof framing.

B. Impaling and stick-pins, including washers, are to be provided as recommended in writing by insulation manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Batt Insulation:

1. Insulate exterior areas adjacent and contiguous to spaces unheated, except where shown otherwise by Drawings.

2. Ensure secure attachment so that insulation will not sag over time. Friction fitting is not sufficient. Mechanically attach insulation. Double sided tape attachment is not acceptable.

    a. Install foil and paper facing on warmer side of area being insulated.

    b. Where insulated walls and underside of structure are being left exposed and unfinished, install sag wires at 16" o.c. (minimum) to support insulation.

    c. Where insulation is being installed using impaling pins, ensure that washers are installed over pins after insulation is in place. Space pins as necessary to provide insulation installation which will not sag over time, and as recommended in writing by insulation manufacturer.

4. Ensure the continuous insulation of the building envelope. Tape joints, both ends and sides.

5. Provide two layers of insulation lapping openings by 14 inches or more where intended to be of sound resistive construction at locations such as telephone outlets, electrical, mechanical, or plumbing penetrations.

3.02 DEMONSTRATION

A. Comply with State of California Noise Insulation Standards.

B. Upon completion of installation of building envelope, certify compliance with requirements for Title 24.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal lap-seam wall panels with concealed fasteners metal soffit panels including trim and accessories. Retain only the following subparagraphs that refer to specification sections that are used in this project.

B. Related Sections include the following:

1. Division 6, Section 06 10 00 “Rough Carpentry” for support framing, including studs and bracing.
2. Division 7, Section 07 62 00 “Sheet Metal Flashing and Trim” for flashing and other sheet metal work that is not part of the metal soffit wall panel assemblies.

1.02 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

3. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

4. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

5. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

6. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

7. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

8. ASTM E 283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

9. ASTM E 330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

10. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

C. Underwriters Laboratories (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

E. State of California: CBC 2019.

1. Approval 9482.5.

1.03 PERFORMANCE REQUIREMENTS

A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.

2. Product Data for applicable materials and resources credits: Indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Provide a statement indicating cost for each product having recycled content.

A. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of roof and wall panels, specified loads, flashings, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.

B. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of panel, trim, clip and fastener required.

C. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

D. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

E. Qualifications Statements: For manufacturer and installer.

F. Design Submittal: Comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by a qualified professional engineer.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Warranty: Warranty documents required in this section.

1.06 MAINTENANCE MATERIAL

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals Section. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).

1. Quantity: Furnish units equal to ten percent percent of amount installed.

2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of advanced installer training.

2. Minimum of ten years of experience in manufacturing metal wall panel systems.

3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. At least five years of experience in the installation of metal wall panels.

2. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the wall panel system.

3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

C. Mock-Ups: Install at Project site a mock-up using required products and manufacturer's approved installation methods. Obtain Owner and Architect approval of finish, color, texture, pattern, trim, fasteners and quality of installation before proceeding with further work.

1. Size: 12” x 12”

2. Maintenance: Maintain mock-up during construction for quality comparison. Remove and lawfully dispose of mock-up construction when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner approval.

D. Preinstallation Conference: Conduct a preinstallation conference at Pride Academy at Prospect Avenue School.

E. Fire Resistance Ratings: Determined by testing identical products and assemblies according to UL 263 and ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

1. Flame-Spread Index: 25 (Class A) or less.

1.08 DELIVERY, STORAGE AND HANDLING

A. General: Comply with manufacturer’s current printed product storage recommendations.

B. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

D. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.09 WARRANTY

A. Special Exposed Panel Finish Warranty: Manufacturer's standard form PVDF Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:

a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling or failure of paint to adhere to bare metal.

2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.

3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments

B. Special Warranty: Installer's standard form in which installer agrees to repair or replace metal wall panels that fail due to poor workmanship or faulty installation within the specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 METAL SOFFIT PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation; Soffit Panel- Flush Face Series TLC-1 Panel.

B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 012500 - "Substitution Procedures"

C. Product Options:

1. Panel Coverage: 12 inches (304.8 mm).

Panel Depth: 1-1/2 inches (38.1 mm).

3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, [AZ50] [AZ55] coating designation, structural quality, Grade 50, [0.018 inch (0.46 mm)] [0.0236 inch (0.60 mm)] [0.0296 inch (0.75 mm)] minimum thickness.

4. Material: Aluminum sheet, ASTM B 209, 0.032 inch (0.813 mm) minimum thickness.

5. Finish: PVDF (Kynar 500)

6. Panel Fasteners: Concealed, direct fastened.

7. Surface Configuration: Flat pan

8. Color: Champagne

9. Air Infiltration: 0.25 cfm/sq.ft. at 6.24 psf when tested according to ASTM E 283.

10. Water Penetration: No penetration at 12 psf when tested according to ASTM E 331.

11. Uniform Static Air Pressure Difference: Tested according to ASTM E 330.

12. Code Approval: Comply with requirements of Florida Building Code construction 9482.5.

2.02 STRUCTURAL PERFORMANCE

G. Structural Performance Criteria: ASTM E 1595 Roof Uplift

2.03 MISCELLANEOUS METAL FRAMING

A. General: ASTM C645, cold-formed metallic-coated steel sheet, ASTM A653, G40 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.04 ACCESSORIES

H. General: Provide components required for a complete assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, filers, closure strips, and similar items.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as panels.

2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure watertight construction.

I. Flashing and Trim: Formed from 0.018-inch minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapets caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.05 SOURCE QUALITY CONTROL

A. Source: Obtain metal wall panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain metal wall panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 - EXECUTION

3.01 INSTALLERS

A. An employer of workers trained and approved by manufacturer.

3.02 PREPARATION

A. Miscellaneous Framing: Install furring, angles, subpurlins, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's recommendations.

a. METAL WALL PANEL INSTALLATION

A. General: Comply with panel manufacturer’s installation instructions including but not limited to special techniques, interface with other work, and integration of systems

B. Fasten metal wall panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.

C. Tolerances: Maximum offset from true alignment of adjacent panels installed butting or in line shall be by 1/16”. Panel to panel joints shall not vary greater than 1/16” of the joint size indicated on drawings.

3.05 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.06 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: If requested by Owner, provide manufacturer’s field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer’s instructions.

3.7 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer’s instructions prior to Owner’s acceptance.

D. Remove and lawfully dispose of construction debris from Project site.

3.8 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 07 54 00

THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope – Install a complete adhered Sika Sarnafil, or equal roofing system including membrane, flashings and other components.

B. Related Work - The work includes but is not limited to the installation of:

1. Substrate Preparation
2. Roof Drains
3. Vapor Barrier
4. Wood Blocking
5. Insulation
6. Separation Layers
7. Roof Membrane
8. Fasteners
9. Adhesive for Flashings
10. Roof Membrane Flashings
11. Walkways
12. Metal Flashings
13. Sealants

C. Upon successful completion of work the following warranties must be submitted:

1. Sika Sarnafil Warranty – 20 years
2. Roofing Applicator Warranty – 20 years

1.02 QUALITY ASSURANCE

A. This roofing system shall be applied only by a Roofing Applicator authorized by Sika Sarnafil prior to bid. Equal roofing systems and applicators shall be submitted and approved prior to bid.

B. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and Sika Sarnafil, or equal.

C. All work pertaining to the installation of roofing membrane and flashings shall only be completed by Applicator personnel trained and authorized by Sika Sarnafil, or equal in those procedures.

1.03 SUBMITTALS

A. At the time of bidding, the Applicator shall submit to the Owner (or Representative) the following:

1. Specific adherence to specification guideline.

2. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.

3. Written approval by the insulation manufacturer for use and performance of the product in the proposed system.

4. Sample copy of manufacturer’s warranty.

5. Sample copy of Applicator's warranty.

6. Dimensioned shop drawings which shall include:

7. Outline of roof with roof size and elevations shown.

8. Details of flashing methods for every penetration and flashing condition.

B. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.

C. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.

D. Material Safety Data Sheets (MSDS)

1.04 CODE REQUIREMENTS

A. The Applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

B. System shall be designed to meet a minimum wind design requirements of the most recent version of ASCE 7.

C. Factory Mutual Research Corporation (FM) - Norwood, MA

1. Class 1-90 (for high wind exposure)

D. Underwriters Laboratories, Inc. - Northbrook, IL

1. Class A assembly

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

D. As a general rule all adhesives shall be stored at temperatures between 40-degree F (5 degree C) and 80 degree F (27 degree C). Read instructions contained on adhesive canister for specific storage instructions.

E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

F. All materials which are determined to be damaged by the Owner's Representative or Sika Sarnafil, or equal representative are to be removed from the job site and replaced at no cost to the Owner.

1.06 JOB CONDITIONS

A. Sarnafil, or equal, materials may be installed under certain adverse weather conditions but only after consultation with manufacturer as installation time and system integrity may be affected.

B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.

C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.

E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. The Applicator is cautioned that certain Sarnafil membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with Sarnafil membranes. The Applicator shall consult Sika Sarnafil regarding compatibility, precautions and recommendations.

H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Sarnafelt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air or similar methods.

J. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

K. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.

L. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

M. The Applicator shall take precautions that storage and application of materials and equipment does not overload the roof deck or building structure.

N. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

O. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing to the Owner's Representative for corrective action prior to the installation of the roof system.

P. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction.

Q. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.

R. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.

S. The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to verify condition of the deck/substrate and to confirm expected pullout values.

T. The Sarnafil membrane shall not be installed under the following conditions without consulting Sika Sarnafil’s Technical Dept. for precautionary steps:

1. The roof assembly permits interior air to pressurize the membrane underside.

2. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.

3. The wall/deck intersection permits air entry into the wall flashing area.

U. Precautions shall be taken when using any adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

V. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

W. Membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

1.07 BIDDING REQUIREMENTS

A. Pre-Bid Meeting:

A pre-bid meeting shall be held with the Owner's Representative and involved trades to discuss all aspects of the project. The Applicator's field representative or roofing foreman for the work shall be in attendance. Procedures to avoid rooftop damage by other trades shall be determined.

B. Site Visit:

Bidders shall visit the site and carefully examine the areas in question as to conditions that may affect proper execution of the work. All dimensions and quantities shall be determined or verified by the Applicator. No claims for extra costs will be allowed because of lack of full knowledge of the existing conditions unless agreed to in advance with the Owner or Owner's Representative.

1.08 WARRANTIES

A. Manufacturer’s Membrane Warranty – 30 years.

B. Manufacturer’s Standard System Warranty – all products installed shall be covered by a standard warranty of 30 years.

C. Applicator/Roofing Contractor Warranty – Applicator’s/Contractor’s warranty shall be 30 years. Applicator/Contractor shall supply Owner with a separate workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within Applicator warranty term, defective or otherwise not in accordance with Contract Documents, the Applicator shall repair that defect at no cost to the Owner. Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent manufacturer.

D. Owner Responsibility - Owner shall notify the contractor of any leaks, within one month, as they occur during the time period when both warranties are in effect.

PART 2 - PRODUCTS

2.01 GENERAL

A. Manufacturer: The components of the Sarnafil Adhered roof system, or equal, are to be products of Sika Sarnafil, or equal, as indicated on the Drawings and specified in the Contract Documents.

B. Other acceptable manufacturers: Johns Manville, Tremco or equal, upon submission of an acceptable pre-bid submittal.

2.02 MEMBRANE

A. Sarnafil G410 fiberglass reinforced membrane with a lacquer coating.

B. Membrane shall conform to ASTM D4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II, Grade I.

1. Sarnafil 6G410-20, 80 mil (2.0 mm), thermoplastic membrane with fiberglass reinforcement.

C. Certified Polymer Thickness

D. Color of Membrane - EnergySmart White, initial solar reflectance of 0.83, emittance of 0.90, and solar reflective index (SRI) of 104 (ENERGY STAR listed).

E. Typical Physical Properties (1)

Parameters	ASTM Test Method	ASTM D-4434 Spec. Requirement	Typical Physical Properties
Reinforcing Material	-	-	Fiberglass
Overall Thickness (1), min., inches (mm)	D638	0.045 (1.14)	[0.0__inches)]
Thickness Above Scrim	-	-	0.023 (avg.)
Tensile Strength, min., psi (MPa)	D638	1500 (10.4)	1600 (11.1)
Elongation at Break, min. (machine / transverse)	D638	250% / 220%	250% / 220%
Seam strength (2), min. (% of tensile strength)	D638	75	80
Retention of Properties After Heat Aging	D3045	-	-
Tensile Strength, min., (% of original)	D638	90	95
Elongation, min., (% of original)	D638	90	90
Tearing Resistance, min., lbf (N)	D1004	10 (45.0)	14 (63.0)
Low Temperature Bend, -40º F (-40º C)	D2136	Pass	Pass
Accelerated Weathering Test (florescent light, uv exposure)	G154	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7x magnification)	-	None	None
Linear Dimensional Change	D1204	0.10 % max.	0.02%
Weight Change After Immersion in Water	D570	± 3.0% max.	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf (10 J)	D5635	Pass	Pass
Initial Solar Reflectance	E903	-	0.83
Emissivity	E408, C1371, Other	-	0.90
Solar Reflective Index (SRI)	E1980	-	104
Recycled Content (5 & 10 ft. sheets only)	8 to 12% Pre-Consumer / Up to 1% Post Consumer.		

Notes
(1) Typical Physical Properties data is applicable for 0.048 in (1.2 mm) membrane thickness and greater.
(2) Failure occurs through membrane rupture not seam failure.

2.03 FLASHING MATERIALS

A. Wall/Curb Flashing - Sarnaclad, or equal - A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20-mil unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0 m

B. Perimeter Edge Flashing - Sarnaclad, or equal - A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles for a high wind installation. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0 m). Consult Product Data Sheet for additional information.

C. Miscellaneous Flashing – all miscellaneous flashing are referenced in terms of Sarnafil. Equal products shall be submitted for review and approval by Architect.

1. Sarnaflash - Prefabricated expansion joint cover made from Sarnafil membrane. Sarnaflash is designed for securement to vertical or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4-1/2 inches (25 mm to 114 mm) across. Available in 40-foot (12 m) rolls.

2. Sarnareglet - Heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Sarnareglet is produced from 6063-T5, 0.10 inch to 0.12 inch (2.5 mm to 3.0 mm) thick extruded aluminum. Sarnareglet has a 2-1/4 inch (57 mm) deep profile and is provided in 10 foot (3 m) lengths. Use prefabricated Sarnareglet mitered inside and outside corners where walls intersect.

3. Sarnastack - Prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick Sarnafil G410 membrane.

4. Sarnadrain-RAC - PVC-coated, heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Sarnadrain-RAC is made of 0.080 inch (2 mm) thick 6063 aluminum with a urethane seal installed at the end of the drainpipe. The large 14-inch x 14 inch (0.36 m x 0.36 m) drain strainer is also made of 0.080 inch (2 mm) thick aluminum stock. The flange dimensions of Sarnadrain-RAC are 18 inches x 18 inches (0.46 m x 0.46 m).

5. Sarnacircle-"G" - Circular 0.048 inch (48 mil/1.2 mm) thick G410 membrane patch welded over T-joints formed by overlapping thick membranes.

6. Sarnacorners – Universal - Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Sarnaclad base flashings.

7. Open Post Flashing - Prefabricated post flashing, 0.048 inch (48 mil/1.2 mm) thick, with an open seam used to flash obstructed rooftop conduits and pipes 1/2 to 1-1/4 inch (12.7-31.8 mm) in diameter. Available in 2 sizes; 1/2 to 3/4-inch (12.7-19 mm) and 3/4 to 1-1/4 inch (19-31.8 mm) diameter. Open Post Flashings are heat welded in place and terminated at the top of the penetration completing the pipe penetration detail.

8. Sikaflex-1a Sealant

9. Sarnafiller - A two-component urethane adhesive used for pitch pocket filler. Cures with excellent elasticity and adhesion to various surfaces.

10. Sarnacol 2170 Adhesive - Solvent-based reactivating adhesive used to attach membrane to flashing substrate.

11. Sarnacol 2170 VC Adhesive - Solvent-based, low VOC, reactivating adhesive used to attach membrane to flashing substrate.

12. Sarnafelt - A non-woven polyester or polypropylene mat cushion layer that is necessary behind G410 or G459 Flashing Membrane when the flashing substrates are rough or incompatible with the flashing membrane.

2.04 INSULATION/OVERLAYMENT/RECOVER BOARD

A. Sarnatherm, - Atlas AC Foam-IV, or equal, - 2 layers of rigid isocyanurate foam insulation composed of a losed cell polyisocyanurate foam core laminated to a high performance coated glass facer. DensDeck, or equal – ½" Siliconized gypsum, fire-tested hardboard with glass-mat facers.

2.05 ATTACHMENT COMPONENTS

A. Membrane Adhesive - Sarnacol, or equal, 2170 VC Adhesive:

A solvent-based, low VOC, reactivating adhesive used to attach the membrane to the substrate, either horizontally or vertically. Consult Product Data Sheets for additional information. Application rates are as follows:

SARNACOL 2170 VC APPLICATION RATES FOR BARE BACK MEMBRANE							
	Adhesive Rates – Gallons per 100 Square Feet *(Liters per Meter²)*						Approximate Sq. Ft./Pail *(meter²)*
	Substrate		Membrane		Total		
Isocyanurate Paper Facer	1.25 *(0.51)*	+	0.50 *(0.20)*	=	1.75 *(0.71)*		285 *(26.48)*
Smooth Plywood	1.00 *(0.41)*	+	0.50 *(0.20)*	=	1.50 *(0.61)*		333 *(30.94)*
Metal	0.75 *(0.31)*	+	0.50 *(0.20)*	=	1.25 *(0.51)*		400 *(37.16)*
Concrete Wall	1.25 *(0.51)*	+	0.50 *(0.20)*	=	1.75 *(0.71)*		285 *(26.48)*
GP DensDeck	1.25 *(0.51)*	+	0.50 *(0.20)*	=	1.75 *(0.71)*		285 *(26.48)*
GP DensDeck Prime GP DensDeck DuraGuard	1.00 *(0.41)*	+	0.50 *(0.20)*	=	1.50 *(0.61)*		333 *(30.94)*
USG Securock Gypsum-Fiber	0.75 *(0.31)*	+	0.50 *(0.20)*	=	1.25 *(0.51)*		400 *(37.16)*

SARNACOL 2170 VC APPLICATION RATES FOR MEMBRANE FLASHINGS USING SARNAFELT									
	Adhesive Rates – Gallons per 100 Square Feet *(Liters per Meter²)*								Approximate Sq. Ft./Pail *(meter²)*
	Substrate (1st coat)		Substrate (2nd coat)		Membrane		Total		
Smooth Plywood	1.00 *(0.41)*	+	1.00 *(0.41)*	+	0.50 *(0.20)*	=	2.50 *(1.02)*		200 *(18.58)*
Concrete Wall	1.00 *(0.41)*	+	1.00 *(0.41)*	+	0.50 *(0.20)*	=	2.50 *(1.02)*		200 *(18.58)*
Masonry Wall	1.00 *(0.41)*	+	1.00 *(0.41)*	+	0.50 *(0.20)*	=	2.50 *(1.02)*		200 *(18.58)*
Granular Bitumen	1.00 *(0.41)*	+	1.00 *(0.41)*	+	0.50 *(0.20)*	=	2.50 *(1.02)*		200 *(18.58)*
Smooth Aged Bitumen	1.00 *(0.41)*	+	1.00 *(0.41)*	+	0.50 *(0.20)*	=	2.50 *(1.02)*		200 *(18.58)*

Notes:

a) Due to an increase in viscosity when outdoor temperatures during installation are below 40-degree F (5 degree C), add 1/2 gallon per 100 square feet (0.2 l per m²) to rate for estimating purposes. Do not install when air temperature is within 5-degree F of dew point. Solvent evaporation time increases significantly when temperatures drop. Ensure first layer of Sarnacol 2170 is fully dry before second layer is applied to the back of the membrane for proper reactivation.

b) Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

B. Insulation Board Placement

1. Sarnacol 2163 Adhesive - A low odor, VOC compliant, one step, low-rise urethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a gravity fed applicator or by hand with a dual component caulk gun. Additional adhesive may be required for rougher surfaces. Consult Product Data Sheets for additional information.

   Notes:
   a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).

   b) Place insulation board into the adhesive shortly after it has reached its maximum rise [typically within 30 to 45 seconds at 60 to 80-degree F (16 to 27 degree C)] and walk into place.

   c) Minimum product temperature before entering the dispenser should be 70-degree F (21 degree C).

   d) Store between 60-degree F (16 degree C) and 80 degree F (27 degree C).

   e) Adhesive shall not be used during inclement weather.

   f) Adhesive shall not be applied to wet or damp surfaces.

   g) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

2. Sarnacol 2164 Adhesive - A low odor, VOC compliant, single component, low-rise urethane foam used to attach insulation to approved compatible substrates.

   Notes:
   a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).

   b) Place insulation board into wet adhesive immediately.

   c) Adhesive shall not be used during inclement weather.

   d) Adhesive shall not be applied to wet or damp surfaces.

   e) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

3. Sarnaplate - Used with various Sarnafasteners to attach insulation boards to roof deck. Sarnaplate is a 3-inch (75 mm) square or round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating.

4. Sarnaplate-HD/CD - Used with Sarnafastener-HD or Sarnafastener-CD10 to attach insulation boards to wood or concrete roof decks. Sarnaplate-HD/CD is a 3-inch (75 mm) round stamping of SAE 1010 steel with an AZ 55 Galvalume

coating. Consult Product Data Sheet for additional information.

5. Sarnaplate-Preassembled Combination of a 3-inch round plate and a #12 fastener used to attach insulation boards to steel or wood roof decks. Sarnaplate-Preassembled consists of a 3-inch (75 mm) round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating and Sarnafastener #12 with modified buttress thread. The fastener shank diameter is approximately 0.168 inch (4 mm) and the thread diameter is approximately 0.214 inch (5 mm). Consult Product Data Sheet for additional information.

6. Sarnafastener #12A #12 corrosion-resistant fastener used with Sarnaplates to attach insulation boards to steel or wood roof decks. Sarnafastener #12 has a modified buttress thread, a shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Product Data Sheet for additional information.

7. Sarnafastener-HD A #14 corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation boards or with Sarnastop and Sarnabar to attach membrane to structural concrete or wood roof decks. Sarnafastener-HD has a shank diameter of 0.190 inch (4.8 mm), a thread diameter of 0.245 inch (6.2 mm) and a #3 Phillips drive head with a diameter of 0.435 inch (11 mm). Consult Product Data Sheet for additional information.

8. Sarnafastener-XP –

   A #15, heavy-duty, corrosion-resistant fastener used with Sarnaplate to attach insulation or with Sarnadisc, Sarnastop and Sarnabar to attach Sarnafil G410 roof membrane to steel or 1/2-3/4-inch wood roof decks. Sarnafastener-XP has a shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Product Data Sheet for additional information.

9. Sarnafastener-XPS - A specially designed, heavy-duty, corrosion-resistant fastener used with Sarnastop or Sarnabar to attach Sarnafil G410 roof membrane to steel roof decks. Sarnafastener-XPS has a shank diameter of approximately 0.21 inch (5.3mm) and a thread diameter of approximately 0.26 inch (6.6). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement and simplicity of application. Consult Product Data Sheet for additional information.

10. Sarnafastener-CD10 - A nail-in, corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation to normal weight concrete roof deck. Sarnafastener-CD10 has a shank diameter of 0.215-inch (5.5 mm), a split diameter of 0.265/0.275 inch (6.7/7.0 mm) and a flat head with a 0.435 inch (11 mm) diameter. Consult Product Data Sheet for additional information.

11. Sarnastop - An extruded aluminum, low profile bar used with certain Sarnafasteners to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate. Sarnastop is a 1 inch (25 mm) wide, flat aluminum bar 1/8 inch (3 mm) thick that has predrilled holes every 6 inches (152 mm) on center. Consult Product Data Sheet for additional information.

12. Sarnabar - An FM-approved, heavy-duty, 14 gauge, galvanized or stainless, roll-

formed steel bar used to attach membrane to roof decks. The formed steel is pre-punched with holes every 1 inch (25 mm) on center to allow various Sarnafastener spacing options. Consult Product Data Sheet for additional information.

13. Sarnacord - A 5/32-inch (4 mm) diameter, red-colored, flexible thermoplastic extrusion that is welded to the top surface of the Sarnafil membrane and against the side of the Sarnabar, used to hold the membrane in position. Consult Product Data Sheet for additional information.

2.06 DECK PRIMERS

A. Sarnacol LR-2001 Deck Primer - Designed for use with Sarnacol LR-2001 adhesive to condition surfaces and promote adhesion between certain vapor barriers, acceptable deck substrates such as perlite, vermiculite and Zonolite with insulation board products. Consult Product Data Sheet for additional information.

B. Sarnavap Self-Adhered Primer - A solvent-based primer designed for use with Sarnavap Self-Adhered vapor barrier to prime wood, concrete, lightweight concrete, gypsum boards and decks prior to application Sarnavap Self-Adhered vapor barrier. Consult Product Data Sheet for additional information.

C. Sarnavap Self-Adhered Primer WB - A water-based primer designed for use with Sarnavap Self-Adhered vapor barrier to promote adhesion to most substrates. Particularly recommended when use of solvent-based primer is not advised or permitted. Consult Product Data Sheet for additional information.

2.07 WALKWAY PROTECTION

A. Sarnatred - A polyester reinforced, 0.096 inch (96 mil/2.4 mm), weldable membrane with surface embossment. Used as a protection layer from rooftop traffic. Sarnatred is supplied in rolls of 39.3 inches (1.0 m) wide and 32.8 feet (10 m) long. Consult Product Data Sheet for additional information.

2.08 VAPOR BARRIER

A. Sarnavap-10 - A 10 mil (0.25 mm) thick polyethylene vapor barrier/air barrier. Sarnavap-10 is supplied in a folded panel that is rolled onto a core. The core width is 5 feet (1.5 m). When unrolled off the core and unfolded, the sheet dimensions are 20 feet (6.9 m) wide by 100 feet (33 m) long. Consult Product Data Sheet for additional information.

2.09 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape - A 2 inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

B. Sealing Tape Strip - Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and windblown moisture entry.

C. Multi-Purpose Tape - A high performance sealant tape used with metal flashings as a preventive measure against air and windblown moisture entry.

D. Sarnamatic 641mc or 661 - 220 volt, self-propelled, hot-air welding machine used to seal Sarnafil membrane seams.

E. Sarnasolv - A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Sarnasolv is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled. Consult Product Data Sheet for additional information.

F. Perimeter Warning Tape - Designed for use on PVC membranes as a reflective, highly visible pressure sensitive tape used to draw attention to roof perimeters and potentially hazardous areas. Perimeter Warning Tape exceeds reflectivity 3 requirements and Federal spec. L-S-300, Class 1.

2.10 SEALANTS AND PITCH POCKET FILLERS

A. Sarnafil Sikaflex-1a Sealant, or equal.

B. Sarnafiller (two-component urethane adhesive for pitch pocket toppings).

Depending on substrates, the following sealants are options for temporary overnight tie-ins:

1. Type III hot asphalt conforming to ASTM D312 (latest version).

2. Sarnafiller.

3. Multiple layers of roofing cement and felt.

4. Spray-applied, water-resistant urethane foam.

5. Mechanical attachment with rigid bars and compressed sealant.

2.11 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4 inch (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.

2.12 RELATED MATERIALS

A. Wood Nailer - Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19 percent by weight on a dry-weight basis.

B. Plywood - When bonding directly to plywood, a minimum 1/2-inch (12 mm) CDX (C side out), smooth-surfaced exterior grade plywood with exterior grade glue shall be used. Rough-surfaced plywood or high fastener heads will require the use of Sarnafelt behind

the flashing membrane. Plywood shall have a maximum moisture content of 19 percent by weight on a dry weight basis.

2.13 ROOF NUMBERS

A. Provide roof numbers to all buildings. Roof numbers shall be a minimum of 6'-3" high and 14" to 16" wide. Numbers shall be cut from roof membrane and adhered using the system approved by the roofing manufacturer. All roof numbers shall be black. Submit roof numbers and obtain approval from Project Manager prior to application. See plans for exact building number. Use "Administration" for the administration building and numbers or letters, in accordance with the building numbering system for the school.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION CONFERENCE

A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.

The meeting shall discuss all aspects of the project including but not limited to:

1. Safety
2. Set up
3. Construction schedule
4. Contract conditions
5. Coordination of the work

3.02 SUBSTRATE CONDITION

A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

B. Applicator shall verify that the work done under related sections meets the following conditions:

1. Roof drains and scuppers have been reconditioned or replaced and installed properly.

2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
3. All surfaces are smooth and free of dirt, debris and incompatible materials.
4. All roof surfaces shall be free of water, ice and snow.
5. Clearing and testing of all roof drains and leaders.

3.03 SUBSTRATE PREPARATION

A. The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner as to eliminate risk of deck overload due to concentrated weight. The

Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location.

B. Existing Poured Structural Concrete Deck:

The contractor shall provide a smooth and level finish and shall be free of dust, excess moisture, oil-based curing agents and loose debris. Sharp ridges or other projections above the surface shall be removed before roofing.

3.04 SUBSTRATE INSPECTION

A. A dry, clean and smooth substrate shall be prepared to receive the Sarnafil Adhered roof system.

B. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.

C. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.

D. All roof surfaces shall be free of water, ice and snow.

E. Sarnafil shall be applied over compatible and accepted substrates only.

3.05 VAPOR BARRIER/AIR BARRIER INSTALLATION

A. Sarnavap Self-Adhered

1. Primer Application - The substrate must be clean, dry and free of dust, grease or other contaminants. Shake well before using. Apply to clean and dry surfaces with a paint brush, roller or sprayer. Application rates will vary depending on substrate. Sarnavap Self-Adhered vapor barrier must be installed on the same day as the primer application. Acceptable substrates for primer application include wood, concrete, lightweight concrete, gypsum boards and decks. Drying time is typically 30 minutes to 3 hours.

   Spraying equipment recommendations - Spray tip size: between 20 and 25 mils at 1300 psi continuous.

   To Install:

   a. Apply primer to prepared substrate.

   b. Allow primer to dry completely.

   c. Install Sarnavap Self-Adhered vapor barrier.

Notes:

a) Do not install when it is raining, snowing, or on wet/humid surfaces.

b) Install Sarnavap Self-Adhered Primer at temperatures 32-degree F (0 degree C) and above. Average coverage rate is 0.25 to 1.22 gallons per square (0.1 to 0.5 L per m²).

c) Install Sarnavap Self-Adhered Primer WB at temperatures 41-degree F (5 degree C) and above. Average coverage rate is 0.25 to 0.75 gallon per square (0.1 to 0.3 L per m²). KEEP FROM FREEZING.

d) Do not use Sarnavap Self-Adhered Primer WB to seal Sarnavap Self-Adhered vapor barrier membrane joints.

e) Sarnavap Self-Adhered Primer WB is not suitable for plastic surfaces.

f) Do not use Sarnavap Self-Adhered Primer WB on asphaltic boards.

B. Membrane Application over Concrete Deck (Reroofing with Removal of Existing Roofing):

Install Sarnavap Self-Adhered over a clean and dry substrate. In concrete applications allow concrete to cure for at least 7 days. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 32-degree F (0 degree C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks. On metal decks use a metal plate (6 x 42 inches - 15 x 106 cm) to support the membrane end lap between metal flutes ensuring a complete end lap seal.

a. Begin application at the bottom of the slope. Unroll Sarnavap Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 inches (75 mm) lengthwise following the reference line and by 6 inches (150 mm) at each end. Stagger end laps by at least 12 inches (300 mm). Do not immediately remove the silicone release sheet.

b. Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Sarnavap Self-Adhered tight and peel back the release sheet by pulling diagonally.

c. Use a 75 lb. (34 kg) roller to press Sarnavap Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

3.06 WOOD NAILER INSTALLATION

A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary, to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.

B. Thickness shall be as required to match substrate or insulation height to allow a smooth transition.

C. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any

direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

D. Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any Sika Sarnafil product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

3.07 INSULATION INSTALLATION

A. General Criteria:

Insulation shall be installed according to insulation manufacturer's instructions.
General Criteria:

Insulation shall be neatly cut to fit around penetrations and projections.

Install tapered insulation in accordance with insulation manufacturer's shop drawings.

Install tapered insulation around drains creating a drain sump.

Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.

Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.

B. Mechanical Attachment (if required – Architect to specify)

1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's and Sika Sarnafil's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

2. Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer and Sika Sarnafil.

3. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

C. Sarnacol 2163 Adhesive (if required – Architect to specify)

1. With a utility knife, cut away the plastic plugs from the Sarnacol 2163 mixing head. Attach a mixing tip to the threaded mixing head. Place the cartridge into the applicator. At the beginning of the tube, some of the material should be pumped out initially to make sure of a proper mix. Apply using a gravity fed applicator or by hand with a dual component caulk gun over properly installed and prepared substrates in bands 12 inches (305 mm) on center. Bands are 1/4 to 1/2 inch (6 to 13 mm) wide before foaming. Adhesive will quickly, within 30 to

45 seconds at 60 to 80-degree F (15 to 27 degree C), transform from a liquid into a low rise foam. Immediately set insulation boards into wet adhesive. Do not allow the adhesive to skin over. Walk insulation boards into place to ensure full embedment. Within 5 to 15 minutes the boards are securely attached to the substrate. In warmer weather this process is a little quicker. In colder weather the process is a little slower. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2 inch (13 mm) in 12 inches (305 mm), begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. Only areas that can be made completely watertight in the same day's operations shall be coated. Un-used adhesive can be applied at a later date by simply replacing the mixing tip.

For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

2. Approved Insulation Boards:

   a. Sarnatherm Polyisocyanurate, 1 inch (25 mm) minimum thickness (required for Systems Warranty).

   b. Or equal – DensDeck, or Securock Gypsum-Fiber

3. Approved Substrate/Deck:

   a. Structural Roof Decking: Concrete, Gypsum, Cemetitious Wood Fiber (Tectum), Wood or Steel.

   b. Base sheets: Standard or Granular surfaced.

   c. Smooth Built-Up Roof Surfaces: Re-Roof Applications.

4. Re-cover Applications - A moisture survey must be performed. Any wet materials must be removed and replaced with compatible materials. For existing B.U.R., modified bitumen or mineral surface cap sheets inspections shall be performed for adhesion between the plies, insulation and deck. Deficiencies such as blisters, buckles, wrinkles and fishmouths shall be cut out or mechanically fastened. Apply Sarnacol 2163/2164 Universal Primer to all substrates prior to the application of Sarnacol 2163 adhesive.

5. Installation Guidelines:

   a. Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).

   b. For ease of application, maintain a minimum material temperature of 70-degree F (21 degree C) prior to use.

   c. Store between 60-degree F (16 degree C) and 80-degree F (27 degree C).

   d. Adhesive shall not be used during inclement weather.

   e. Adhesive shall not be applied to wet or damp surfaces.

f. Do not use warped or curled insulation boards.

g. For uneven surfaces, trimming or slitting of boards may be necessary.

h. Approximate Set-Time:

Air Temperature between 60 to 90-degree F (15 to 32 degree C) = 5 to 8 minutes.

Air Temperature between 32 to 60-degree F (0 to 15 degree C) = 8 to 15 minutes.

i. Coverage:

Approximately 600 square feet per case. Rates are based on an application pattern of 4 ribbons, 1/4 to 1/2-inch (6 to 13 mm) beads, 12 inches (30 cm) on center per 4 x 4 feet (121.9 x 121.9 cm) insulation board. Coverage rates may vary over irregular surfaces.

j. A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

3.08 INSTALLATION OF SARNAFIL MEMBRANE

The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

A. Sarnacol 2170 / 2170 VC Adhesive:

1. Over the properly installed and prepared substrate surface, adhesive shall be applied using solvent-resistant 3/4-inch (19 mm) nap paint rollers. The adhesive shall be applied to the substrate at a rate according to Sika Sarnafil requirements. The adhesive shall be applied in smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be coated with adhesive. The first layer of adhesive shall be allowed to dry completely prior to installing the membrane.

2. When the adhesive on the substrate is dry, the Sarnafil roof membrane is unrolled. Adjacent sheets shall be overlapped 3 inches (75 mm). Once in place, one-half of the sheet's length shall be turned back and the underside shall be coated with adhesive at a rate of 1/2 gallon per 100 square feet (0.2 liters per m^2). When the membrane adhesive has dried slightly to produce strings when touched with a dry finger, the coated membrane shall be rolled onto the previously-coated substrate being careful to avoid wrinkles. Do not allow adhesive on the underside of the Sarnafil membrane to dry completely. The amount of membrane that can be coated with adhesive before rolling into substrate will be determined by ambient temperature, humidity and crew. The bonded sheet shall be pressed firmly in place with a water-filled, foam-covered lawn roller by frequent rolling in two directions. The remaining un-bonded half of the sheet shall be folded back and the procedure repeated.

Notes: The Applicator shall count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate. No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

3.09 HOT-AIR WELDING OF SEAM OVERLAPS

A. General –

1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (76 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.

2. Welding equipment shall be provided by or approved by Sika Sarnafil. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Sika Sarnafil Technical Service Representative prior to welding.

3. All membrane to be welded shall be clean and dry.

B. Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45-degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow", the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of Sika Sarnafil's automatic welding equipment. When using this equipment, Sika Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.

2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Sika Sarnafil's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at

least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.10 MEMBRANE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

A. Sarnacol Adhesive for Membrane Flashings

1. Over the properly installed and prepared flashing substrate, Sarnacol adhesive shall be applied according to instructions found on the Product Data Sheet. The Sarnacol adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.

2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

3. Install Sarnastop/Sarnabar/Sarnacord according to the Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs. Sarnastop is required by Sika Sarnafil at the base of all tapered edge strips and at transitions, peaks, and valleys according to Sika Sarnafil's details.

B. Sika Sarnafil's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by Sika Sarnafil prior to installation.

1. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Sika Sarnafil Technical Department.

2. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the flashing membrane.

3. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop at 6 to 8 inches (0.15 to 0.20 m) on center.

4. Sarnafil flashings shall be terminated according to Sika Sarnafil recommended details.

5. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Sika Sarnafil Technical Department for securement methods.

3.11 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:

1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).

2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

3. Metal, other than that provided by Sika Sarnafil, is not covered under the Sika Sarnafil warranty.

4. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

5. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

6. Metal joints shall be watertight.

7. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

8. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.

9. Counter flashings shall overlap base flashings at least 4 inches (100 mm).

10. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2-inch (38 mm) minimum and shall be securely sealed from air entry.

3.12 SARNACLAD METAL BASE FLASHINGS/EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

A. Sarnaclad metal flashings shall be formed and installed per the Detail Drawings.

1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).

2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

3. Adjacent sheets of Sarnaclad shall be spaced 1/4 inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4-inch minimum (100 mm) wide strip of Sarnafil flashing membrane shall be hot-air welded over the joint. Exercise caution at perimeter of roof.

3.13 EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

A. Edge Grip Extruded

1. Position the roof membrane over edge of roof and down outside face of wall covering wood nailer(s) completely. Allow 1/2 inch (13 mm) of excess membrane to extend down past the wood nailer. Hot-air weld all seams making sure there are no voids in welds.

2. Apply a 3/8 inch (10 mm) continuous bead of Sikaflex – 1a sealant to the clean bottom of heavy-duty extruded retainer. Install extruded retainer from right to left as seen from rooftop. Field cut sections as necessary.

3. Install retainer splice under intersecting sections of extruded retainer.

4. Fasten extruded retainer into side of nailer 12 inches (0.3 m) on center. Use fasteners provided with Edge Grip Extruded system; 1-1/2-inch (38 mm) hex head stainless steel fasteners with neoprene washers. Allow 1/8-inch (3 mm) gap between extruded retainer sections for thermal expansion [1/4 inch (6 mm) if temperature is below 40 degrees F (4 C)].

5. Fasteners shall provide a minimum 240 lbs. (109 kg) pull-out resistance; suitable for the substrates to which being installed.

6. Install concealed joint splice plates at intersecting sections of snap-on fascia cover joints.

7. Position snap-on fascia cover so that it’s top engages the extruded retainer top. Rotate downward engaging bottoms of snap-on fascia cover and extruded retainer base plate. Allow 1/4-inch (6 mm) gap between snap-on fascia sections for thermal expansion. Field cut where necessary.

3.14 WALKWAY INSTALLATION

A. Sarnatred Walkway - Roofing membrane to receive Sarnatred Walkway shall be clean and dry. Place chalk lines on deck sheet to indicate location of Walkway. Apply a continuous coat of Sarnacol 2170 or 2170 VC adhesive to the deck sheet and the back of Walkway in accordance with Sika Sarnafil's technical requirements and press Walkway into place with a water-filled, foam-covered lawn roller. Clean the deck membrane in areas to be welded. Hot-air weld the entire perimeter of the Walkway to the Sarnafil deck sheet. Check all welds with a rounded screwdriver. Re-weld any inconsistencies. Important: Check all existing deck membrane seams that are to be covered by Walkway with rounded screwdriver and reweld any inconsistencies before Walkway installation. Do not run Walkway over Sarnabars.

3.15 PERIMETER WARNING TAPE

Areas of membrane where tape is to be applied must be cleaned to a “like new” condition. Failure to properly clean the membrane will result in less than satisfactory adhesion. The membrane should be cleaned as follows:

A. New membrane: Remove loose dirt and dust by wiping clean with water. For areas where dirt is embedded, scrub the application area with a commercial cleaner such as Simple Green, 409 or other similar all-purpose cleaner using a Scotch Brite scrubbing pad or similar product. Wash away residual cleaning material with clean water.

B. Weathered membrane: For older membranes or areas where there is excessive dirt buildup, use the above cleaning procedure followed by cleaning with a natural fiber rag wet with MEK, and wipe away all residual cleaning solution and remaining dirt until membrane has a “like new” appearance.

C. After surface is clean and dry, apply tape to surface taking care to avoid trapping air and creating blisters as tape is smoothed over with hand pressure. If a chalk line is used be sure to keep chalk dust clear of application area.

D. Do not apply Perimeter Warning Tape to surfaces where the temperature is below 40 degrees Fahrenheit.

E. Perimeter Warning Tape may be slippery when wet.

3.16 TEMPORARY CUT-OFF

A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100 percent watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. Waterstop shall be sealed to the deck or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 2.10. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of offsite. None of these materials shall be used in the new work.

B. If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

C. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.17 TESTING

A. Flood Testing Drains: Flood test each drain for leaks, after completing roofing and flashing but before overlying construction is placed. Plug or dam drains, and flood with potable water.

1. Flood to an average depth of 1-1/2 inches not exceeding a depth of 2.5 inches.

2. Flood each area for 24 hours.

3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

B. Additional Testing: Set a sprinkler on the roof and run for approximately 1 hour, then move to a new section. Provide an observer below the roof substrate to identify any water intrusion.

1. After flood testing, if water intrusion is noted, repair leaks, repeat flood tests, and make further repairs until drain and flashing installations are watertight.

3.18 COMPLETION

A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sika Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sika Sarnafil prior to demobilization.

B. All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

END OF SECTION

SECTION 07 61 00

SHEET METAL ROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Preformed, prefinished metal roofing, siding, flashings, parapet coping and gutters.

1. Minimum 30 lb. felt underlayment.

B. Related Work:

1. Rough Carpentry; refer to Section 06 10 00.
2. Sheet Metal Flashing and Trim; refer to Section 07 62 00.
3. Roof Accessories; refer to Section 07 72 00.
4. Joint Sealants; refer to Section 07 92 00.
5. Drainage and Vent Systems, see Section 22 20 00 – Plumbing Systems.

1.02 REFERENCE STANDARDS

A. ASTM A792 – Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

B. SMACNA - Architectural Sheet Metal Manual

C. CBC, 2016 Edition.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00.

B. Indicate material profile, jointing pattern, jointing details, fastening methods and installation details.

C. Submit manufacturer's installation instructions in accordance with other sections of these specifications.

D. Submit manufacturer's certification stating that prefinished metal roofing complies with Chapter 15, Part 2, Title 24, California Building Code, 2016 Edition, for Class "B" or higher classification.

E. Samples: Submit manufacturer's standard profile samples in accordance with Section 01 33 00.

1. Submit samples from manufacturers’ full line of Kynar 500 coating colors.

F. Design Criteria:

1. Panel and attachment shall be designed to resist the following design loads:

Wind Load: 80 mph, exposure 'C'

2. The roof panel manufacturer shall submit a wind pressure map showing a fastening schedule along with attachment calculations stamped by a licensed professional engineer that address the design wind uplift conditions for the entire roof including perimeter and corner areas. The manufacturer shall further submit certification that the roof system, when attached per their recommendations, complies with 1.03D of this specification section.

1.04 DELIVERY, STORAGE AND HANDLING

A. Panels should be stored on edge in a clean dry place. One end should be slightly elevated to allow moisture to run off rather than accumulate on the faces.

B. Panels with strippable plastic film must not be stored in the open exposed to the sun.

C. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion and to provide ventilation. (Proper ventilation during storage is particularly important in the cast of natural finish such as galvalume coated steel.)

D. Prevent contact with materials during storage which may cause discoloration or staining.

E. In handling pre-finished panels, lift up panels and do not slide panels when unstacking.

1.05 QUALITY ASSURANCE

A. Submit report from independent testing laboratory on results of color retention under exposure to ultra-violet light.

1.06 WARRANTY

A. Provide manufacturer's standard material warranty for base metal and factory coating. Warranty to be based on actual project installation and environmental conditions.

B. Contractor shall warrant panels, flashings, sealants, fasteners and accessories against defective materials and/or workmanship, to remain weatherproof with normal usage for two (2) years following date of notice of completion.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS:

A. AEP-SPAN, Fontana, CA;

B. Butler Manufacturing Co., Kansas City, MO

C. Berridge Manufacturing Co., San Antonio, TX

D. Metal Sales Manufacturing Corporation, Fontana, CA

E. Centria, Moon Township, PA

2.02 SHEET MATERIALS

A. Panels:

1. Base Metal: Steel conforming to ASTM A653, minimum yield 43,500 psi, thickness 22 gauge.

a. Protective Coating: Zincalume conforming to ASTM A792, AZ50, thickness 1.6 mils.

2. Finish:

a. Exterior finish includes a 0.2 mil thick corrosion-resistant primer and a 0.8 mil thick finish coat of Polyvinylidene Fluoride (PVF-2), full 70% Kynar 500/Hylar 5000 for a total dry film thickness of 1.0 mil.

b. Interior finish to include a 0.15 mil thick epoxy primer and a 0.35 mil off white top coat for a total dry film thickness of 0.50 mil.

3. Exterior Color: Color to be Kynar 500 Champagne.

4. Configuration: Batten System with snap-on batten caps approximately 1-1/2" wide x 2 " high, spaced 16 inches on center. Panels shall have two (2) minor stiffening ribs in each panel to prevent oil-canning.

2.03 ACCESSORIES

A. Panel Clips: 22 gauge steel coated with G-60 per ASTM A653.

B. Fasteners: Stainless steel with Neoprene washers where required.

C. Sealant: As specified in Section 07 92 00 – Joint Sealants.

D. Parapet Copings and Exposed to View Flashings and Trim: Same material and finish as roof panels, fabricated to SMACNA details and standards, and per details shown on the Drawings.

E. Gutters: Conforming to ASTM A635, G-90 galvanized, 22 gauge minimum thickness.

1. Profile as indicated and approved in shop drawings. Conform to SMACNA requirements.

2. Form sections square, true and accurate in size, in maximum possible lengths free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

3. Hem exposed edges of metal. Solder shop formed metal joints and remove flux.

4. Fabricate with welded connection pieces and epoxy liner for water tight installation. Perform water test.

5. Anchoring devices in conformance with SMACNA requirements.

2.04 FABRICATION

A. Fabrication: Unless otherwise shown on Drawings or specified herein, fabricate panels in one (1) piece lengths and flashings and accessories in longest practical lengths.

1. Roofing panels shall be factory formed.
2. Field formed panels are not acceptable.

B. Exposed adjacent flashing shall be of the same material and finish as the roof panels.

C. Flashings, hem exposed edges on underside 1/2-inch.

2.05 UNDERLAYMENT

A. Provide 30 lb. inorganic asphalt saturated felt.

B. Slip Sheet: Rosin surfaced building paper weighing not less than 5 pounds per 100 square feet.

C. Mineral Board: Sloping roof at metal deck; provide 1/2-inch thick Loadmaster Duraflex Mineral Board over metal decking. (Loadmaster, 1-800-527-4035.)

2.06 BATTEN SEAM SYSTEM

A. Structural panels and snap-on battens shall be roll formed in continuous lengths (maximum 40 feet).

B. Batten spacing shall be 16 inches on center.

C. Battens shall have a nominal installed height of 2 inches.

D. Panels and battens are to be continuous at change of slope where practical.

E. Attachment to structural supports with 1-1/2 inches long cadmium plated screws through the hidden clip and the panel. Maximum spacing 60 inches on center for open span structural supports. Intermediate batten clips attached through the panel, 20 inches on center maximum with 10 x 3/4-inch TEKS screws.

F. Attach to substrate with 2-1/2-inch-long ring shank galvanized nails through the hidden batten clip and the panel spaced 20 inches on center.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect substrates to verify they are clean and smooth, free of depressions, waves, or projections, properly sloped.

B. Inspect structural support to verify it is properly located, horizontal supports level, and vertical supports plumb.

C. Verify location of penetrations and see that they are properly sleeved where required.

D. Clearing and Testing of all roof drains and leaders.

3.02 INSTALLATION

A. Panels:

1. Follow roof panel manufacturer's directions.
2. Install panel seams vertically, except where otherwise indicated on drawings.
3. Do not stretch or compress panel sidelap interlocks.
4. Secure panels without warp or deflection.
5. Fully engage snap-on batten caps.
6. Remove strippable protective film immediately prior to installation.

B. Allowable Erection Tolerance:

1. Maximum Alignment Variation: 1/4-inch in 40 feet.

C. Flashing:

1. Follow manufacturer's directions and Architect approved shop drawings.
2. Overlap roof panels at least 6 inches.
3. Install flashings to allow for thermal movement.

D. Cutting and Fitting:

1. Neat, square and true. Torch cutting is prohibited.

2. Openings 6 inches and larger in any direction: Shop fabricate and reinforce to maintain original load capacity.

3. Where necessary to saw cut panels, debur and treat with galvanic paint.

E. Install 30 lb. felt underlayment in two layers shingled, and nailed in place, 6 inch side laps, 12 inch end laps.

3.03 CLEANING

A. Touch-up damaged paint surfaces with air dry touch-up paint provided by the panel manufacturer. Follow directions carefully to minimize color differences. Small brush application only; do not spray touch-up paint.

B. Cleaning and Repairing:

1. At completion of each day's work and at work completion, sweep panels, flashing and gutters clean. Do not allow fasteners, cuttings, filings or scraps to accumulate on roof surface.

2. Remove debris from project site upon work completion or sooner, if directed.

3.04 FIELD QUALITY CONTROL

A. Final inspection will be performed by a firm appointed and paid for by the Owner.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Flashings, counter flashings, seismic joint covers, vents, and copings as indicated on the Drawings and specified herein.

B. Related Sections:

1. Metal Fabrications; refer to Section 05 50 00.

2. Refer to Division 7 for Roofing Sections

3. Prefabricated roof curbs, hatches, and skylights see Section 07 72 00 – Roof Accessories.

4. Joint Sealants; refer to Section 07 92 00.

5. Painting and Coating; refer to Section 09 90 00.

6. Mechanical Equipment

1.02 REFERENCE STANDARDS

A. Preform sheet metal work, including fabrications, in strict accordance with Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Architectural Sheet Metal Manual, and the Aluminum Association.

1.03 SUBMITTALS

A. Submit copies of standard details covering all sheet metal conditions and fabrications to be necessary on the project. Where standard details do not exist, prepare and deliver such details to Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fabricate sheet metal items from sheet steel in accordance with ASTM A653, galvanized in accordance with ASTM A653, G90. Galvanizing on exposed surfaces not receiving paint shall receive an appearance grade finish.

B. Unless shown otherwise on Drawings, provide steel sheet metal of at least 22-gauge steel.

C. Where sheet aluminum is shown on Drawings, provide 0.032-inch thickness (20 gauge) and in accordance with ASTM B209, for 3003-H14, in color finish as selected by Architect.

D. Extruded Aluminum: Manufacturer's standard extrusions of sizes and profiles indicated, and in accordance with ASTM B221 for 6063-T52 alloy and temper, AA-C22A41 clear anodized finish; 0.080-inch minimum thickness for primary legs of extrusions that are anodized.

E. Stainless Steel: AISI Type 302/304, complying with ASTM A167, with No. 2D soft annealed finish, except where harder temper required for forming or performance; 0.0187-inch (.05 mm) thick, except as otherwise indicated.

2.02 ACCESSORIES

A. Fasteners and Clips: Provide as required and appropriate for the materials being fastened. Where fasteners or clips may be exposed to outside weather conditions, provide stainless steel type.

1. Provide fasteners such as bolts, screws and nails hotdip galvanized as specified in accordance with ASTM A153.

B. Where rivets will be used, provide malleable iron type with rust-inhibitive coating.

C. If drive pins are incorporated into work, provide cadmium plated with neoprene facing, at least one-inch long, with neoprene washers.

D. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B32) with rosin flux.

E. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B32) with acid-chloride type flux, except use rosin flux over tinned surfaces.

F. Bituminous Coating: Solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

G. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

H. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Section 07 92 00 Joint Sealants.

I. Epoxy Seam Sealer: Two-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

J. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet metal.

K. Paper Slip Sheet: 5 lbs. rosin-sized building paper.

L. Polyethylene Underlayment: Minimum 6-mil carbonated polyethylene film resistant to decay when tested in accordance with ASTM E154.

M. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, noncorrosive.

N. Conductor-Head Guards: 20 gage bronze or nonmagnetic stainless-steel mesh or fabricated units, with selvedge edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

O. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.

2.03 FABRICATION

A. General Metal Fabrication: Shop fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams.
For metal other than aluminum, in edges to be seamed, form seams and solder.
Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weather/waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch-deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from incompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

F. Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed for extruded aluminum joint covers. Fabricate mitered and welded corner units.

2.04 PREFABRICATED COPINGS AND FLASHINGS

A. Provide factory prefabricated 0.050" aluminum continuous snap-on type copings with concealed mounting plate at joints. Copings shall be maximum 10’ lengths. Mounting plate shall be extended 5 inches minimum beyond space between coping lengths. Secure cover plate according to manufacturers’ recommendations. Provide flashing manufactured by Fry Reglet or other as approved by Architect.

1. Pre-finish coping in Kynar 500 coating of custom color as selected by Architect.

2. Copings shall be Factory Mutual Class I-90 certified. Provide certification to Architect.

3. Arched copings shall be factory pre-fabricated true-arch copings, CNC machine cut heli-arc welded and finish ground prior to Kynar 500 finish. Segmented copings shall not be accepted. Arched coping sections shall be fabricated from 0.063" aluminum and not exceed 5' in length.”

PART 3 - EXECUTION

3.01 PREPARATION

A. Inspect substrate conditions prior to installation of sheet metal items. Conditions which could be detrimental to correct and proper installation of sheet metal assemblies are to be called to the attention of the Owner for their disposition prior to sheet metal work being installed.

B. Coordinate fabrication and installation of sheet metal items with work of others such as roofing, curtainwall and windows, sealants, mechanical and electrical.

C. Clearing and testing of all roof drains and leaders.

3.02 INSTALLATION

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.

E. Install counterflashings in reglets, either by snap-in seal arrangement or by welding in-place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated in depending on degree of sealant exposure.

F. Install elastic flashing in accordance with manufacture's recommendations. Where required, provide for movement as joints by forming loops or bellows in width of flashing. Locate cover or filler strips at joints to facilitate complete drainage of water for flashing. Seam adjacent flashing sheets with adhesive, seal and anchor edges in accordance with manufacturer's recommendations.

G. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.

H. Conductor Head Guards: Install "bee-hive type" strainer-guard at conductor heads, removable for cleaning downspouts.

I. Flash around exterior openings in the building where other waterproofing methods are insufficient.

J. Flood Testing Drains: Flood test each drain for leaks, after completing roofing and flashing but before overlying construction is placed. Plug or dam drains, and flood with potable water.

1. Flood to an average depth of 1-1/2 inches not exceeding a depth of 2.5 inches.

2. Flood each area for 24 hours.

3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

K. Additional Testing: Set a sprinkler on the roof and run for approximately 1 hour, then move to a new section. Provide an observer below the roof substrate to identify any water intrusion.

1. After flood testing, if water intrusion is noted, repair leaks, repeat flood tests, and make further repairs until drain and flashing installations are watertight.

3.03 JOINTS

A. Typically, provide flat locked joints with sealant between metal surfaces, unless shown otherwise. Where standing seams are required, provide with folded corners.

B. Provide minimum of 1-inch laps.

C. Where concealed joints are possible, provide flat locked joints with 3 inch reinforcing behind, set in full bed of sealant

D. Do not leave sheet metal joint unsealed. See sealant section of these specifications.

3.04 INSPECTION

A. Immediately following installation of sheet metal work, touch-up areas where primer has been removed during installation operations and where soldering has occurred.

B. Where architectural coatings are provided, touch-up marred or abraded finishes with compatible coating which can be expected to provide the same serviceability as factory applied coatings.

3.05 CLEANING

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

3.06 PROTECTION

A. Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide materials, labor and equipment necessary for the completion of roof access hatches.

B. Related work:

1. Ladders, see Section 05 50 00 – Metal Fabrications.

2. Thermoplastic Membrane Roofing; refer to Section 07 54 00.

3. Sheet Metal Flashing and Trim; refer to Section 07 62 00.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures and Section 01 25 00 – Substitution Procedures. Submit manufacturer's standard technical product data, rough-in diagrams, details, installation instructions and general product information. Data shall show thickness, type, grade, and class of materials; dimensions; details of construction and installation details.

B. Submit manufacturer's installation and operation instructions for roof access hatches.

PART 2 - PRODUCTS

2.01 ROOF ACCESS HATCHES

A. Provide prefabricated units manufactured of galvanized sheet steel, prime painted complete with cam-action spring-loaded opener and positive latching device.

1. Provide one of the following units 2’-6” x 3’-0” size, unless noted otherwise:

a. Bilco,Type S

b. Milcor, Model M-1

c. Dur-Red Model LH

B. Provide unit with fully insulated 14-gauge lid and integral curb. Weatherstrip lid with continuous bulb seal.

C. Provide solid, non-compressible mounting blocking at railing anchor points for mounting the safety rail.

D. Provide each unit of size necessary to comply with Drawings. Weatherstrip lid.

E. Curb height shall be modified to make counterflashing at least 8-inches above surface of tapered roof insulation where it occurs. Coordinate with roof deck contractor.

2.02 ROOF ACCESS LADDER SAFETY POST

A. Provide spring balanced ladder safety post at all roof hatch ladder, Bilco Model LU-2-steel with hot dipped galvanized finish. Mount to the top two rungs of the roof access ladders.

2.03 SAFETY RAIL AT ROOF HATCH

A. KEEHATCH Model No. RHSR-SS Railing System for standard 2'-6" x 3'-0" roof hatch.

2.04 ROOF ANCHORS

A. In sloped roof construction, where roof slope exceeds 2:12, provide roof anchors. Roof Anchors shall be Simplified Safety CB-12 or CB-18, or equal. Install per manufacturer's recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that units are adequately braced for seismic conditions and loads, and that conjunctive roofing, mechanical and electrical operations will provide a watertight and weathertight installation.

B. Clearing and testing of all roof drains and leaders.

3.02 INSTALLATION

A. Install all roof accessories in accordance with manufacturer's instructions, and prior to any other roofing operations. No cutting-in later of roof accessories will be allowed.

END OF SECTION

SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work specified in this section.

1.02 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested firestop systems shall be used in specific locations as follows:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

2. Blank openings through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

3. Openings and penetrations in fire-rated partitions or walls containing fire doors.

4. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 03 30 00 – Cast-In-Place Concrete

2. Section 07 92 00 – Joint Sealants

3. Section 09 24 00 – Cement Plastering

4. Section 09 29 00 – Gypsum Board

5. Section 27 05 48 – Vibration and Seismic Controls for Communications Systems

6. Section 23 01 00 – HVAC General Provisions

7. Section 23 07 00 – HVAC Insulation

8. Section 10 44 00 – Fire Protection Specialties

9. Section 22 01 00 – Plumbing General Provisions

10. Section 26 00 00 – General Electrical Requirements

1.05 REFERENCES

A. Test Requirements: ASTM E814, "Standard Method of Fire Tests of Penetration Firestop Systems."

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Firestop Devices (XHJI)
b. Fire-Resistance Ratings (BXUV)
c. Through-Penetration Firestop Systems (XHEZ)
d. Fill, Voids, or Cavity Materials (XHHW)
e. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

D. ASTM E84, “Standard Test Method for Surface Burning Characteristics of Building Materials.”

E. Inspection Requirements: ASTM E2174, “Standard Practice for On-Site Inspection of Installed Fire Stops.”

F. All major building codes: ICC, SBCCI, BOCA, and IBC.

G. NFPA 101 - Life Safety Code

H. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 01 33 00.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to jobsite.

1.08 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, Phone: (800) 879-8000.

2. Provide products from the above acceptable manufacturer; *no substitutions will be accepted.*

2.03 MATERIALS

A. Use only firestop products that have been UL 1479 or ASTM E814 tested for specific firerated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

2. Hilti CP 604 Self-Leveling Firestop Sealant

3. Hilti CP 620 Fire Foam

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601S Elastomeric Firestop Sealant

2. Hilti CP 606 Flexible Firestop Sealant

3. Hilti FS-ONE Intumescent Firestop Sealant

4. Hilti CP 604 Self-Leveling Firestop Sealant

E. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

F. Foams, Intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

2. Hilti CP 618 Firestop Putty Stick

3. Hilti CP 620 Fire Foam

G. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Firestop Putty Stick

H. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Firestop Putty Pad

I. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti CP 643 Firestop Collar

2. Hilti CP 644 Firestop Collar

3. Hilti CP 648 Wrap Strips

J. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti CP 637 Firestop Mortar

2. Hilti FS 657 Fire Blocks

3. Hilti CP 620 Fire Foam

K. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti FS 657 Fire Blocks

L. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:

1. Hilti FS 657 Fire Blocks

M. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.

3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.

1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTME 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3.

B. Related Sections include the following:

1. Division 1 Section "LEED Requirements" for additional LEED requirements
2. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.03 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.04 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. LEED Submittals:

1. Credits MR 4.1 and 4.2: Product Data indicating percentages by weight of postconsumer and preconsumer recycled content.

a. Include statement indicating costs for each product having recycled content.

2. Credit EQ 4.1: Manufacturers' product data for installation sealants, including printed statement of VOC content.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.06 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).

2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.02 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.03 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Neutral- and Basic-Curing Silicone Sealant:

1. Products:

a. GE Silicones; SilPruf LM SCS2700.
b. Tremco; Spectrem 1 (Basic).
c. GE Silicones; SilPruf SCS2000.
d. Sonneborn, Division of ChemRex Inc.; Omniseal.
e. Tremco; Spectrem 3.
f. Tremco; Spectrem 2

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

D. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:

1. Products:

   a. Pecora Corporation; 898.
   b. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: To sensitive surface joint substrates indicated, O.

   a. Use O Joint Substrates: Galvanized steel and insulated glazing units.

E. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Products:

   a. Dow Corning Corporation; 786 Mildew Resistant.
   b. GE Silicones; Sanitary SCS1700.
   c. Tremco; Tremsil 200.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

2.04 URETHANE SEALANT

A. Multicomponent Pourable Urethane Sealant:

1. Products:

   a. Pecora Corporation; Urexpan NR-200.
   b. Schnee-Morehead, Inc.; Permathane SM 7201.
   c. Tremco; THC-901.
   d. Tremco; THC-900.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.

B. Single-Component Nonsag Urethane Sealant:

1. Products:

    a. Sika Corporation, Inc.; Sikaflex - 1a.
    b. Sonneborn, Division of ChemRex Inc.; NP 1.
    c. Tremco; Vulkem 116.
    d. Tremco; DyMonic 100

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2.05 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.

B. Products:
1. Pecora Corporation; AC-20+.
2. Schnee-Morehead, Inc.; SM 8200.
3. Sonneborn, Division of ChemRex Inc.; Sonolac.
4. Tremco; Tremflex 834.

2.06 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.07 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include, but are not limited to, the following:

   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include, but are not limited to, the following:

   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.04 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.06 SEALANT SCHEDULE

JOINT SEALANT	APPLICATION
Single and Multi-Component Neutral- and Basic-Curing Silicone Sealant	• Exterior perimeter joints at frames of doors, windows and louvers • Exterior control and expansion joints in ceilings and other overhead surfaces • Exterior vertical joints between different materials listed above • All other exterior vertical and horizontal nontraffic joints unless noted otherwise
Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant	• Exterior joints with galvanized steel or insulated glass substrates
Single-Component Mildew-Resistant Acid-Curing Silicone Sealant	• Interior joints between plumbing fixtures and adjoining walls, floors, and counters • Joints between counters and adjoining walls and floors at bathrooms, kitchens and other wet areas
Multicomponent Pourable Urethane Sealant	• Exterior horizontal nontraffic and traffic isolation and contraction joints in cast-in-place concrete slabs
Single-Component Nonsag Urethane Sealant	• Interior perimeter joints of exterior openings
Latex Sealant	• Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances

END OF SECTION

08 00 00

OPENINGS

SANTEE SCHOOL DISTRICT

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Standard steel door frames and other light frames shown on Drawings, with fastening devices.

B. Related Sections:

1. Section 06 10 00 – Rough Carpentry.
2. Section 07 92 00 – Joint Sealants.
3. Section 08 14 00 – Wood Doors.
4. Section 08 71 00 – Door Hardware.
5. Section 08 80 00 – Glazing.
6. Section 09 90 00 – Painting and Coating.

1.02 REFERENCE STANDARDS

A. Follow Hollow Metal Manufactures Association (HMMA) and Steel Door Institute (SDI) recommendations for materials, construction and installation procedures.

B. Comply with California Building Code, Title 24, Part 2, Section 703.

1.03 SUBMITTALS

A. Shop drawings shall be submitted for approval in accordance with section 01 33 00 – Submittal Procedures, covering each type of door frame condition.

B. Oversized Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

C. Schedule: Submit a schedule of frames using same reference numbers for details and openings as those on the Contract Drawings.

D. Templates will be furnished by hardware supplier for preparing shop drawings and for preparing and reinforcing hollow metal work to receive hardware.

E. Submit initial shop drawings, indicating attachment and fastening devices, reinforcement, gauges, paint type and certification that frames meet or exceed quality standards of SDI. Final submittal shall be made no later than 60 days after initial submittal.

1.04 QUALITY ASSURANCE

A. Provide doors frames and accessories manufactured by a certified SDI member company. Company must be a certified member in good standing of these organizations as of the past 5 years.

B. Steel Frame Standard: Comply with SDI 100, unless more stringent requirements are indicated.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

2. Oversized Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

3. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating for 450 F. (250 C.) Maximum in 30 minutes of fire exposure.

D. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257 OR UL 9.

E. Mock-Up: Provide one fully painted, fully glazed combination window and door opening (all door hardware need not be installed) as soon as practicable after delivery of frames to the site. Approved opening will serve as a standard of quality for the balance of the hollow metal frames on the project.

F. Testing:

1. Contractor shall allow in his bid for replacement of four doors, which will be selected at random by the Architect for dismantling and inspection of internal construction. Contractor shall provide labor and tools to cut open and dismantle doors under Architect's direction. Owner reserves the right to dismantle additional doors, at Owner's expense, as deemed necessary by Owner.

2. Owner's testing lab will test gauges of selected door frame parts, interior and exterior welding, galvanizing, and shop priming, for conformance with SDI recommended specifications and additional requirements of this Section. Retesting, if necessary, shall be done in accordance with requirements of Division 01 – General Requirements of these specifications.

G. Replacement of Product and Manufacturer:

1. Failure of any hollow metal frame to meet specified standards shall be grounds to reject entire shipment of hollow metal frames, including those already installed. Items shall be replaced at Contractor's expense, including four additional doors for dismantling.

2. Failure of any hollow metal frame to meet specified standards shall be grounds to reject the manufacturer of the frames. Upon rejection of manufacturer, Contractor shall propose an alternate manufacturer acceptable to the Owner and Architect. No extensions of time or additions to the contract will be allowed due to an Owner mandated substitution of hollow metal manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide packaging, containers, separators, banding, spreaders, paper wrapping, etc., as required to completely protect units during transportation and storage.

B. Inspect door frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired, provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Protection: Store frames at building site under cover. Place units on minimum 4 inch (100 mm) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work included, but are not limited to the following for Steel Door Frames:

1. Door Components, Inc.
2. Ceco Door Products, a United Dominion Company
3. Republic Doors and Frames
4. Steelcraft, a Division of Ingersoll-Rand.

2.02 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A1008, Commercial Steel (CS), or ASTM A1008, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Hot-Dipped Zinc-Coated Steel Sheets: ASTM A653, Commercial Steel (CS), Type B; with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating, stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheets: ASTM A879, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.03 FRAMES

A. Provide fully welded frames for doors, 16 gauge, prime painted steel, designed for butted, wrap-around, and keyed-in construction conditions, fire-rated where required. Frames for exterior locations shall be galvanized with A60 (absolute) coating.

1. All door frames shall have head section continuous welded to jamb section at the hinge side of the frame.

2. Exterior frames shall have all horizontal sections including mullions continuously welded to vertical sections on the exterior (from the room side of the fixed stop outward) portion of the frame. Intent is to seal driven water out of joints. Caulking will not be considered at these locations.

3. Maximum allowable gap at stop miters shall be 1/16-inch.

4. All welds shall be ground smooth, and "Bondo" applied and sanded as necessary for a smooth, flush, quality appearance of the frame faces.

5. All frames shall be sized to provide for a minimum tolerance of 1/4-inch larger than wall or partition assembly unit is to be installed in.

6. Provide minimum three (3) wall anchors on jambs and two (2) on head.

B. Provide knock-down frames only where specifically noted, or where absolutely required for renovation / modernization work at existing wood stud openings.

1. Weld pipe spacers or other type of spacers, per manufacturer's standard design in back of frame to fit tightly against wood studs.

2. Face weld, grind smooth and re-prime with rust-inhibitive primer in field all exposed frame face joints.

3. Exposed joints at stucco and drywall to be sealed with caulk.

2.04 DOORS

A. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches thick unless otherwise indicated.

1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty)], Model 2 (Seamless).

2. Exterior Doors: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless)], metallic-coated steel sheet faces.

3. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates from same material as door face sheets.

4. Top edge inverted edge of channel flush with top of door welded conditions grind smooth

2.05 ACCESSORIES

A. Include minimum three (3) 16 gauge jamb anchors for each side of frames, and as otherwise required by the Drawings.

C. Where required to be rated, provide fire-rated doors with UL label attached in an inconspicuous location.

D. Provide minimum two (2) 14 gauge steel floor anchors per door frame, and as otherwise required by the Drawings.

E. Prepare and reinforce door frames for hardware as follows: 12 gauge for surface applied closers, 3/16-inch for hinges, 12 gauge for hold-open arms, 9 gauge for floor checking hinges, and 14 gauge for other reinforcement.

F. Hardware Preparation: Prepare, reinforce, mortise, drill, and tap frames according to templates supplied by hardware supplier, reinforcing as standard with door and frame manufacturer except 3/16-inch steel behind butts and 12 gauge steel for mortised or surface-applied hardware. Conform to ANSI A115 Series as applicable to the hardware specified.

G. Finish: Thoroughly clean metal surfaces and chemically treat for paint adhesion. Paint inaccessible surfaces before assembling. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply a baked-on coat of manufacturer's standard rust-inhibitive primer, including concealed surfaces of door frames and anchors. (Note: painter will be required to apply a "satin" finish final paint coat.)

PART 3 - EXECUTION

3.01 INSTALLATION

A. In general install door frames in accordance with SDI 100 Series.

B. Install frames for doors plumb, rigid and in true alignment, and fastened so as to retain their position and clearance during construction of partitions and walls. Frames and doors shall be installed so the appropriate door undercut is maintained (plus or minus 1/8") for thresholds, door shoes, and sweeps.

C. Ensure dimensional tolerance and stability of frames for proper installation and operation of hardware and doors.

D. Coordinate frame and drip flashing installation where shown on Drawings.

E. Touch up shop applied primer on frames following installation and just prior to finish painting.

F. Following installation, provide protection of frames until frames are to be finish painted.

G. Fire rated steel frames shall be installed in accordance with their listing, NFPA 80, and the manufacturer's instructions.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Wood doors prepared for hardware as indicated on the Drawings and specified herein.

B. Related Sections:

1. Hardware: See Section 08 71 00 – Door Hardware

2. Job Site Finished Doors: See Section 09 90 00 - Painting and Coatings, for finishing wood doors.

1.02 REFERENCE STANDARDS

A. Follow American Woodwork Standard, current edition, recommendations for materials, construction, and installation procedures.

B. Manufactured units must be labeled and certified according to Section 1710.5.1 Exterior Windows and Doors of 2016 CBC, Title 24.

C. Non-Fire-Rated Wood Doors: WDMA Industry Standard I.S.1 latest edition shall be the standard of construction. In addition, all solid core flush wood doors shall be in accordance with Woodwork Institute “Manual of Millwork” for custom and premium grade doors with core, stile, and rail components glued together with no voids permitted.

D. Fire-Rated Wood Doors: Where fire resistance classifications are shown or scheduled for wood door assemblies, doors shall be installed in compliance with the requirements of "NFPA-80 Standard for Fire Doors and Windows". Fire rated doors shall bear the label of an independent testing agency having approval of the local building authorities.

1.03 SUBMITTALS

A. Submit catalog cuts on doors.

B. Submit Woodwork Institute certifications issued by a Woodwork Institute licensee certifying that doors fully meet the requirements for the grades specified in these specifications.

C. Upon completion of the job, submit a Woodwork Institute Certified Compliance Certificate for Installation.

D. Submit two (2) flitches, 8-inches by 10-inches, of the veneer type to be used on doors for review.

E. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

F. One extra door shall be furnished for destructive testing to verify that the product supplied correlates with samples approved.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Factory seal (4) sides of unfinished doors before delivery. The doors will be stored and handled in accordance with manufacturer's requirements and in accordance with NWMA pamphlet "Care and Finishing of Wood Doors".

1.05 GUARANTEE

A. The door shall be warranted by the manufacturer to be free of manufacturing defects for a life of the original installation. All exterior doors shall be warranted for exterior use. Warranty shall provide for replacement of the door as originally furnished. Manufacturer shall pay a reasonable charge to remove a defective door, refinish and replace with a new door providing the defect was not apparent prior to its installation.

B. Refer to Section 01 78 30 – Warrantees, Guarantees & Bonds for additional requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Algoma Hardwoods, Inc.
B. Eggers Industries
C. Marshfield Door Systems

2.02 FABRICATION

A. Non-Label Doors: Doors shall be solid wood stave and shall be thoroughly seasoned, (7 ply construction) kiln dried with a moisture content of not less than 5% and not greater than 8%.

1. Core: Solid Stave Core: Low density wood blocks, kiln dried, not more than 2½" wide; random lengths, joints well staggered. Engineered composite doors with MDF veneer shall not be acceptable.

2. Cross Bands: Shall be 1/16-inch thick hardwood extending full width of door and laid with grain at right angles to face veneers. Cross bands and faces shall be laminated to the core with Type I melamine fortified urea glue by the hot press process. Entire core unit to be sanded before veneering to ensure minimal telegraphing of core through the veneer.

3. Skins: Shall be made of mill option sound Birch hardwood back and center ply with grain direction of center ply laid with grain at right angles to face and back. Skins shall be assembled and glued to core with type I glue.

4. Stiles, rails: Stile edge bands shall be two-ply laminated to the core. Outer stile shall be compatible with face veneers. Two-ply rails of mill option hardwoods shall be used. Stiles and rails must comply with wood stave doors and measure a minimum of 1-3/8" and glued securely to the core parts with no voids allowed. All doors shall be 1-3/4" thick unless designated otherwise.

B. Styles:

1. Stile edge screw withdrawals when tested in accordance with ASTM D1037 shall exceed 740lbs. and VA 08210-TM (min. 700#).

2. Stile edge split resistance when tested in accordance with ASTM D143 Modified must exceed 751 lbs. and VA 08210-TM (minimum 500 PSI).

3. Provide mineral core doors with full length untreated solid lumber outer stiles compatible with face veneers.

2.03 FACE VENEERS

A. Doors shall receive opaque finish, provide manufacturer's standard medium density overlay over standard thickness hardwood face veneer. See painting spec 09 90 00.

2.04 ACCESSORIES

A. Door Louvers

1. Design is based on the use of the following louver manufactured by Anemostat Products:

a. For Installation in Non-fire-resistive Rated Doors: Model CHDL-2F (vision-proof, inverted V).

b. For Installation in Fire-resistive Rated Doors: Model FLDL-UL.

2. Provide louvers having the following characteristics and features:

a. When required to be installed in fire-resistive rated doors, bearing the listing mark of the Underwriters Laboratories (UL), and provided with an automatic closing mechanism activated by a fusible link device rated at 135 degrees F.

b. Factory finished to match color selected by Architect.

B. Moldings: Provide moldings for factory applied decorative surface application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer must examine doors and door frames, and verify that frames are correct type and have been installed as required for proper hanging of corresponding doors. Notify Architect in writing of conditions detrimental to proper and timely installation of wood doors. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer. Do not hang doors with an apparent defect.

3.02 PREPARATION

A. Store doors in well ventilated building, cover to keep clean, but allow circulation. Relative humidity must be between 30% and 60%.

B. Condition doors to average prevailing humidity in installation area prior to hanging.

3.03 INSTALLATION

A. Manufacturer's Instructions: Install wood doors in accordance with manufacturer's instructions and as shown. Manufacturer's instructions shall be made available to inspecting authorities.

B. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA 80 and instructions attached to door. Do not undercut rated doors.

C. Job Fit Doors: Align doors to frame for proper fit and uniform clearance at each edge and machine for hardware. Seal cut surfaces immediately after fitting and machining.

D. Clearance: For non-fire rated doors provide clearances of 1/8-inch at each jamb, 1/8-inch at meeting stiles for pairs of doors and 1/4-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold, unless otherwise noted; for fire-rated doors, provide clearances complying with the limitations of the authority having jurisdiction. Install all mortised butts with #12 x 1-1/4 inch threaded to the head steel wood screws.

E. Doors shall be pre-fit and pre-machined for finish hardware at manufacturer's mill.

F. Provide vision frame and lower assemblies complete, prefinished, and factory installed.

3.04 ADJUSTING

A. Operation: Re-hang or replace doors which do not swing or operate freely, as directed by Architect.

B. Finished Doors: Refinish or replace doors damaged during installation, as directed by Architect.

3.05 PROTECTION

A. Advise Architect of proper procedures required for protection of installed wood doors from damage or deterioration until acceptance of work.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Access door and frame units, fire-rated, in wall, and ceiling locations.

B. Reference drawings for extent, location and size of each type of access door required.

1.02 RELATED SECTIONS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to work of this section.

B. Section 03 30 00 – Cast-In-Place Concrete: Openings in concrete.

C. Section 04 22 00 – Concrete Unit Masonry: Openings in masonry.

D. Division 7 – Thermal and Moisture Protection: Roof hatches.

E. Division 9 – Finishes: Access tile in suspended or furred acoustic tile ceilings.

F. Section 09 90 00 – Paints and Coatings: Field paint finish.

G. Division 22 – Plumbing: Plumbing components requiring access.

H. Division 23 – Heating, Ventilating and Air Conditioning: Mechanical components requiring access.

I. Division 26 – Electrical: Electrical components requiring access.

1.03 REFERENCES

A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 REGULATORY REQUIREMENTS

A. Comply with California Building Code

1.05 DESIGN REQUIREMENTS

A. Fabricate floor access assemblies to support live load of 100 lb/sq ft with deflection not to exceed 1/240 of span.

1.06 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for administrative requirements.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of all access door units. Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment and indicate on submittal schedule. Submit shop drawings for fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

D. Samples: Submit two access units, [3x5] inch minimum size illustrating frame configuration, anchors, panel face material, and factory primer color.

E. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions. Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices. Including complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

F. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary slightly from sizes indicated.

G. Project Record Documents: Record actual locations of all access units.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated access doors.

1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed. Provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Under Writers Laboratories, Inc., "Building Materials Directory" for rating shown.

B. Provide products listed and labeled by UL and/or ITS (Warnock Hersey) as suitable for the purpose specified and indicated. Provide UL label on each fire-rated access door.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated doors.

1.08 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors. Coordinate locations with other work, furnish inserts and anchoring devices which must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delays.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Access Doors and Frames:

1. Karp Associates, Inc.
2. Milcor Inc: www.milcorinc.com.
3. J.L. Industries.

2.02 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

2.03 FABRICATION AND MATERIALS

A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts and ready for installation.

B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.

C. Frames: Fabricate from 16-gage steel.

1. Fabricate frame with exposed flange nominal 1" wide around perimeter of frame for units installed in the following construction:

a. Exposed masonry.
b. Exposed concrete.
c. Drywall finish.

2. For gypsum drywall or gypsum plaster, furnish perforated frames with drywall bead.

3. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.

4. For full-bed plaster applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

D. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.

1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

E. Recessed Panel Doors: Fabricate from not less than 18-gage sheet steel with face of panel formed to provide recess below surface of applied finish. Reinforce panel as required to prevent buckling. Finish with manufacturer's factory-applied prime paint.

1. Furnish recessed panels for concealed installation in acoustic tile ceiling systems.

2. Furnish recessed panels and frames with expanded metal lath for concealed installation in plaster.

F. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.

1. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

D. Adjust hardware and panels after installation for proper operation.

E. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

F. Paint to match adjacent finishes, unless otherwise noted in plans.

END OF SECTION

SECTION 08 43 33

FOLDING GLASS WALLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes furnishing and installing a top-hung sliding-folding aluminum-framed glass door storefront system that includes:

1. Aluminum frame
2. Threshold
3. Panels
4. Sliding-folding and locking hardware
5. Weather-stripping
6. Glass and glazing
7. Insect screen
8. Accessories as required for a complete working installation.
9. Glass swinging door in each assembly with hardware per hardware schedule.
10. Sawcut and demolition of existing concrete for installation of flush threshold. See attached detail.

B. Related Documents and Sections: Contractor to examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to, the following:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 General Requirements, Specification Sections, apply to this Section.
2. Section 06 10 00, Rough Carpentry: Wood framing R.O. and blocking.
3. Section 07 62 00, Sheet Metal Flashing and Trim: Flashing and other sheet metal work.
4. Section 07 92 00, Joint Sealants

1.02 REFERENCES

A. Reference Standards in accordance with Division 01 and current editions from the following:

1. AAMA. American Architectural Manufacturers Association; www.aamanet.org
   a. AAMA 503, Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
   b. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum
   c. AAMA 920, Operation / Cycling Performance

d. AAMA 1303.5, Voluntary Specification for Forced Entry Resistant Aluminum Sliding Glass Doors

e. AAMA 2604, Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

f. AAMA 2605, Voluntary Specifications, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

2. ANSI. American National Standards Institute; www.ansi.org

a. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings

3. ASTM. ASTM International; www.astm.org

a. ASTM C1036, Standard Specification for Flat Glass

b. ASTM C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass

c. ASTM E283, Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

d. ASTM E330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

e. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

f. ASTM E413, Classification for Rating Sound Insulation

g. ASTM E547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.

h. ASTM E1332, Standard Classification for Rating Outdoor-Indoor Sound Attenuation

4. CPSC. Consumer Product Safety Commission; www.cpsc.gov

a. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials

5. NFRC. National Fenestration Rating Council; www.nfrc.org

a. NFRC 100, Procedure for Determining Fenestration Product U-factors

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate Folding Glass Storefront system and framing R.O.

B. Preinstallation Meetings: See Section 01 33 00.

1.04 SUBMITTALS

A. For Contractor submittal procedures see Section 01 33 00.

B. Product Data: Submit manufacturer's printed product literature for each Folding Glass Storefront system to be incorporated into the Work. Show performance test results and details of construction relative to materials, dimensions of individual components, profiles and colors.

C. Shop Drawings: Indicate Folding Glass Storefront system component sizes, dimensions and framing R.O., configuration, swing panels, direction of swing, stacking layout, typical head jamb, side jambs and sill details, type of glazing material, handle height and field measurements.

D. Manufacturers' Instructions: Submit manufacturer's installation instructions.

E. Operation and Maintenance Data: Submit Owner's Manual from manufacturer. Identify with project name, location and completion date, and type and size of unit installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer capable of providing complete, precision built, engineered, pre-fitted units with a minimum twenty-five (25) years' experience in the sale of folding-sliding door systems for large openings in the North American market.

B. Installer Qualifications: Installer experienced in the installation of manufacturer's products or other similar products for large openings. Installer to provide reference list of at least three (3) projects of similar scale and complexity successfully completed in the last three (3) years.

1. Installer to be trained and certified by manufacturer.

C. Single Source Responsibility: Furnish Folding Glass Storefront system materials from one manufacturer for entire Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 requirements, and as follows:

1. Deliver materials to job site in sealed, unopened cartons or crates.

a. Upon receipt, inspect the shipment to ensure it is complete, in good condition and meets project requirements.

2. Store material under cover in a clean and dry location, protecting units against weather and defacement or damage from construction activities, especially to the edges of panels.

1.07 FIELD CONDITIONS

A. Field Measurements: Contractor to field verify dimensions of rough openings (R.O.) and threshold depressions to receive sill. Mark field measurements on shop drawing submittal.

1.08 WARRANTY

A. Manufacturer Warranty: Provide Folding Glass Storefront system manufacturer's standard limited warranty as per manufacturer's published warranty document in

force at time of purchase, subject to change, against defects in materials and workmanship.

1. Warranty Period beginning with the earliest of 120 days from Date of Delivery or Date of Substantial Completion:

    a. Rollers and Glass Seal Failure: Ten (10) years

    b. All Other Components Except Screens: Ten (10) years

        1). Exception: Five (5) years if NOT installed by manufacturer's certified trained installer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product by Manufacturer: NanaWall SL45 by NANA WALL SYSTEMS, INC. (www.nanawall.com), (800) 873-5673. Email: info@nanawall.com, or equal.

a. Document 00 43 25, Substitution Request Form (During Procurement), or

b. Document 00 63 25, Substitution Request Form (During Construction)

2.02 PERFORMANCE / DESIGN CRITERIA

A. Performance Criteria (Lab Tested):

1. Air Infiltration (ASTM E283) - Flush Sill:

    a. 0.25 cfm/ft2 (1.28 L/s/m2) at a static air pressure difference: of 1.57 psf (75 Pa)

    b. 0.78 cfm/ft2 (6.66 L/s/m2) at 6.24 psf (300 Pa

2. Forced Entry (AAMA 1303.5 and AAMA CAWM 300): Meets requirements.

3. Swing Panel - Operation / Cycling Performance (AAMA 920): 500,000 cycles with 100 U-factor rated.

    a. for Schools) For gasketed NanaWall glass wall assemblies with glass units testing at STC 35 or higher.

5. LEED v4 for Building Design and Construction (BD&C)

a. EAc2: NanaWall systems using low U-Value designed double or triple IGU and thermally broken frames can provide significant energy performance.

b. MRc1: NanaWall can be easily disassembled for salvage and reuse.

c. EQc7: NanaWall glass wall assembly borrowed light brings daylight deeper into the floor plate.

d. EQc8: NanaWall glass wall assemblies provide direct outdoor lines of sight.

e. EQc9: NanaWall glass wall assemblies can contribute with system acoustic ratings of 31 dB up to 38 dB reductions.

Design Criteria:

1. Sizes and Configurations: As indicated by the Drawings for selected number and size of panels, location of swing panels, and location of tracks and stacking bays.

2. Unit Operation: Adjustable sliding and folding hardware with top and bottom tracks;

   a. Inswing type with 90 degree fold, except where stacked locations are shown greater than 90 degrees.

3. Panel Configuration:

   a. Straight

   b. 90º angle turn

   c. 135º angle turn

4. Stack Storage Configuration:

   a. Inside

   b. Foldflat® against Wall – where shown.

5. Mounting Type: Top hung

6. Panel Type: Hinged

   a. Primary swing panel of paired swing panels, looking from inside, to be on the left or right based on location of the wall shown on plans.

   b. Entry/Egress panel hinged to side jamb as shown on plans.

7. Panel Pairing Configuration: Drawings show number of panels. Submit recommended pairing combinations, including integral swing egress door.

2.03 MATERIALS

A. Sliding-Folding Glass Storefront Description: Monumental top-hung system designed for straight runs, segmented angle changes, center pivot, and capable of folding flat against adjacent walls. Manufacturer's standard frame and panel profiles, with head and floor tracks, side jambs and panels with dimensions as shown on Drawings.

   1. Panels:

      a. Single lite.

   2. Panel Size (W x H): As indicated on plans

   3. Rail Depth: 1-3/4 inch (45 mm)

   4. Head Width: 4-7/8 inch (124 mm)

   5. Head and Jamb Rail Width: 2-1/8 inch (53 mm)

   6. Bottom Rail Width:

      a. 2-1/16 inch (53 mm) for Flush Sill

b. Manufacturer's standard kickplate with 12" height at egress door only where indicated on plans.

7. Aluminum Extrusion: AlMgSi0.5 alloy, 6063-T5

a. Thickness: 0.078 inch (2.0 mm) nominal

8. Aluminum Finish (including head track covers):

a. Anodized (AAMA 611):

1). Clear

B. Glass and Glazing:

1. Safety Glazing: In compliance with ANSI Z97.1 and CPSC 16CFR 1201.

a. Glass Acoustical Performance (DIN 52210-3,4): Rw (STC) 31; 3/4 inch (20 mm) double IGU, air-filled, tempered glass

b. Manufacturer's tempered glass lites in double insulated glazing units, dry glazed with glass stops on the inside.

1). Double IGU: 3/4 inch (20 mm) thick - Air filled with Glass Spacers: Manufacturer's standard gray finish; with capillary tubes.

c. Glass Treatment: tempered

1). Standard

C. Locking Hardware and Handles:

1. Main Entry Panel for Models WITH Swing Panels: Provide field installed panic device on the inside and manufacturer's standard lever handles on the outside. Provide a lockset with a lockable latch and multi-point locking with a dead bolt and rods at the top and bottom on primary panel only.

a. Rods to be concealed and not edge mounted.

b. After turn of key or thumbturn, depression of handles withdraws latch.

c. Lifting of handles engages rods and turn of key or thumb turn engages deadbolt and operates lock.

d. Lever Handle - Finish:

1). Brushed satin stainless steel

e. Locking:

1). Standard profile cylinder – refer to 08 71 00

2. Main Entry Panel for Models WITHOUT Swing Panels: Provide manufacturer's standard L-shaped handle on the inside, flat handle on the outside and lock set with profile cylinder Operation of lock set is by turn of key from the outside and with a thumbturn from the inside with a two point locking hardware operated by 180º turn of the handle.

a. L-shaped handles – Finish:

1.) Brushed stainless steel

3. Handle Height: 41-3/8 inch (105 cm) centered from bottom of panel or as otherwise indicated.

4. Aluminum locking rods with standard fiberglass reinforced polyamide end caps at the top and bottom. Rods to have a stroke of 15/16 inch (24 mm).

5. Additional profile cylinders to be keyed differently.

D. Sliding- Folding Hardware: Provide manufacturer's standard combination sliding and folding hardware with top and bottom tracks.

1. For each pair of folding panels, provide independent cardanic suspension for four (4) wheeled rollers coated with fiberglass reinforced polyamide upper running carriage and lower guide carriage.

2. Swing Panel Hinges:

a. Zinc die cast with finish closest match to finish of frame and panels and stainless steel security hinge pins with set-screws.

3. Adjustment: Provide 1/16 inch (1.5 mm) in width per hinge adjustments without removing panels from tracks and without needing to remove panels from tracks.

a. Standard flush fill

b. Finish:

1). Clear anodized finish.

c. Cover plate over sill NOT acceptable.

E. Weatherstripping: Manufacturer's double layer EPDM between panels, EPDM gasket and Q-lon gasket, or brush seal between panel and frame, or brush seals with a two-layer fiberglass reinforced polyamide fin attached at both inner and outer edge of bottom of door panels with a recessed sill or on frame for sealing between panels and between panel and frame.

F. Fasteners: Stainless steel screws for connecting frame components.

2.04 FABRICATION

A. Extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weatherstripping components needed to construct a folding glass wall.

1. Each unit factory pre-assembled and shipped with all components and installation instructions.

2. Exposed work to be carefully matched to produce continuity of line and design with all joints.

3. No raw edges visible at joints.

2.05 ACCESSORIES

A. Provide sidelights, transoms, corner posts, or single or double doors as indicated.

1. equivalent subject to project requirements.

2. Finish - Aluminum Top Track, Side Jambs and Vertical Struts:

   a. Clear anodized

3. equivalent subject to project requirements.

4. Finish - Aluminum Top Track, Side Jambs and Vertical Struts:

   a. Clear anodized

2.06 EXAMINATION

A. Examination and Acceptance of Conditions as follows:

1. Carefully examine rough openings with Installer present, for compliance with requirements affecting Work performance.

   a. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square with no unevenness, bowing, or bumps on the floor; and other conditions as required by the manufacturer to receive Work.

   b. Verify the structural integrity of the header for deflection with live and dead loads limited to the lesser of L/720 of the span or 1/4 inch (6 mm). Provide structural support for lateral loads, and both wind load and eccentric load when the panels are stacked open.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

2.07 INSTALLATION

A. General: Install Folding Glass Storefront system in accordance with the Drawings, approved submittals, manufacturer's recommendations and installation instructions, and as follows:

1. Properly flash, waterproof and seal around opening perimeter.

2. Securely attach anchorage devices to rigidly fit frame in place, level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work

3. When lower track is designed to drain, provide connections to allow for drainage.

4. Install panels, handles, lockset, screens and other accessories in accordance with manufacturer's recommendations and instructions.

2.08 FIELD QUALITY CONTROL

A. Field Tests and Inspections per Section 01 40 00 of the following:

1. Verify the Folding Glass Storefront system operates and functions properly. Adjust hardware for proper operation.

B. Non-Conforming Work: Repair or replace non-conforming work as directed by the Architect; see General and Supplementary Conditions, and Division 01, General Requirements.

2.09 CLEANING AND PROTECTION

A. Keep units closed and protect Folding Glass Storefront installation against damage from construction activities.

B. Remove protective coatings and use manufacturer recommended methods to clean exposed surfaces.

END OF SECTION

SECTION 08 45 00

TRANSLUCENT WALL AND ROOF ASSEMBLIES

PART 1- GENERAL

1.01 RELATED DOCUMENTS:

A. The General Conditions of the Contract, including Supplementary Conditions and Division 1 – General Requirements; apply to the work of this Section.

1.02 WORK INCLUDED:

A. Design, manufacture and installation of translucent insulating system. An assembly of extruded Nano-cell polycarbonate glazing panels incorporated into a complete aluminum framed system that has been tested and warranted by the manufacturer as a single source system.

B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.

C. Trained and factory authorized labor with supervision to complete the entire panel installation.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Division 3, 5, 6 - Structural Steel/Wood Framing/Concrete.

B. Division 3, 5 - Curbs and supporting members.

C. Division 7 - Roofing.

D. Division 7 - Sheet Metal and Flashing.

E. Division 7 - Sealant.

1.04 QUALITY ASSURANCE

A. Skylight system must be evaluated and listed by recognized building code authorities: International Code Council Evaluation Service Inc (ICC-ES).

B. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacture of skylights using polycarbonate (not glass) panel systems for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of ten (10) years, with similar size, scope, climate and type.

C. Erection shall be by a factory-approved installer which has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, and will ensure that it fully meets all requirements of this specification.

1.05 APPROVED MANUFACTURERS:

1. All manufacturers acceptable for use on this project under this section must be approved prior to bid. Manufacturers must submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports as specified below. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified. Should non-compliance be subsequently discovered, the previously given approval will be invalidated and use of the product on the project will be disallowed. Requests for approval, with all appropriate submittal data and samples must be received no less than 15 days prior to bid date. A list of all approved manufacturers and products will be issued by addendum. No other manufacturers will be acceptable. No verbal approval will be given.

1.06 SUBMITTALS:

A. Submit shop drawings and color samples in accordance with Division 01 – General Requirements.

B. The manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.

C. The manufacturer shall submit certified test reports made by an independent organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are current and indicative of products used on this project. Test reports required are:

1. Self Ignition Temperature (ASTM 1929-3)

2. Smoke Density (ASTM D2843)

3. Burning Extent (ASTM D635)

4. Surface Burning Characteristics (ASTM E84)

5. Color Tolerances and Differences (ASTM D2244-11)

6. Weathering (ASTM D4364)

7. Weathering Evaluation before and after exposure to 300°F, 25 minutes include Light Transmission, and Color Change, per ASTM E1175, and ASTM D2244 respectively.

8. Shatter Resistance (ASTM D3841/SPI Method B)

9. Large Missile Impact Testing - Impact Resistance per SFBC PA 201-94.

10. Insulation “U” Factor per NFRC100 test methods & procedures

11. Water Penetration (ASTM E331)

12. Load Bearing Capability (ASTM E330 – 02(2016))

13. OSHA Life Safety Fall and Walk Through Protection for 300 lb. point load per STD 29 CFR 1910.23 (e)(8)

14. OSHA Life Safety STD 29 CFR - Impact loading by blunt object of 500 ft. lbs. per ASTM E695 - 03(2009)

15. Performance of exterior windows, curtain walls when impacted by wind-borne debris per ASTM E1996 - 09, Level D

16. IES LM-44-90 Testing for Total and Diffused Reflectometry (Diffused Light Transmission)

D. MAINTENANCE DATA: The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.

1.07 WARRANTY:

A. Provide a single source skylight / wall light / walkway / canopy system manufacturer warranty for glazing panels and framing system – third party warranty for glazing panels shall not be acceptable.

B. Provide manufacturer 10 year warranty to include:

1. Change in light transmission of no more than 6% per ASTM D1003

2. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system.

3. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes. (When measured per ASTM D1003 and ASTM D2244 respectively).

C. Refer to Section 01 78 30 – Warrantees, Guarantees & Bonds for additional requirements.

PART 2 - PRODUCTS

2.01 TRANSLUCENT INSULATING INTERLOCKING NANO-CELL GLAZING TECHNOLOGY:

A. The design and performance criteria of this job are based on products manufactured by CPI Daylighting, Inc., Phone: (800) 759-6985, Fax (847) 816-0425;
Website: www.cpidaylighting.com

B. Acceptable Manufacturer:

1. CPI Daylighting (Preferred Manufacturer) – ICC
2. Kalwall Corporation, Kalwall Translucent Panels, ICC ES Report No. PFC-1705

Substitute products must be proven equal and approved by addenda prior to the published bid date per specification section 1.04 E. Fiberglass skins are unacceptable.

2.02 TRANSLUCENT PANEL PERFORMANCE

A. Nano-Cell Panel Technology – Longevity and Resistance to Buckling and Pressure

1. Translucent Panels must be of Nano-Cell technology. Wide Cell technology (cell size exceeding 0.18") shall not be acceptable.

2. The translucent panel shall include an integral extruded Nano-Cell structural core. The panel's exterior skins shall be connected with supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.18" (truss-like construction). In addition, the space between the two exterior skins shall be divided by multiple parallel horizontal surfaces, at a spacing not to exceed 0.18".

B. Appearance:

1. Panel assembly thickness shall be a minimum .47" (12mm) single panel with exposed interlocking 1.25" wide U battens.

2. Panel Width: Shall not exceed 2' to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels over 2' wide will not be approved.

3. The panels shall be uniform in color with an integral Nano-Cell core. In a cross section, the core shall be constructed of Nano-Cell honeycomb cells not to exceed 0.18" x 0.18". The appearance should be equal to CPI's Pentaglas 12 Panel. Wide cell panel configurations greater than 0.18" by .018" shall not be accepted.

C. Thermal and solar performance:

1. Insulation Value ("U") per NFRC 100 test methods & procedures - 0.48
2. Light Transmission (L.T.%) per ASTM E972, E1175 or D1003
3. Solar Transmission (S.T.) per ASTM E1084 at "normal" (90°) incidence angle.

D. Translucent Panel Joint System:

1. Panel shall be extruded in one single formable length. Maximum panel width shall not exceed 2'. Transverse connections are not acceptable.

2. The panels should be manufactured with grip-lock double tooth upstands that are integral to the unit. The upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.

3. The U or H battens shall have a grip-lock double tooth locking mechanism to ensure maximum uplift capability.

4. The metal retention clip shall be configured with a 0.4" wide top flange that extends continuously across the web from end to end and from side to side. To allow a safety factor, the clip must be tested to meet a wind uplift standard of 90 psf per ASTM E330.

5. The panel system U connection shall meet wind load performance requirements without deterioration after 100 months of Florida outdoor exposure. This performance must be demonstrated by providing independent lab comparison test reports for a weathered vs. a new panel assembly. As a standard for all systems, provide test reports for a 16mm panel assembly, 6' wide x 12' long that have been exposed to Florida weather conditions for 100 months per ASTM

E330 for loading, ASTM E1886 for cycling and ASTM E1996 for missile impact at design load of 70 PSF.

6. Water Penetration: No water penetration of the panel U / H joint connection length at test pressure of 10.0 PSF per ASTM E331.

7. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.

E. Flammability

1. The exterior and interior faces shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D635. Flame spread no greater than 25 per ASTM E84. Smoke density no greater than 75 per ASTM D2843 and a minimum self-ignition temperature of 1000°F per ASTM D1929. The panel shall be self-extinguishing.

2. Interior flame spread classification of Class I per ASTM E84.

F. Impact Resistance - the panels shall pass the following tests:

1. ASTM D3841/SPI - Impact and Shatter Resistance of 200 ft. lbs.

2. SFBC – PA 201-94, impact resistance of 350 ft. lbs.

3. ASTM E1996 - Must comply with standard specification for performance of exterior windows or curtain walls when impacted by windborne debris at level D and after cyclic wind loading at the specified design load.

G. OSHA Life Safety Standards 29 CFR 1926.502 (i)(2) and 29 CFR 1910.23 (e)(8)

1. Panel assembly shall withstand impact loading by blunt object of 500 ft. lbs. per ASTM E695-03(2009).

2. Panel assembly shall withstand a 300 lb. point load at 5’ span per OSHA Standard 29 CFR 1910.23 (e)(8).

H. [Hurricane Zone Panel System shall meet wind uplift resistance requirements per ASTM E1996 and / or Dade County test protocols PA 201, PA 202, PA 203 when required by local codes.]

I. Cyclic Wind Load – Translucent Panels shall be tested for cyclic wind loads and impact resistance per ASTM E1886 and ASTM E1996 at test load to verify the positive and negative design loads and level D impact.

J. Weatherability:

1. The light transmission as measured by ASTM D1003, shall not decrease more than 6% over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging).

2. The panel shall be tested by recognized laboratory for weathering evaluation per ASTM D4364 (EMMAQUA, UNBACKED), after exposure to minimum concentrated natural sunlight radiation of 56000 MJ/M^2 (1540 MJ/M^2 of UV, 200 – 385 N.M). The panel shall not change in color more than 4.0 units Delta E, 4.0 units Delta L and Delta B.

3. The panel shall not change color more than 4.0 units (DELTA-E by ASTM D2244) after 60 months outdoor weathering in Arizona determined by an average of at least two samples.

4. Thermal aging - the interior and exterior faces shall not change color in excess of 0.75 Delta E by ASTM D2244 and shall not darken more than 0.3 units (Delta L by ASTM D2244) and 0.2 units Delta Y (YI) by ASTM E313 and shall not show cracking or crazing when exposed to 300°F for 25 minutes.

5. The faces shall not become readily detached when exposed to temp of 300°F and 0°F for 25 minutes.

6. Panels shall consist of a polycarbonate resin with a permanent, co-extruded, ultra-violet protective layer. Post-applied coating or films of dissimilar materials are unacceptable. Fiberglass skins are unacceptable.

7. UV Maintenance: The system shall require no scheduled re-coating to maintain its performance or for UV protection.

8. Panel shall be factory sealed at the sill to restrict dirt ingress.

K. Diffused Light Transmission:

1. As a reference for measuring the quality of the diffused light through the panel assembly, the IES (Illuminating Engineering Societies) LM-44-1990 Approved Method for Total and Diffuse Reflectometry procedure shall be used. Results for a Clear Pentaglas / Single Glazed panel assembly shall be provided as a base standard for comparison.

a. For Pentaglas / Single Glazed systems with total illuminator flux output at 60 lumens, diffused light transmission requirements are:

Zonal ..... % of transmittance from the maximum
Zone ..... Total lumens transmitted through panels
0-30 ..... 66.0
0-40 ..... 78.5
0-60 ..... 94.0
0-90 ..... 100.0

L. The minimum ratio of the panel weight to the panel thickness should be:

1. For 0.47” thick Pentaglas 12 panel, 0.54 LB. per S.F.

2.03 METAL FRAME STRUCTURE

A. To meet ASCE/SEI 7-10 building design load.

B. The Skylight framing is designed to be self-supporting between the support constructions. The deflection of the Structural framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection, shall not exceed L/60 for the unsupported span. The skylights will impose reactions to the support construction. All adjacent and support construction must support the transfer of all loads including horizontal and vertical, exerted by the skylights. Design or structural engineering services for the supporting structure or building components not included in the skylight scope are not included under this section.

C. Water Penetration: The Metal Framed Skylight shall allow no water penetration at a minimum differential static pressure of 6.24 lbs. per sq. ft. per AAMA 501-05 Pressure Difference Recommendations and as demonstrated by prior testing of typical framing sample per ASTM E331.

D. Water test of Metal Frame Structure shall be conducted according to procedures in AAMA 501.2

2.04 METAL MATERIALS

A. Extruded Aluminum shall be ANSI/ASTM B221; 6063-T6: 6063-T5 or 6005-T5.

B. Flashing:

1. 5005 H34 aluminum 0.04” minimum thickness.

2. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile - when lengths exceed 10 ft. in nominal 10-ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6-in. to 8-in., set in a full bed of sealant and riveted if required.

C. All Fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.

D. All exposed ALUMINUM FINISH shall be standard color [Mill Finish] [CPICRF Standard Paint] [CPICRF Custom Paint] [Clear Anodize] [Bronze Anodize] [Other Finish]

PART 3 - EXECUTION

3.01 EXAMINATION

A. General Contractor to verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, skylight installer and all parties directly affecting and effected by the work of this section.

B. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor unless otherwise stipulated.

C. Installer to examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

3.02 INSTALLATION

A. Install components in strict accordance with manufacturer’s instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified.

B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.

C. Remove all protective coverings on panels immediately after installation.

3.03 CLEANING

A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths.

B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use.

C. Installers shall leave panel system clean at completion of installation. Final cleaning is by others upon completion of project, following manufacturer's cleaning instructions.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Door Hardware.
2. Gate Hardware.
3. Power supplies for electric hardware.
4. Low energy door operators plus sensors and actuators.

B. Related Sections:

1. Section 06 20 00 – Finish Carpentry: Finish Hardware Installation
2. Section 07 92 00 – Joint Sealants: Exterior thresholds
3. Section 08 11 13 – Hollow Metal Doors and Frames.
4. Section 08 14 00 – Wood Doors.
5. Section 08 80 00 – Glazing.
6. Division 26 – Electrical.
7. Section 28 31 11 – Fire Detection and Alarm System.

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.

1.02 REFERENCES:

Use date of standard in effect as of Bid date.

A. American National Standards Institute – ANSI/BHMA 156.18 – Materials and Finishes.

B. ADA – Americans with Disabilities Act of 1990 as amended by the ADA Amendments Act of 2010.

C. BHMA – Builders Hardware Manufacturers Association

D. DHI – Door and Hardware Institute

E. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Other Opening Protectives
2. NFPA 105 – Smoke Door Assemblies and Other Opening Protectives
3. NFPA 252 – Fire Tests of Door Assemblies

F. UL – Underwriters Laboratories

1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
2. UL 305 – Panic Hardware

G. WH – Warnock Hersey

H. 2016 California Building Code

I. SDI – Steel Door Institute

J. WI – Woodwork Institute

K. AWI – Architectural Woodwork Institute

L. NAAMM – National Association of Architectural Metal Manufacturers

1.03 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS: Submit six copies of schedule per Section 01 33 00. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.

2. Use BHMA Finish codes per ANSI/BHMA A156.18.

3. Name, part number and manufacturer of each item.

4. Fastenings and other pertinent information.

5. Location of hardware set coordinated with floor plans and door schedule.

6. Explanation of abbreviations, symbols, and codes contained in schedule.

7. Mounting locations for hardware.

8. Door and frame sizes, materials and degrees of swing.

9. List of manufacturers used and their nearest representative with address and phone number.

10. Catalog cuts.

11. Wiring and Riser Diagrams.

12. Manufacturer’s technical data and installation instructions for electric hardware.

13. Date of jobsite visit for renovation projects.

B. Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.

C. Deviations: Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1 – General Requirements, Specification Sections. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.04 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Exterior Classroom Exit Doors: Use classroom security function locksets with holdback feature.

E. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

F. See 2.6.G for added information regarding resilient and intumescent seals.

G. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

H. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to District locksmith.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.06 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.

2. Location of wall-mounted hardware, including wall stops.

3. Location of finish floor materials and floor-mounted hardware.

4. Locations for conduit and raceways as needed for electrical hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.

5. Manufacturer templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

D. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.

1. For renovation projects, submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.

1.07 WARRANTY:

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Locksets:	Five years
2.	Exit Devices:	Three years mechanical Two years electrical
3.	Closers:	Ten years mechanical Two years electrical
4.	Hinges:	Life of the Installation
5.	Continuous Hinges	Life of the Installation
6.	Other Hardware	Two years

1.08 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.

2. With installer, access control contractor and electrical contractor present, test electrical hardware systems for satisfactory operation.

3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.09 REGULATORY REQUIREMENTS:

A. All hardware for accessible doors shall meet the requirements of CBC Sections 1008.1.7, 1008.1.9, 11B-404, 11B-309.4 and 1008.1.8.

B. Hand-activated door opening hardware, handles, pulls, latches, locks, and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate. CBC Section 11B-309.4. Hardware shall be within 34” and 44” above the floor. CBC Section 11B-404.2.7.

C. Adjust doors to open with not more than 5.0 lbs pressure to open at exterior doors and 5.0 lbs at interior doors. As allowed per California Building Code, Section 11B-404.2.9 and 1008.1.3, DSA may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15 lbs.

D. Adjust door closer sweep periods so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door, per California Building Code Section 11B-404.2.9, Item 3.

E. Smooth surfaces at bottom 10” of push sides of doors, facilitating push-open with wheelchair footrests, per California Building Code Section 11B-404.2.10.

F. Door opening clear width no less than 32", measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30" and the hardware projects no more than 4". California Building Code Section 11B-404.2.3 and 1008.1.1.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24" in depth, may have the clear opening width reduced to 20". Example: shallow closets.

G. Door opening clear height no less than 80" measured from top of sill to bottom of frame header stop. Projections into clear opening height not to exceed 4". California Building Code Sections 11B-404.2.3 and 1008.1.1.

H. Thresholds: floor or landing no more than 1/2" below the top of the threshold of the doorway. Change in level between 1/4" and 1/2": beveled to slope no greater than 1:2 (50 percent slope). California Building Code Sections 11B-404.2.5 and 1008.1.7.

I. Floor stops: Do not locate in path of travel. Locate no more than 4" from walls, per CBC 2019 Section 11B-204 and 11B-307.

J. Pairs of doors: limit swing of one leaf to 90 degrees to protect persons reading wall-mounted tactile signage.

K. Meet California Building Code Sections 11B-404.2.7, 11B-404.2.9, 1008.1.8 and 1008.1.9.

L. Exit Devices:

1. Panic hardware shall comply with CBC Section 1008.1.9.2. Panic hardware shall be so mounted (within 36" and 44" above finished floor as recommended) that the clear width of the exitway is not less than 32" measured between the face of the door and the opposite stop. CBC Section 11B-404.2.3 and Figure 11B-404.2.3.

2. The unlatching force of panic hardware shall not exceed 5 lbs (22.2N), applied in the direction of travel. CBC Section 11B-309.4.

3. Panic hardware shall not be provided with "Night Latch" (NL) function for any accessible doors or gates unless the following conditions are met:

a. Such hardware has a dogging feature

b. It is dogged during the time the facility is open

c. Such dogging operation is performed only by employees as their job function (non-public use)

M. All classroom doors shall be lockable from the inside.

PART 2 – PRODUCTS

NOTE: ABSOLUTELY NO CONCEALED HARDWARE TO BE USED AT ANYTIME OR UNDER ANY CIRCUMSTANCES

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2.01 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives 3CB1	Bommer
Continuous Hinges	(IVE) Ives Aluminum Geared Series	Pemko
Pivots	DO NOT USE	
Floor Closers	DO NOT USE	
Key System	7 Pin Small Format (FAL)	Best
Locks	(SCH) Schlage L9000, LV9000	Best
Exit Devices	(VON) Von Duprin 99	District Standard
Key-Removable Mullion	(VON) Von Duprin KR4954,KR9954	District Standard
Closers	(LCN) LCN 4041,4041XP	District Standard
Auto Flush Bolts	(IVE) Ives FB30,FB40,FB50,FB60	DCI
Coordinators	(IVE) Ives COR Series	DCI
Silencers	(IVE) Ives	Rockwood
Push & Pull Plates	(IVE) Ives	Rockwood
Kickplates	(IVE) Ives	Rockwood
Stops & Holders	(IVE) Ives	Rockwood
Thresholds	(NGP) NGP	Zero
Seals & Bottoms	(NGP) NGP	Zero

2.02 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless-steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing. Use heavy-weight hinges at doors with panic hardware and high-use door openings.

D. Continuous Hinges: Use at outswing exterior doors

1. Geared-type aluminum.

a) Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.

2. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation, by placing a strip of insulation on the back of the hollow metal frame behind the rabbet section. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.

2.03 LOCKSETS, LATCHSETS:

A. Mortise Locksets and Latchsets: Shall be Schlage L9000 Series as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.

2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.

3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.

b) Inside lever applied by screwless shank mounting – no exposed trim mount screws

c) Outside and inside trim thru bolted together and through the door

4. Spring-loaded fusible link provides fail secure mode in case of fire.

5. Universal lock case – 10 functions in one case.

6. Floating mounting tabs automatically adjusts to fit a beveled door edge.

7. Field reversible handing without opening lock case.

8. External spring cages allow for simple trim retrofit.

9. Lever rotation in both directions (up & down) for ease of use.
10. At Vandlgard locks, locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force. Use at exterior doors when fixed Vandal-Resistant trim (Ives VR900 Series) is not used.

11. Furnish inside indicator at exterior classroom doors with “locked” display.

12. Independent lever rotation.

13. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.

14. Thumbturns: accessible design not requiring pinching or twisting motions to operate.

15. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

16. Scheduled Lock Series and Design: Schlage L and LV series, OMEGA design.

17. Certifications:

    a) ANSI/BHMA A156.18, Grade 1 Operational, Grade 1 Security.
    b) ASTM F1450.

18. Accepted substitutions: none

2.04 EXIT DEVICES / PANIC HARDWARE

A. General features: Shall be Von Duprin 99-2 Series as scheduled.

1. Independent lab-tested 1,000,000 cycles.

2. Use 98 Series with stainless-steel finish at gates. All other openings use 99-2 Series.

3. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.

4. 0.75-inch throw deadlocking latchbolts.

5. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.

6. Mount all panic devices with through-bolt fasteners. Absolutely no concealed hardware to be used, under any circumstances.

7. No exposed screws to show through glass doors.

8. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.

9. Releasable in normal operation with 15-lb. maximum operating force, and with 32 lb. maximum pressure under 250-lb. load to the door.
10. Flush end cap design as opposed to typical “bottle-cap” design end cap.

11. Exterior doors use XP-series devices: Static load force resistance of at least 2000 pounds.

12. Where devices span over door lite frame and the face of the selected lite manufacturer's frame is raised from the face of the door, furnish panic hardware manufacturer's fitted shims or glass-bead kits at no additional cost to the project.

13. Comply with CBC Section 1008.1.8.

B. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.

2. Lever Trim: breakaway type, forged brass or bronze escutcheon min .130" thickness, compression spring drive, match lockset lever design.

3. Vandal-Resistant Trim: Use Ives VR900 Series at exterior doors whenever possible.

4. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware".

5. At Paired Openings: Use key-removable mullion with 2 rim panic devices, DO NOT use concealed vertical rod devices or surface vertical rod devices.

6. DO NOT use mortise panic (9975) devices.

7. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.

8. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

9. Accepted substitutions: none

2.05 CLOSERS

A. Surface Closers: Shall be LCN 4041 and 4040XP Series.

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.

2. Use 4041XP closers at all exterior and high-use door openings.

3. ISO 2000 certified. Units stamped with date-of-manufacture code.

4. Independent lab-tested 10,000,000 cycles.

5. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.

6. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

7. At 6/8 high door openings, modify closer mounting so that closer body does not interfere with 80" opening height.

8. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 11B-309.4 and 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.

9. When provided, the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

10. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.

11. Extra-duty arms (EDA and CUSH) at exterior and interior doors scheduled with parallel arm units.

12. Generally, closers need to swing to maximum allowable degree of opening (180 degrees if possible).

13. Generally, do not use closers with hold-open feature unless specifically approved by Facilities Engineering and Maintenance.

14. Use through-bolt fasteners at all closers.

15. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.

16. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.

17. Non-flaming fluid will not fuel door or floor covering fires.

18. Pressure Relief Valves (PRV) not permitted.

19. Supply Special Rust Inhibitor (SRI) at corrosive environments. This special corrosion resistant pretreatment, when added to the powder coat finish, gives the closer a tremendous advantage over a potentially corrosive environment.

20. Accepted substitutions: none

B. Low-Energy Door Operators: Shall be LCN 4600 Series. Comply with ANSI/BHMA A156.19 Electric power-open, hydraulically checked spring power closing. Modular construction. Finished metal cover. Field-adjustable opening force, opening speed, time-open, closing and latching speeds. Door reopens and timing cycle restores if system reactuated during closing cycle. Breakaway clutch protection from forced closing. Door, frame, motor and drive train protected by attenuated initiation of opening cycle.

1. Self-contained low-voltage power supply, terminal strip and sequencing for incorporation of hardwired electric hardware with system operation.

2. Provide concealed on/off system switch at closer body mechanism.

2.06 OTHER HARDWARE

A. Automatic Flush Bolts: Low operating force design.

B. Overhead Stops: Glynn-Johnson 80 and 100 Series. Non-plastic mechanisms and finished metal end caps. Field-changeable stop-only functions. Use only where floor or wall stops are inadvisable. When used, use heavy-weight hinges or continuous hinges.

C. Kick Plates: Rounded and relieved edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Vandal-Resistant Trim: Use IVES VR900 Series at all exterior doors whenever possible.

E. Viewers: Provide 190-degree viewer at all exterior doors without visionlites. Install at wheelchair use eye level.

F. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.

2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90 deg stop / 95 deg deadstop. Note degree of opening in submittal.

G. Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material’s thickness and durability.

1. Proposed substitutions: submit for approval.

2. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.

3. Non-corroding fasteners at in-swinging exterior doors.

4. Fire-rated Doors, Resilient Seals: UL 263 / CBC Section 703 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal. Adhesive applied seals are not allowed.

5. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL 263 / CBC Section 703. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required

H. Thresholds: As scheduled and per details. Comply with CBC Section 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material’s thickness. Proposed substitutions: submit for approval.

1. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 07 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

2. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.

3. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

4. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full thread. Sleeve nuts: full length to prevent door compression.

I. Exposed Through-Bolts: Use for fastening all closers and panic hardware. Coordinate with wood doors; ensure provision of proper blocking to ensure through-bolts will not crush or deform door for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to ensure through-bolts will not crush or deform door for mounting panic hardware and door closers.

J. Silencers: Interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

K. Wall- & Floor-mounted electromagnetic door holders: LCN's SEM series or approved equivalent. Incorporate into U.L. listed fire & life-safety system, doors release to allow closure and latching when door's zone is in alarm state. Use minimum projection required to allow door to open as widely as allowed by wall conditions and projection of door hardware.

2.07 FINISH:

A. Generally, BHMA 626 Satin Chromium OR BHMA 630 Satin Stainless Steel. Generally, use stainless steel finish only at gate openings.

1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.

B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.08 KEYING REQUIREMENTS:

A. Key System: Seven Pin Small Format interchangeable core

1. Falcon or Best cores to be pinned by owner

2. Temporary cylinders/cores remain supplier’s property.

3. Furnish 10 construction keys.

4. Furnish 2 construction control keys.

5. Furnish 200 keyblanks and 10 control keyblanks.

6. Key Cylinders: furnish 7-pin solid brass construction.

7. Furnish 20 extra “0” bitted cores.

B. Cylinders/cores: keyed at by Owner, O bitted from factory of lock manufacturer where permanent records are maintained. Locksets and cylinders same manufacturer.

1. 4 keys per cylinder, 10 control keyblanks, 200 additional keyblanks.

C. Bitting List: use secured shipment direct from point of origination to District locksmith at completion.

D. Approved Finish Hardware Submittal: furnish 2 copies to District locksmith at completion.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS:

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

3.02 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.

2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 34 inches to 44 inches above the finished floor, per CBC Sections 11B-404.27 and 11B-309.4.

3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

D. Existing frames and doors to be retrofitted with new hardware:

1. Field-verify conditions and dimensions prior to ordering hardware. Fill existing hardware cut outs not being reused by the new hardware. Remove existing hardware not being reused, return to Owner unless directed otherwise.

2. Remove existing floor closers not scheduled for reuse, fill cavities with concrete and finish smooth

3. Cut and weld existing steel frames currently prepared with 2-3/4” height strikes. Cut an approx. 8" section from the strike jamb and weld in a reinforced section to accommodate specified hardware’s strike.

4. Patch and weld flush filler pieces into existing door hardware preparations in steel doors and frames, leave surfaces smooth.

5. Glue in solid wood block fillers to fill cut outs in existing wood doors, sand surfaces smooth. Alternatively, use an approved epoxy-based wood filler product, submit product data for approval.

3.03 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

3. Use manufacturers' fasteners furnished with hardware items or submit Request for Substitution with Architect.

4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.04 REMODEL OR REPAIR TO EXISTING FACILITY

A. Field verify existing conditions and measurements prior to ordering hardware. Fill existing hardware cut outs not being used by the new hardware. Remove existing hardware not being reused.

B. Disable or remove existing floor closers where they exist. If disabled cut or remove spindle.

C. Where existing wall conditions will not allow door to swing using the scheduled hinges, provide wide-throw hinges and if needed extended arms on closers.

D. Provide proper brackets to accommodate the mounting of closers on doors with flush transoms.

3.05 ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.

2. Adjust doors to fully latch with no more than 1 pound of pressure.

3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.

4. Adjust door closers per 1.9 this section.

B. Inspection: Use hardware supplier's consultant or consultant's agent. Include supplier's report with closeout documents.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.

2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.

3. Identify items that have deteriorated or failed.

4. Submit written report identifying problems

3.06 DEMONSTRATION:

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

3.07 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.08 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. Manufacturers and their abbreviations used in this schedule

GLY Glynn-Johnson
IVE H.B. Ives
LCN LCN Closers
NGP National Guard Products
SCH Schlage Lock Company
VON Von Duprin

Hardware Group No. CLS-IS
For use on Door #(s):
3B 4B 7
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1 4.5 X 4.5		652	IVE
1	EA	CLASSROOM SECURITY	LV9071BDC OMEA L283-711		626	SCH
1	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	525A-223		A	ZER

Hardware Group No. CLS-OS2
For use on Door #(s):
3 4 6
Provide each SGL door(s) with the following:

1	EA	CONTINUOUS HINGE	112HD		628	IVE
1	EA	CLASSROOM HOLDBK	LV9076BDC LLL OMEA L283-150		626	SCH
1	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	DOOR PULL	VR900 LLP		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	525A-223		A	ZER

Hardware Group No. ED2
For use on Door #(s):
5
Provide each SGL door(s) with the following:

1	EA	CONTINUOUS HINGE	112HD		628	IVE
1	EA	PANIC HARDWARE	CD-PA-AX-98-NL-OP-110MD		626	VON
1	EA	MORTISE CYL TURN	PROVIDE FROM SCHOOLS STOCK		626	SCH
1	EA	SFIC CYLINDER	C953-7CCA		626	FAL
1	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	DOOR PULL	VR910 NL		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	526A-223		A	ZER

Hardware Group No. FLD1
For use on Door #(s):
6B 6C 6D 10C
Provide each FLD door(s) with the following:

1	EA	MORTISE CYL TURN	PROVIDE FROM SCHOOLS STOCK		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX X K510-730 36-083 36-082-037		626	SCH
1	EA	PERM CORE	PER OWNERS KEY SYSTEM		626	SCH
1	EA	BY DOOR MANUFACTURER	BALANCE OF HARDWARE			

Hardware Group No. FLD2
For use on Door #(s):
10B
Provide each FLD door(s) with the following:

1	EA	PANIC HARDWARE	CDSI-PA-AX-35A-NL-OP-388		626	VON
1	EA	SFIC MORTISE CYL.	80-135 X B520-378 36-083 36-082-025		626	SCH
1	EA	SFIC RIM CYLINDER	80-159		626	SCH
2	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	BY DOOR MANUFACTURER	BALANCE OF HARDWARE			
1	EA	DOOR PULL	VR810 NL		630	IVE
1	EA	SURFACE CLOSER	1450 CUSH STD		689	LCN

Hardware Group No. HM-ED-OS
For use on Door #(s):
2 2B 2C 10
Provide each PR door(s) with the following:

2	EA	CONTINUOUS HINGE	112HD		628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
2	EA	PANIC HARDWARE	CD-PA-AX-98-NL-OP-110MD		626	VON
1	EA	MULLION STORAGE KIT	MT54		689	VON
2	EA	MORTISE CYL TURN	PROVIDE FROM SCHOOLS STOCK		626	SCH
1	EA	SFIC CYLINDER	C953-7CCA		626	FAL
1	EA	MORTISE CYLINDER	C987-7CCA 5622-IC		626	FAL
3	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	DOOR PULL	VR910 NL		630	IVE
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA SRI		689	LCN
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
2	EA	MULLION SEAL	8780NBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	525A-223		A	ZER

Hardware Group No. HM-ED-OS-1 **NOT USED**
For use on Door #(s):
2C
Provide each PR door(s) with the following:

2	EA	CONT. HINGE	112HD EPT		628	IVE
2	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-PA-AX-98-EO-CON		626	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-PA-AX-98-NL-OP-110MD-CON		626	VON
1	EA	DELAYED EXIT LOGIC CONTROLLER	DE5300 24 VDC		US32D	VON
1	EA	MULLION STORAGE KIT	MT54		689	VON
2	EA	SFIC CYLINDER	C953-7CCA		626	FAL
2	EA	MORTISE CYLINDER	C987-7CCA 5622-IC		626	FAL
2	EA	SFIC CORE	CB807 SFIC		626	FAL
2	EA	MAGNETIC LOCK	M490 HDB490 12/24 VDC		628	SCE
1	EA	DOOR PULL	VR910 DT		630	IVE
1	EA	DOOR PULL	VR910 NL		US32D	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA SRI		689	LCN
2	EA	DOOR SWEEP	8193AA		AA	ZER
2	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	WEATHER STRIPPING	PERIMETER SEAL BY ALUMINUM DOOR MANUFACTURER			
1	EA	THRESHOLD	525A-223		A	ZER
1	EA	HORN	1910-1 12/24 VDC		WHT	SCE
1	EA	POWER SUPPLY	PS906 BBK 900-4RL-FA 900-4RL-FA KL900 120/240 VAC		LGR	SCE

Hardware Group No. LV-EXT1
For use on Door #(s):
8
Provide each SGL door(s) with the following:

1	EA	CONTINUOUS HINGE	112HD		628	IVE
1	EA	STOREROOM LOCK	LV9080BDC LLL OMEA L283-150		626	SCH
1	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	DOOR PULL	VR900 LLP		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	526A-223		A	ZER

Hardware Group No. RR-OS
For use on Door #(s):
1
Provide each SGL door(s) with the following:

1	EA	CONTINUOUS HINGE	112HD		628	IVE
1	EA	CLASSROOM SECURITY	LV9071BDC LLL OMEA L283-150		626	SCH
1	EA	MORTISE CYL TURN	PROVIDE FROM SCHOOLS STOCK		626	SCH
1	EA	SFIC CORE	CB807 SFIC		626	FAL
1	EA	DOOR PULL	VR900 LLP		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	526A-223		A	ZER

Hardware Group No. SR1
For use on Door #(s):
9
Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	OFFICEW/SIM RETRACT	LV9056BDC OMEA 09-544		626	SCH
1	EA	PERM CORE	PER OWNERS KEY SYSTEM		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	PERIMETER SEALS	328AA HEAD AND JAMBS		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	526A-223		A	ZER

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Exterior and interior glass and glazing, including glazing clips, channels, compound and glazing beads, unless furnished with frame to be glazed as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 07 92 00 – Joint Sealants.
2. Section 08 11 13 – Hollow metal Door Frames.

1.02 REFERENCE STANDARDS

A. ASTM C1036 – Standard Specification for Flat Glass (flat, for glazing, mirrors and other uses).

B. ASTM C920 – Standard Specification for Elastomeric Joint Sealants (Sealing Compound, Synthetic Rubber base, Single Component, Chemical Curing for Caulking, Sealing and Glazing in Building Construction).

C. AAMA 800 and AAMA 807.3 - Non-skinning Resilient Preformed Compounds - Tapes, Ribbons, Beads with Release Paper.

D. ANSI Z97.1

E. GANA – Glass Association of North America

F. 16 CFR 1201

G. Chapter 24, Part 2, Title 24, California Building Code, 2016.

H. NFPA 80

1.03 SUBMITTALS

A. Submit manufacturer's standard size samples of glass units to be used for review by Architect.

B. Submit manufacturer's literature and pertinent technical data on the products to be installed. Submit two (2) samples of glass units.

C. Prepare and submit a schedule of glass and glazing components.

1. Schedule tapes, gaskets, separators and related items including the designation of areas and specific locations where materials and products are to be used, special instructions on their use and installation, and show scheduled items on shop drawings.

2. Provide detailed instructions for the installation and reglazing of glass units. Include with instructions and explanatory details, the sequence of installation, method of installation for materials and products including the glass, glazing gaskets, setting blocks, jamb blocks, etc., location of specific items such as the setting blocks and jamb blocks and special instructions as may be required.

D. Certifications:

1. Certify that the following materials and products and processes conform to these Contract Documents and submit in accordance with other sections of these specifications:

a. Sealants
b. Neoprene, nylon, etc.
c. Glass
d. Compatibility of materials, finishes, methods of application.

1.04 QUALITY ASSURANCE

A. Glass Performance:

1. The maximum overall size, minimum thickness, and type of glass is to conform to the applicable glass manufacturer's published recommendations for the openings or sizes indicated on the drawings, and the performance requirements specified in these specifications.

2. Ensure that glass and glazing components conform to governing codes and regulations.

3. Design glass to perform to a specified safety factor of 2.5, and sustain at maximum wind loading a statistical glass breakage of no more than eight lites in one thousand.

B. Be responsible for correct selection of glass including required accommodations for fire access, conditions of thermal stress, venting, wind loading and other factors which can reasonably be inferred from the drawings and location of the project.

C. Safety Glazing: All glass to be tempered and installed in accordance with the requirements of the Consumer Products Safety Commission regulation CPSC 16 CFR 1201.

D. Identification-Safety Glazing Materials: Identification shall be etched or ceramic fired on the glass and readable from the inside of the building after installation, CBC 2019, Title 24, Part 2, Section 2406.3

1.05 DELIVERY, STORAGE AND HANDLING

A. Take reasonable precautions necessary to provide complete protection of glass and glazing materials before, during and after installation.

B. In event of damages or breakage, repair or replace damaged and defective materials and products to the satisfaction of the Owner within five (5) calendar days.

1.06 GUARANTEE

A. Furnish written guarantee covering work of this Section for 5 years from date of substantial completion. Under the terms of this guarantee, failures shall be repaired or replaced to satisfaction of the Architect and Owner without additional cost to the Owner. Under the guarantee, failures except vandalism and malicious mischief shall be repaired at no additional cost to Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Float Glass: 1/4-inch thick unless otherwise noted, tempered in doors and adjacent lights, and where required per Title 24, Chapter 24, Section 2406-Safety Glazing**.** "Starphire, Ultra-Clear" by PPG Industries, or "Optifloat, Clear" by Pilkington.

B. Insulated dual pane Low E Glass Units (1"): Exterior clear, tempered at all locations. "Solargray" (PPG Industries), or "Optifloat, Tint" by Pilkington, then 1/2" air gap and float/tempered/Fire with PPG Solarban 70XL (Solar Control Low-E Clear Insulating Glass) on #3 pane, or equal, as follows:

1. Coating on #3 surface

2. U-Value: .28 Winter and .26 Summer

4. SHGC: .27

5. Visible light transmittance of 64 percent, light to solar gain.

2.02 GLAZING

A. Sealants:

1. Tremco, General Electric, and Dow Corning sealant products are approved where use is documented and in accordance with the use and conditions of this project.

2. Compatibility and sequence of installation for sealants is to be carefully considered in design to ensure that required cure and optimum performance are met.

3. Do not use sealants that degrade or fail under design conditions including, thermal movement (expansion and contraction), sanding water, ultra-violet exposure, aging, and other adverse time and environmental conditions.

4. Structural Sealants: Provide Tremco, "Spectrum II", G.E. or Dow Corning "745", or equal, approved sealant and Dow Corning "1200 RTC4V" primer or equal. Ensure acceptance by manufacturer of product or system of construction into which glass and sealant is being installed.

6. Color: To be selected by Architect.

7. Test sealants in accordance with ASTM C794.

8. Perform field adhesion tests in accordance with manufacturer's printed recommendations.

9. Glazing Putty: NFPA-80, paintable.

B. Spacers: Provide extruded silicone shims, 60-70 Type A Durometer.

C. Setting Blocks: Provide neoprene 80 to 90 Type A Durometer hardness type.

D. Tape: Provide Tremco 440 tape, or other approved.

E. Neoprene Glazing Gaskets and Air Seals:

1. Provide glazing gaskets which are extruded type with continuous interlocking projection to engage into the metal glass holding member, are designed to be in contact at times with adjacent contiguous elements during dynamic loading, building and thermal movements, and provide a continuous water tight seal as required to meet the performance criteria.

2. Roll-in and back-up gaskets are to be sized in lengths or units to provide for a minimum crowd-in of one percent to two percent, or as otherwise recommended by manufacturer, to ensure against pullback at corners.

3. Roll-in glazing and back-up gaskets for one lite or glazed opening is to be continuous one-piece units with factory fabricated injection molded corners free of flashing and burrs.

4. Materials, recommendations and details describing the proposed use, design, and application procedures for glass and glazing materials are to be documented and fully described on shop drawings.

5. Air seal gaskets are to be continuous, closed cell (sponge) neoprene gaskets with pressure sensitive adhesive on one side in thickness and shore Durometer hardness as required for the specified performance criteria.

F. Provide compound for fire-rated materials in strict accordance with manufacturer's instructions.

2.03 SOURCE QUALITY CONTROL

A. Glass units are to be tongless edged, best quality, sizes and thickness required by drawings or conditions.

B. Glass and related glass and glazing materials will be verified and coordinated with the performance requirements and be as recommended, in writing, by the applicable glass and gasket manufacturers. The type, size, thickness and design of glass units, including dimensions, tolerances, glazing pockets, jamb and seismic blocking, glass edge clearance and frame lap, will be verified and documented.

Note: The selection of the glass will take into special account the performance requirements herein specified.

C. The edge treatment of butt glazed glass shall be as required to ensure the full adhesion and performance of the butt glazed sealant joint and shall be as recommended in writing by the applicable glass, sealant and gasket manufacturers.

D. Where wire glass or fire assembly is scheduled, glaze in accordance with U.L. Building Materials, page 28A. Glazing putty compound shall be per NFPA 80.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Remove lacquer and other coatings from glazing rabbetes. Thoroughly clean areas to receive glass and glazing materials. The installation shall be in strict accordance with recommendations of window, glass and sealant manufacturers. Glass shall be installed so that no metal-to-glass contact occurs.

B. Installation shall be in accordance with applicable requirements of the latest edition of the "Glazing Manual" of the Flat Glass Marketing Association. Where vinyl or neoprene glazing beads or channels are used, they shall be in one piece for each edge of glass, with corners neatly mitered and tightly fitted together.

C. Glass shall be cut to size in the shop and shall have clean-cut edges. Other edges will not be accepted.

D. Glass in aluminum frames unless otherwise specified shall be "dry-glazed" using neoprene glazing channels and snap-on beads furnished by manufacturer. Channels shall be installed so that no metal-to-glass contact occurs. Corners shall be neatly mitered to hairline joint. Channels shall be installed so that top of channel is flush with top of glazing stops and forms a neat, straight line.

E. Before the shop or field pre-glazing of the curtainwall units, openings will be checked to see that they are square, plumb and in true plane. If found otherwise, glazing will not proceed until proper corrections are made.

F. Perimeter clearance must be sufficient to avoid point loading and provide for jamb and seismic blocking.

3.02 TEMPERED GLASS UNITS

A. Do not field cut or drill tempered glass units. Cut to proper size in factory.

B. Vertical tempering will not be allowed.

3.03 FIELD QUALITY CONTROL

A. Testing: Upon completion of installation of glass and glazing, perform water tests in accordance with industry standards for such tests, and ASTM E331, AAMA FC-1, and NAAMM. Repair leaks and re-test. Continue with tests and repairs or replacements until such time as entire installation has been tested and certifiably exhibits no water intrusion, thereby instituting five-year guarantee against such water intrusion.

3.04 CLEANING

A. Immediately prior to scheduled acceptance of work, remove protective materials and clean glass members, being careful not to use abrasive or harmful cleaning agents.

3.05 PROTECTION

A. Maintain glass in a reasonable clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other surfaces.

END OF SECTION

09 00 00

FINISHES

SANTEE SCHOOL DISTRICT

SECTION 09 24 00

CEMENT PLASTERING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Lath and cement plaster for soffits, exterior walls, interior walls and ceilings where indicated, and base coats for ceramic wall tile installation.

1. All exterior walls shall be provided with lath and cement plaster a minimum of 8 feet from ground level.

B. Related Work:

1. Substrates such as concrete masonry and cast-in-place concrete.
2. Plaster soffit backing material.
3. Wood and metal stud framing.
4. Section 09 30 00 – Tiling.
5. Section 09 90 00 – Painting and Coating.

1.02 REFERENCE STANDARDS

A. Comply with applicable provisions of Chapter 25, Part 2, Title 24, California Building Code.

B. Install plaster work in accordance with the Plaster and Lathing Systems Manual issued by the Southern California Plastering Institute, Inc. Acceptable practice per Technical Services Information Bureau, Technical Bulletins, www.tsib.org, Phone (714) 221-5530.

1.03 SUBMITTALS

A. Samples:

1. Submit in accordance with Section 01 33 00 – Submittal Procedures, and the General Conditions, samples of color and texture for Architect's review.

2. Provide samples of aluminum channel screeds and trim, three (3) of each color indicated.

3. Provide a 4 foot by 8-foot sample panel of each plaster system required on project, at a field location selected by Architect. Once sample installation has been approved, that sample becomes the standard of quality expected for that system throughout the project.

1.04 QUALITY ASSURANCE

Provide protection of materials and assemblies in place from plastering operations. Drawings are not necessarily intended to assign construction sequence or method, therefore, protection of in place materials and assemblies may be required in excess of that which can be construed from drawings. Furnish, install, then remove all that protection and scaffolding or staging at no additional cost.

PART 2 - PRODUCTS

2.01 PLASTER MATERIALS

A. Cement: ASTM C150, Type I or II, Portland, 50 percent (50%) plastic cement by TXI Riverside Cement.

B. Lime: ASTM C206, dry hydrated type. Lime putty, if proposed, shall weigh more than 83 pounds per cubic foot.

C. Sand: ASTM C144, clean and well graded from coarse to fine.

D. Water: Clean and free from injurious amounts of acid, alkali, and organic matter.

E. Fiber Reinforcing: Provide chopped alkali-resistant glass fibers or 15 denier polypropylene fibers for use in scratch and brown coats.

F. Color: Provide integral color stucco coat, colors as selected by Architect (3 minimum), manufactured by Expo Stucco, La Habra Stucco, Omega Products International, or equal. Integral coloring is to be used regardless of the fact that field painting is also required.

2.02 LATH AND ACCESSORIES

A. Lath:

1. At vertical surfaces without rigid back-up (between framing members) provide 3.4 pound, expanded metal wire (diamond mesh), galvanized, ASTM C847, paper backed at exterior locations, manufactured by Clarkwestern Dietrich Building Systems, LLC, ClarkDietrich Metal Lath and Accessories, or other approved. Provide with paper meeting FS QQ-L-101C, Type I, Grade D, at soffits and walls in wet areas.
2. At vertical surfaces with rigid back-up (plywood) at exterior, over one layer of Grade D paper and one layer of leather back plaster felt, 1-1/2" x 17 gage woven wire galvanized stucco netting (self furring lath with staple attachment over plywood substrate is unacceptable), and at interior locations 1-inch x 20 gage woven wire stucco netting, ASTM C1032 as manufactured by Clarkwestern Dietrich Building Systems, LLC, ClarkDietrich Metal Lath and Accessories, or equal. Lath shall be held a minimum of 1/4-inch away from rigid back-up by the use of furring nails. Self furring lath with staple attachment over plywood substrate is unacceptable.

3. At Exterior Soffits: Provide 3/8-inch rib, expanded diamond mesh weighing 3.4 pounds per square yard, fabricated from galvanized steel sheets, ASTM C847.

B. Accessories: Provide galvanized trim such as Dietrich Cornerite TM, beads, screeds, and prefabricated joints for control and expansion/contraction, unless otherwise noted on Drawings.

1. Wire Staples: 16 gage by 1-3/8 inches long by 3/4- inches wide, or barbed roof nails 1-1/2 inches long with 7/16-inch head. At horizontal soffits provide 5/8-inch wide, 1-1/2 inches long, No. 9 W&M gauge ring shank hook staples.

2. Hanger Wires: 8 gage

3. Tie Wires: 16 gage or 18 gage. See Drawings.

4. Sheet Metal Items: 26 gage corner beads, base screeds, runners, and expansion screeds.

5. Expansion joint with expansion flange, including prefabricated joints for control and expansion/ contraction.

6. Hot-Rolled Carrying Channels: 1-1/2 inches deep, weighing 1.12 pounds per lineal foot with wire hangers spaced 36 inches on centers.

7. Cold-Rolled Furring Channels: 7/8-inch deep x 22 gage hat section, spaced at 16 inches on centers.

8. Drip screeds as indicated on Drawings, or vented casing style bead.

9. Vent Screeds: Fry channel screed aluminum extruded alloy 6063 TS, PCS-75-V 300 factory baked on custom color to match exterior plaster at soffit. Install where indicated on Drawings.

10. Plaster Screeds and Moldings: Provide aluminum extruded alloy 6063 TS channel screeds and moldings by Fry Reglet Corp., as shown on the Drawings. Provide factory baked on custom color as selected by Architect.

11. Furring Nails: Corrosion resistant with cardboard furring spacers.

C. Galvanize metal fastening devices such as staples, nails, screws, and wire ties.

D. Bonding Agent: Provide Plaster-Weld, or other approved, to allow proper bond of plaster to substrate.

PART 3 - EXECUTION

3.01 PREPARATION

A. Properly prepare surfaces, substrates, and previously installed assemblies to receive of plaster finish.

B. Ensure that existing surfaces are clean and free of loose and foreign material. Apply necessary surface treatments such as bonding agents when required or recommended.

C. Lightly sandblast or acid wash existing surfaces where such treatment is recommended by the Plastering Institute, and where such treatment will not harm other surfaces or assemblies.

D. Inspect framing systems in place to see that they are rigidly and permanently fastened; ready to receive lath, and provide written acceptance of substrate.

3.02 FIELD QUALITY CONTROL

A. Comply with the requirements of California Building Code Chapter 25 for support of lath:

“2507.3 Lath attachment to horizontal wood supports. [DSA-SS, DSA-SS/CC and OSHPD 1 & 4]

Where interior or exterior lath is attached to horizontal wood supports, either of the following attachments shall be used in addition to the methods of attachment described in referenced standards listed in Table 2507.2.

1. Secure lath to alternate supports with ties consisting of a double strand of No. 18 W & M gage galvanized annealed wire at one edge of each sheet of lath. Wire ties shall be installed not less than 3 inches (76 mm) back from the edge of each sheet and shall be looped around stripping, or attached to an 8d common wire nail driven into each side of the joist 2 inches (51 mm) above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches (51 mm) above the bottom of the joist and the ends of the wire secured together with three twists of the wire.

2. Secure lath to each support with 1/2-inch-wide (12.7 mm), 11/2-inch-long (38 mm) No. 9 W & M gage, ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath not more than 3 inches (76 mm) from edge of each sheet. Such staples may be placed over ribs of 3/8-inch (9.5 mm) rib lath or over back wire of welded wire fabric or other approved lath, omitting the 10d nails."

END OF COMMENT

1. Interiors: Application of Metal Plaster Bases shall comply with the requirements of CBC section 2507.

2. Vertical and Horizontal Assemblies shall comply with CBC section 2507.

3.03 INSTALLATION

A. Install lath with long dimension at right angles to supports. Lath over solid backing shall have at least 1/4-inch clearance from backing.

B. Stagger ends of lath to avoid continuous joints. Lap joints at least 2 inches. Butt lath into internal corners and reinforce angles with Cornerite reinforcement, secured along edges at no more than 10 inch intervals.

C. Attach lath to supports and side laps at 6 inches on centers maximum.

D. Fasteners for lath and metal accessories (reveals, expansion joints, screeds, etc.) must be into wood framing members (on plywood only), and lengths need to consider plywood thickness (verify minimum penetration into wood studs, blocking, plates)

E. Install control joints at maximum 10 foot intervals in each direction. Ensure a waterproof joint. Where recommended by the Plastering Institute or required by Code, install weep screeds.

F. Attach plastering accessories to supports using blocking, provide true grounds for plaster. Wire-tie, nail or staple to supporting substrates. When solid flange moldings are installed the stucco netting shall be cut and wire placed over the flange before the molding is fastened to the substrate. Place additional building paper over the upper flange of horizontal moldings.

G. If wood grounds are not shown, install preformed corner beads.

H. As work progresses, build-in expansion/contraction joints as shown on drawings. If not detailed, place as recommended by Lath and Plastering Manual but gain written approval from Architect on their exact location prior to installation.

3.04 NUMBER OF COATS AND THICKNESS

A. Interior Base Coats for Ceramic Tile: Provide scratch approximately 1/2-inch thick, to receive brown coat by tile installer. Refer to tile section 09 30 00, for additional information.

B. Exterior Veneer Stucco Over C.M.U.: Brown coat and two finish coats approximately 5/8-inch total thickness to cover substrate and provide medium dash finish coat with light knockdown.

C. Exterior Stucco Over Lath and Framing: Scratch, brown and two finish coats approximately 7/8-inch thick. Provide medium dash finish coat, with light knock down.

D. High-Strength Gypsum Plaster Over Metal Lath: Scratch, brown and Keene Cement Finish coats; smooth troweled.

3.05 APPLICATION

A. Scratch and Brown Coats: Apply with sufficient material to completely cover lath and scratch across supports. Patch cracks in brown coat prior to application of finish.

B. Exterior Finish Coats: Apply in two coats with an approved type of plastering machine, each coat covering surface uniformly. Apply first coat to form medium dash coat texture pattern, followed by second coat resulting in uniform color and texture throughout project. All plaster will have an integral color in the finish coat. Smooth finishes will be unacceptable.

1. Apply first coat by making several passes with nozzle to completely cover surface.

2. Apply second coat by doubling back the same day, when first coat is sufficiently dry.

C. Refer to Title 24, Section 2504, Part 2, California Building Code 2016, for horizontal assemblies required for plaster ceilings.

3.06 CURING

A. Moist cure the scratch coat for 48 hours prior to application of brown coat. Cure brown coat 7 days prior to application of finish coat (48 hours moist curing, 5 days additional curing.) For moist cure, keep plaster surface continuously wet by water fog spray, or cover surface with absorptive cover kept continuously wet.

3.07 CUTTING AND PATCHING

A. Cut, patch, point up, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to the substrate has failed.

B. Sand smooth-troweled finishes lightly to remove trowel marks and arises.

3.08 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces that are not to be plastered. Repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers, and equipment and clean floors of plaster debris.

B. Provide final protection and maintain conditions, in a manner suitable to ensure that plaster will remain intact without damage or deterioration at time of Substantial Completion.

C. Plaster from beads, screeds, base, and trim. Leave work clean and ready for painting.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Framing required for gypsum board ceilings, blocking and furring channels, as required, gypsum board walls and ceilings and taped and sanded joint treatment where required, including adhesives and texturizing as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 06 10 00 – Rough Carpentry.
2. Section 10 20 00 – Interior Specialties.
3. Section 09 90 00 – Painting and Coating.

1.02 REFERENCE STANDARDS

A. Work to conform to California Building Code, Chapter Title 24, Part 2.

1. Gypsum board material shall be classified in accordance with ASTM E84 or UL 723, and shall have a Class C flame spread index of 76-200 and smoke developed index of 0-450.

B. Perform gypsum board systems work in strict accordance with recommendations of the following reference standards, unless otherwise specified in this section or required by local code. Keep a copy of applicable reference standards in field office for duration of project.

1. ASTM C1396 – Standard Specification for Gypsum Board.

2. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for use as Sheathing.

3. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

4. ASTM C514 – Standard Specification for Nails for the Application of Gypsum Board.

5. ASTM C557 – Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

6. ASTM C1002 – Standard Specification for steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

7. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

8. ASTM E413 – Classification for Rating Sound Insulation.

9. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

10. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

11. Gypsum Association - GA-216 – Recommended Specifications for the Application and Finishing of Gypsum Panel Products.

12. Gypsum Association - GA-254 – Recommended Specifications for the Fire-Resistant Gypsum Sheathing.

13. Underwriters Laboratories, Inc. (UL) - Building Materials Directory.

14. Underwriters Laboratories, Inc. (UL) - Fire Resistance Index.

1.03 SUBMITTALS

A. Submit copies of manufacturer's product information and installation instructions for each item and accessories.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's unopened containers, packages or bundles identified with manufacturer's name, brand, type, and grade clearly marked.

B. Store in dry areas and protect from dampness and deterioration.

C. Protect ready-mixed products from freezing.

D. Protect metal products from rusting.

E. Deliver fire-rated materials bearing testing agency label and required fire classification number.

1.05 PROJECT CONDITIONS

A. Do not install board products unless installation areas comply with minimum temperature and ventilation requirements recommended by manufacturer. As a minimum, provide temperatures above 50 degrees F. during and after installation.

B. Under slow drying conditions, allow additional drying time between coats of joint treatment.

C. Protect installed materials from drafts during hot, dry weather.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide gypsum board materials manufactured by one of the following:

United States Gypsum (USG)
Pabco Gypsum

Georgia Pacific
National Gypsum Company

2.02 GYPSUM BOARD:

A. Standard: ASTM C1396 Type I; 5/8-inch thick, Type X with U.L. designation as required by U.L. listing, tapered edges, ends square cut, maximum permissible lengths

B. Water-resistant: 5/8-inch thick, Type X with U.L. designation as required by U.L. listing, tapered edges, ends square cut, maximum permissible lengths.

1. Water Resistant Board: Use type and thickness as required for U.L. Fire description but not less than 5/8-inch U.L. labeled “WRX” meeting ASTM C1396.

2. Joint Tape: SHEETROCK Joint Tape.

3. Setting Type Joint Compound: Easy Sand or DURABOND by USG.

C. USG FIBEROCK® brand:

1. VHI panel, high-density cellulose wall panels, long edges tapered to form a shallow channel for joint reinforcement. Setting-type joint compound is required.

2. Panels to comply with ASTM D3273, C1629; Thickness: 5/8 inch, unless otherwise indicated.

D. GEORGIA-PACIFIC DENSSHIELD® brand:

1. Water-Resistant treated core covered front and back with acrylic coated high-density fiberglass mats.

2. Panels to comply with ASTM D3273, E96; Thickness: 5/8 inch, unless otherwise indicated.

F. GEORGIA-PACIFIC DENSGLASS®: Exterior Sheathing

1. Mold and Moisture Resistant Fiberglass Mats
2. Panels to comply with ASTM D3273 thickness ½” unless otherwise specified.

G. Impact Resistant Gypsum Board: Interior Sheathing

1. Georgia-Pacific – ToughRock®
2. National Gypsum – Hi-Abuse XP®
3. USG – Fiberock® Abuse-Resistant Panels

2.03 GYPSUM BOARD ACCESSORIES

A. Provide gypsum board accessories in accordance with GA-216, and as shown on drawings and specified.
B. Trims: Provide accessories such as corner beads and edge trim as metal fabrications. Plastic materials will not be acceptable.

1. Cornerbead: Use SHEETROCK paper faced metal outside corner, B1 XW EL.

2. L-Trim: Use SHEETROCK paper faced metal “L” trim, B4.

3. J-Trim: Use SHEETROCK paper faced metal “J” trim, B9.

4. Control Joint: Use No. 93, Amico

5. Bullnose Cornerbead: Use SHEETROCK paper faced metal 3/4-inch, or 1-1/2 inch (as selected by Architect). Bullnose outside corner.

C. Provide suspension system for applications of gypsum board using the components required by Drawings, and in accordance with ASTM C645, and Chapter 25, Title 24, California Building Code.

D. Fasteners: Corrosion resistant conforming to ASTM C1002.

1. Wood Studs: Minimum 1-1/4 inch, Type W, bugle head.
3. Metal Studs: Minimum Type S, bugle head.
4. Ceiling Furring: S-12, bugle head at 12 inches at all edges and supports.

E. Adhesive: Provide type manufactured by US Gypsum or other approved, appropriate for attaching board to dissimilar substrate materials shown on Drawings.

1. Gypsum board to gypsum board- Durabond or Easy Sand.

2. Gypsum board to coreboard, or sound deadening board- Durabond or Easy Sand.

3. Gypsum board to cementitious substrates- Durabond 90.

F. Hanger Wire: Provide No. 8 pre-straightened hanger wires.

G. Furring Channels: Provide 7/8-inch hat or Z-type furring channels fabricated from minimum 22 gage galvanized steel.

H. Joint Treatment:

1. Paper tape conforming to ASTM C475, or USG Heavy Duty.

2. Compound-powdered or ready-mixed conforming to ASTM C475. Taping and topping joint compound or all-purpose joint compound may be used.

I. Texturing:

1. Wall Texturing: Provide materials manufactured by one of the following:

Hamilton Drywall Products
USG
National Gypsum Co.

3. Ceiling Texturing: Provide materials manufactured by one of the following:

   Hamilton Drywall Products
   USG
   National Gypsum Co.

J. Shims: Provide for between studs and gypsum board for level and true wall plane.

5. Drywall Channel Screeds: Provide channel screeds and moldings by Fry Reglet Corp., as shown on the Drawings. Provide custom colors as selected by the Architect.

6. Acoustical Sealant: USG SHEETROCK Acoustical Sealant.

7. Drywall Primer: USG SHEETROCK 1st Coat.

8. Setting Compound: DURABOND or Easy Sand.

2.04 EXTERIOR WALL SHEATHING

A. Product: GEORGIA-PACIFIC DENSGLASS®: Exterior Sheathing

1. Mold and Moisture Resistant Fiberglass Mats.
2. Panels to comply with ASTM D3273 thickness 5/8”.

2.05 ACCESS DOORS

A. In partitions and ceilings installed in accordance with this Section, provide doors where shown on the Drawings and where required for access to mechanical installations and electrical installations. Verify quantity, type and location with mechanical and electrical trades.

B. Types:

1. Refer to Specifications Section 10 20 00, and Division 23, Mechanical Sections, for types of access doors

2. For piercing fire-rated surfaces, provide access doors having the same fire rating as the surface being pierced.

3. For tile surfaces and toilet rooms, provide stainless steel access doors and frames, with satin finish.

4. For other installations, provide prime-coated steel access doors and frames for finish painting to be performed at the job listed under Section 09 90 00 of these Specifications.

2.06 DRYWALL REVEAL MOLDINGS

A. Drywall Channel Screeds: Provide channel screeds and moldings by Fry Reglet Corp., as shown on the Drawings. Provide custom colors as selected Architect.

1. 3/4-inch Model No. DRM-625-75 by Fry Reglet Corp.
2. 2-inch Model No. DRM-625-200 by Fry Reglet Corp.
3. 3-inch Model No. DCS-625-300 by Fry Reglet Corp.

2.07 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

B. Metal Trim: The Drawings do not show all locations and requirements for metal trim. Carefully study the Drawings and the installation and provide all metal trim normally recommended by the manufacturer of the gypsum wall board accepted for use in this Work.

2.08 WALL SHEATHING

A. Cementitious Fiber-Mat Reinforced Sheathing: ASTM C1325, ANSI A118.9, Cementitious Backer.

1. Product: Subject to compliance with requirements, provide DUROCK® Brand Cement Board by Untied States Gypsum Company.

2. Type and Thickness: 5/8" inch thick.

3. Size: 48" by 96" inches.

2.09 FASTENERS FOR EXTERIOR WALL SHEATHING

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and application.

1. Wood Screws: 1-5/8” inch bugle headed #6 screw with corrosion-resistant coating. Corrosion resistance to comply with printed submittal literature.

2. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: 1-1/4” bugle headed #6 screws with corrosion resistant coating. Corrosion resistance to comply with printed submittal literature.

4. For Steel Framing less than 0.329 inch thick, attach sheathing to comply with ASTM C1002.

5. For Steel Framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C954.

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

A. Install gypsum board in accordance with the Drawings and with the separate boards in moderate contact but not forced into place.

B. At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards.

C. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.

D. Joints between wall and floor shall not exceed 1/8-inch. Where sound-rated drywall construction is indicated, seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C919 and manufacturer's recommendation for location of edge trim, and close off sound-flanking paths around or through construction, including sealing of partitions above acoustical ceilings.

E. Ceilings: Install the gypsum wallboard to ceilings with the long dimension of the wallboard at right angles to the supporting members.

1. Wall board may be installed with the long dimension parallel to supporting members that are spaced 16 inches on centers when attachment members are provided at end joints.

F. Ceiling Suspension System: Carrying Channels shall be securely hung from the structure above, spaced as shown and noted on the Drawings, but in no case more than 4'-0" on center. Hanging wire shall be securely fastened to the structure above as detailed, as recommended by the manufacturer of the suspension system components and as required to meet all Building Code requirements. Installation shall conform to Division of the State Architect, IR 25.

1. Hanging wires shall be securely fastened to the carrying channels, saddle-tied by at least three turns around each channel, and shall be spaced as shown and noted on the Drawings, but in no case more than 4'-0" on center.

2. Channels shall be located within 6 inches of parallel walls and shall be cut short of abutting walls 1/2-inch, plus or minus 1/4-inch. Carrying channels shall be leveled with turnbuckles where required.

G. Furring Channels shall be securely fastened to carrying channels and shall be spaced 16 inches on center, unless shown otherwise on the Drawings. Furring channels shall be fastened to carrying channels with furring clips manufactured for this purpose.

H. Walls: Install the gypsum wallboard to studs at right angles to the furring or framing members.

1. Make end joints, where required, over framing or furring members.
2. Install gypsum wallboard over full height of all stud walls.

I. Attaching:

1. Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 7” to 8” on center at ceilings and 16" on center at walls.

2. Where framing members are spaced 24 inches apart on walls, space screws 12" on center.

3. Attach double layers in accordance with the pertinent codes and the manufacturer's recommendations as accepted by the Architect.

4. Attach to wood as required by governmental agencies having jurisdiction.

J. Access Doors:

1. By careful coordination with the Drawings and with the trades involved, install the specified access doors (Section 10 00 00 and specifications in Division 23, Mechanical) where required.

2. Anchor firmly into position and align properly to achieve an installation flush with the finished surface.

3.03 JOINT TREATMENT

A. Inspect areas to be joint treated, verifying that the gypsum wall board fits snugly against supporting framework.

B. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and maintain temperature until joint finishing compounds have dried.

C. Apply the joint treatment and finishing compound by machine or hand tool.

D. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

E. Embedding Compounds:

1. Apply to gypsum wallboard and fastener heads in a thin uniform layer.

2. Spread the compound not less than 3 inches wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape.

3. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6 inches wide at joints, and feather edged.

4. Sandpaper between costs as required.

5. When thoroughly dry, sandpaper to eliminate ridges and high points.

F. Finishing Compounds:

1. After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener heads.

2. Feather the finishing compound to not less than 12 inches wide.

3. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care not to scuff the paper surface of the wallboard.

4. Texture finish walls and ceilings to be painted. Submit a sample to the Architect for acceptance.

3.04 CORNER TREATMENT

A. Internal Corners: Treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.

B. External Corners:

1. Install the specified corner bead, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard.
2. Space the fasteners approximately 6 inches on centers, and drive through the wallboard into the framing or furring member.

3. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8 inches to 10 inches on each side of the corner.

3.05 CLEANUP

A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.

B. At completion of each segment of installation in a room or space, promptly pick-up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Tile work including tile, trims, setting mortars, leveling coats, and grouting as indicated on the Drawings and specified herein.

B. Related Sections:

1. Floor and wall substrates, including plaster scratch coat, concrete and water-resistant gypsum board.

2. Section 07 10 00 – Dampproofing and Waterproofing.

1.02 REFERENCE STANDARDS

A. Perform work and provide materials in accordance with recommendations of TCA and ANSI.

B. Comply with the Americans with Disabilities Act, Accessibility Guidelines, Section 302 Ground and Floor Surfaces.

1.03 SUBMITTALS

A. Provide manufacturer's standard samples for selection of type, style, finish and color of units, including samples of grout available, and color samples of joint sealant.

B. Shop drawings of expansion joint locations.

C. Letter of acceptance of tile substrate by the tile installer.

1.04 PROJECT CONDITIONS

A. Provide sufficient heat (except where impractical such as outdoors) and ventilate in areas where work is being performed.

B. Take precautionary measures to ensure that excessive temperature changes do not occur.

1.05 ATTIC STOCK

A. Contractor shall provide 5% additional material, including tile and grout after project has been completed. Place attic stock in location as directed by Project Manager.

PART 2 - PRODUCTS

2.01 CERAMIC TILES

A. Manufacturers:

1. Dal-Tile Corporation – no substitutions.
2. Arizona Tile – exterior slate tile – no substitutions.

B. Provide impervious ceramic tile with a monolithic body pressed from porcelain particles, evenly colored throughout, of sizes as indicated, including special shapes required; colors shall be from manufacturer's standard pallet in price Groups noted below. Where no price group is specified provide colors from Price Group 3.

C. Basis-of-Design Product: The design for each tile type is based product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

D. For tiles to be used on floors produce a coefficient of friction of 0.60, or higher (0.80 in wet areas) accordance with pertinent provisions of ASTM C1028.

E. Tiles for walls to be used in potentially wet areas, walls are not to be backed with paper material.

F. Ceramic Wall Tile: Matte, Dal-Tile, 2-inch by 4-inch Keystones series, Color and pattern as selected by Architect, Price Group 2, 90%; Matte, Dal-Tile, 2-inch by 2-inch Keystones series, color and pattern by Architect, Price Group 3, 10%.

A. All ceramic tile flooring shall be stable, firm, and slip resistant, per **CBC Section 11B-302.1**.

B. Ceramic Floor and Base Tile: Dal-Tile, 2” x 2” Keystone series. Color and pattern as selected by Architect. Price Group 3. Install 4-inch build up base.

C. Exterior Wall Tile – Arizona Tile Multi Color Indian Slate. Location per drawings.

D. Detectable Warning Area Tile: Terra Paving, ADA-3 Truncated Domes (Wausau Tile), 12 inch by 12 inch, or Armor-Tile, truncated vitrified polymer dome tiles, CBC, 2019, Title 24, Part 2, Chapter 11B-705.1.2.5.

1. Detectable Warnings, CBC, 2019, Title 24, Part 2, Chapter 11B-705.1.2.5, and the latest edition of California Code of Regulations / IR 11B-4: Detectable Warnings.

a. Square grid, in-line pattern:

b. Diameter of nominal 0.9 inch (22.9mm) at base tapering to 0.45 inch (11.4) at top.

c. Nominal height of 0.2 (5.08 mm) inch.
d. Nominal center to center spacing of 2.35 (59.7 mm).

e. Color “yellow” conforming to Federal Color No. 33538 per Standard No. 595C. CBC Chapter 11B-705.1.2.5 and 11B-810.5.2.

2. 2016 California Building Standards Codes; DSA Bulletin, October 31, 2002 (Revised 4/9/2008) Exception to the Independent Entity Evaluation and Product Approval of Detectable Warnings and Directional Surfaces: In the interim and until such time that the evaluation and approval program for detectable warning products and directional surfaces is fully developed, operational and product approvals can be issued, DSA will provisionally accept a written five (5) year product warranty provided by the manufacturer of detectable warnings and directional surface products as equivalent to the evaluation and product approval program. Such warranty shall indicate compliance with architectural standards as published in the current edition of the California Building Standards Code, and also include durability criteria which indicates that the shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly for at least five (5) years after initial installation.

   As used in this bulletin, “not degrade significantly” means that the product maintains at least 90 percent of its approved design characteristics, as determined by the enforcing agency.

2.03 WATERPROOFING MEMBRANE

A. Provide waterproof membrane underlayment as specified in Section 07 10 00.

2.04 ACCESSORIES

A. Trims: Provide full line of trims, coves, caps and bullnoses.

2.05 MIXES

A. Mortar and Grout:

1. At concrete substrates, provide latex-based mortar and grout materials manufactured by Laticrete or Custom-Building Products. Products manufactured by other approved will be considered.

   a. Color: To be selected by Architect, from manufacturer's standard colors.

2. Installation shall comply with CBC, 2019, Title 24, Part 2, Section 2103.A.9, 2103A.13, and Table 2103A.11.

B. Leveling Coat: Provide a latex cement leveling coat where necessary to achieve required degree of evenness.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect surfaces on or over which tile units are to be installed. Correct deficiencies of substrates prior to installation of any materials which could prevent proper application and serviceability of materials.

B. Prior to installing materials, ensure that walls and floors are level, plumb and even to achieve required final surface variation of maximum 1/8-inch in 8 feet, except where

horizontal applications are required to slope for drainage.

3.02 PREPARATION

A. Ensure cleanliness of substrates prior to installing materials.

3.03 INSTALLATION

A. Install waterproof membrane underlayment in accordance with Section 07110, at thin-set applications.

B. Place materials in accordance with patterns shown on drawings or required by District. Carefully plan material layouts for largest possible cut pieces, equal at opposite sides of areas being covered. Ensure that patterns are uninterrupted unless required. Floor and wall tiles shall be installed with joints aligned vertically and horizontally.

C. Neatly cut around fixtures, penetrations, and drains. Accurately form corners, bases, curves, intersections, caps and returns. Cut members required to be cut with power cutting tools. No other method will be accepted.

D. Ensure that areas receiving tile units are uniform and will allow installation of units without projection of edges which could break or spall easily.

E. Ensure that joints are uniform watertight and align in directions, including with joints of same or similar materials in other planes.

F. Sound materials after setting. Replace and remove hollow sounding units.

G. Build in expansion and contraction joints as work progresses, keeping mortar and grouts out. Submit suggested locations of expansion joints to Architect for review. Do not exceed 16 feet in any direction without such joints.

H. Allow sufficient time for mortar to cure (minimum 48 hours) prior to grouting.

I. Install units in accordance with the methods specified in the latest edition of the TCNA Handbook for Ceramic, Glass, and Stone Tile Installation as follows and as indicated on the Drawings and/or as listed as follows:

LOCATION	SUBSTRATE	METHOD
Exterior mortar-set paver tile over slab-on-grade	cement mortar, bonded	F101
Interior mortar-set paver tile or ceramic tile over slab-on-grade	cement mortar, bonded	F111
Interior mortar set ceramic tile over slab-on-grade at toilet rooms	concrete	F121
Interior thin-set paver tile over slab-on-grade	concrete	F113

LOCATION	SUBSTRATE	METHOD
Tile shower floors	concrete	B414 F121
Interior walls, mortar set	cement mortar, plywood, wood studs	W221
Interior tile walls, mortar set	cement mortar wood studs	W231
Interior tile walls, mortar set	cement mortar metal studs	W241
Interior walls, thin set	water resistant gypsum wallboard	W243
Interior walls, thin set	cementitious backer board metal studs	W244C
Tile shower / shower walls	cement mortar	B426
Exterior accent wall tile	cement mortar	W201

J. Do not use broken, damaged units.

K. Protect grout against staining until sealer is applied. Stained grout will be removed and replaced prior to Notice of Completion.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Work includes furnishing and installing acoustical lay-in units and suspension systems.

B. Related Sections:

1. Section 09 29 00 – Gypsum Board.
2. Mechanical work, Division 23 00 00.
3. Electrical work, Division 26 00 00.

1.02 CODES AND REFERENCE STANDARDS

A. Acoustical panels and tile shall be listed by Underwriter's laboratories, Inc. for flame spread rating specified herein.

B. Acoustical ceiling assemblies shall comply with the seismic design requirements of Title 24, California Building Code (CBC), Chapter 25 and Sections 808, 1615.1 and DSA IR 25-1 and 25-2.

C. Acoustical panels shall be made in accordance with ASTM C423 sound absorption coefficients by reverberation room method in the type E mounting described in ASTM E795 and tested per accreditation program for ASTM C423.

1.03 SUBMITTALS

A. Submit shop drawings for review. Show sizes and locations of grids, locations of hanger wires, methods of attachment to supporting structure, and locations and framing conditions for mechanical and electrical equipment within or attached on ceiling.

B. Secure permits for seismic conditions. Show lateral bracing, suspension members, and other information necessary on shop drawings to secure these permits.

C. Submit samples of acoustical materials and suspension systems for review.

D. Recycled Content Certification.

E. Submit acoustical test reports from an independent acoustical testing Laboratory.

1.04 EXTRA MATERIALS

A. Leave extra ceiling panels for Owner's use, equal to 10 percent of total number of units used on project, but in no case less than two full boxes of each pattern.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project in original unopened packages bearing the manufacturer's name, brand designation, and label verifying compliance with these specifications. Store materials in properly protected and dry storage area.

B. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed.

1.06 PROJECT CONDITIONS

A. Maintain a uniform temperature of not less than 60 degrees F. nor more than 85 degrees F. and a relative humidity of not more than 70 percent continuously from 24 hours before installation until 24 hours after completion of work.

1.07 SCHEDULING

A. Wet operations such as plastering, concrete and masonry work shall be completed and dry before installation of acoustical ceilings. Mechanical, electrical and other work above the ceiling line shall be completed and approved prior to start of acoustical ceiling installation.

1.08 SUSTAINABILITY

A. Submit the following credit certificates/letter from the manufacturer (LEED for Schools):
EA Credit 1
MR Credit 2
MR Credit 4
MR Credit 5
MR Credit 6
MR Credit 7
IEQ Credit 4, 4.1 to 4.6
IEQ Credit 8.1, 8.2
IEQ Prerequisite 3
IEQ Credit 9

PART 2 - PRODUCTS

2.01 GENERAL

A. Acoustical materials shall be as specified herein.

B. Use Code Approved Seismic Clip to allow for 7/8” wall angle in lieu of 2” wall angle. USG ACM7 Seismic Clip with USG M7 wall angle. With aluminum capped grids, use aluminum capped wall angle, USG M7A.

2.02 ACT-1 CEILING (2' x 4')

A. Ceiling Grid: 24" x 48" with 15/16-inch wide grid.

B. Ceiling Tile Pattern: Armstrong, School Zone Fine Fissured, or equal, 24" x 48" x 3/4" Color: White.

C. Surface Burning Characteristics (Flame Spread and Smoke Developed): Class A (Flame spread 25 or under) UL labeled per ASTM E1264. Smoke developed shall be no greater than 450 when tested in accordance with CBC Chapter 8, Section 803.

D. **2' x 4' Acoustical Lay-in Ceiling Suspension System:**

1. Suspension system shall conform to the heavy-duty classification of ASTM C635 and shall be 24" x 48" x 15/16" steel system. Minimum pre-consumer recycled content of 23% and post-consumer recycled content of 68%

2. Main runners, cross tees, spacer bars, variable placement tees, grid adapters and wall moldings shall be of cold-rolled hot-dipped galvanized steel.

3. Finish shall be white baked-on vinyl painted finish.

4. Provide suspension system of one of the following manufacturers:

a. Armstrong World Industries, Inc.
Prelude XL Heavy Duty System
Main Runner – Prelude XL –7301 Heavy Duty
Cross Runner – Prelude XL – XL7340

b. USG Corporation
Donn® DX® Heavy Duty System
Main Runner – DX-26 Heavy Duty
Cross Runner – DX-422

c. Chicago Metallic Corporation
Series 1200
Main Runner – 200 Heavy Duty
Cross Runner – 1274

2.03 ACT-2 CEILING (2'X 2')

A. Ceiling Grid: 24" x 24" with 9/16-inch wide grid, beveled tegular.

B. Ceiling Tile Pattern: Armstrong, Ultima Open Plan, 24" x 24" x 3/4", or equal

C. Surface Burning Characteristics (Flame Spread and Smoke Developed): Class A (Flame spread 25 or under) UL labeled. Smoke density shall be no greater than 450 when tested in accordance with Title 24, California Building Code (CBC), 2016, Chapter 8.

D. 2 x 2 Acoustic Lay-In Ceiling Suspension System:

1. Suspension system shall conform to the heavy-duty classification of ASTM C635, and shall be 24" x 24" X 9/16" steel system. Minimum pre-consumer recycled content of 23% and post-consumer recycled content of 68%

2. Main runners, cross tees, spacer bars, variable placement tees, grid adapters and wall moldings shall be of cold-rolled hot-dipped galvanized steel.

3. Finish shall be white baked-on vinyl finish.

4. Provide suspension system of one of the following manufacturers:

a. Armstrong World Industries, Inc.,
Prelude XL Heavy Duty System
Main Runner – 7301 Heavy Duty
Cross Runner – XL7328 / XL7340

b. USG Corporation
Donn® DX® Heavy Duty System
Main Runner – DX-26 Heavy Duty
Cross Runner – DX-216/424

c. Chicago Metallic Corporation
Series 1200
Main Runner – 200 Heavy Duty
Cross Runner – 1252/1274

5. At floating ceilings, provide 4” curved perimeter trim, Axiom Vector by Armstrong or equal, finish shall be baked-on vinyl to match grid system.

PART 3 - EXECUTION

3.01 GENERAL

A. Examination of surfaces and conditions affecting proper installation of the materials, and reporting defects in materials or surfaces to which acoustical tile is applied. Commencement of work will signify acceptance of above indicated materials and surfaces as satisfactory.

3.02 INSTALLATION

A. Layout work in accordance with reviewed and approved shop drawings. Adjust spacing of runners to achieve intent of drawings.

B. Secure perimeter acoustical moldings to walls at maximum 2 foot intervals, with power driven studs for cementitious substrates, and with screws at 16-inch intervals at stud walls. Provide moldings at perimeters of penetrations and room areas. Attach border units for clean finish and tight appearance.

C. Unless shown otherwise, ensure that installed tiles are square within each room area, in continuous lines parallel to walls, symmetrical about centerline of room area.

D. Drill holes for pipes. Tiles cut from sides to permit penetration and installation of other construction will not be acceptable.

3.03 SUSPENSION SYSTEM INSTALLATION
(Division of the State Architect Interpretation of Regulations, IR 25-1 and 25-2)

A. 12-gauge (minimum) hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing. Splices will not be permitted in hanger wires unless specifically approved by DSA/Structural Safety Section.

B. Provide hanger wires within 8 inches of the ends of main and cross runners or at one-quarter of the length of the end tee, whichever is least at the perimeter of the ceiling area.

C. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing. Provide additional hangers, struts or braces as required at ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than one in six out of plumb are to have counter braced wires.

D. Ceiling grid members may be attached to not more than two adjacent walls. Ceiling grid members should be at least 1-1/2-inch free of other walls. If walls run diagonally to ceiling grid systems runners, one end of main and cross runners should be free and a minimum of 1/2-inch clear of wall.

E. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or one 16 gage wire with a positive mechanical connection to the runner may be used. Where the perpendicular distance from the wall to the first parallel runner is 12-inches or less, this interlock is not required.

F. Provide in sets of four, No. 12 gage splayed bracing wires oriented 90 degrees from each other and compression strut as indicated in the Drawings, at the following spacing:

1. For school buildings, place sets of splay wires at a spacing not more than 12 feet by 12 feet on center.

2. Provide splay wires at locations not more than one-half the above spacing from each perimeter wall or at the edge of vertical ceiling offsets for both school and hospital buildings.

3. The slope of these wires should not exceed 45 degrees from the plane of the ceiling and should be taut without causing the ceiling to lift. Splices in bracing wires are not permitted without special DSA/Structural Safety Section approval.

G. Fasten hanger wires with not less than three tight turns. Fasten splay wires with four tight turns. Make tight turns within a distance of 1-1/2 inches. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.

H. Separate ceiling hanging and bracing wires at least 6 inches from unbraced ducts, pipes, conduit, etc. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4-inch nominal diameter, to hanger wires using connectors acceptable to DSA/Structural Safety Section.

I. When drilled-in concrete anchors or shot-in anchors are used for hanger wires, one out of ten must be field tested for 200 pounds of tension. When drilled-in concrete anchors are used for bracing wires, one out of two must be field tested for 440 pounds in tension. Shot-in anchors are not permitted for bracing wires. If shot-in or drilled-in anchor fails, adjacent anchors must be tested.

J. Attach light fixtures to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures.

K. Fixtures and air terminals or services supported on intermediate duty grid systems must be independently supported by not less than four taut No. 12 gage wires attached to the structure above.

Flush or recessed light fixtures and air terminals or services weighing 56 pounds or more must be independently supported by not less than four No.12 gage taut wires attached to the structure above regardless of the type of ceiling grid system used. The (4) four taut No.12-gauge wires including their attachment to the structure above must be capable of supporting four times the weight of the unit.

L. Flush or recessed light fixtures and air terminals or services weighing less than 56 pounds, may be supported directly on the runners of a heavy-duty grid system. In

addition, they must have a minimum of two (2) 12-gauge slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. All 4 ft. by 4 ft. light fixtures must have slack safety wires at each corner.

M. Support surface mounted light fixtures by at least two positive devices which surround the ceiling runner, and which are supported from the structure above by a No.12 gage wire. Spring clips or clamps that connect only to the runner are not acceptable.

N. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting four times the weight of the fixture.

3.04 LAY-IN PANEL INSTALLATION

A. Install factory pre-fabricated acoustical units manufactured specifically for the drop-in and for the concealed suspension system per manufacturer's specifications and directions.

3.05 CLEANUP

A. Replace loose and damaged tile and panels when directed. Touch-up damaged finish. Leave surfaces clean and free from markings and other disfigurements. Remove debris resulting from the work of this section.

END OF SECTION

SECTION 09 60 26

CONCRETE MOISTURE TESTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Testing for moisture vapor emission of concrete slabs scheduled to be covered with moisture sensitive flooring materials using Anhydrous Calcium Chloride tests.

B. Testing to determine relative humidity in concrete slabs scheduled to be covered with moisture sensitive flooring materials using in situ probes.

C. Verify that pH of concrete floor surfaces are acceptable for floor covering installation.

D. If areas of concrete floors are not within the floor covering manufacturer's maximum allowable emission rate, and an acceptable rate cannot be obtained, the Contractor shall incorporate vapor emission compliance procedures to remedy the condition, and prepare the slab for the specified finish floor covering at no additional cost to the owner.

1.02 REFERENCES

A. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

B. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

C. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

D. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

1.03 QUALITY ASSURANCE

A. Moisture & Alkalinity Testing Systems Quality Assurance:

1. Manufacturer: Company specializing in the manufacturing and distribution of vapor emission testing procedures for a minimum 5 years.

2. Installer: Certified third-party testing agency with minimum 5 years experience conducting moisture testing for concrete slabs of similar size, design and complexity.

B. Vapor Emission Remediation Systems Quality Assurance:

1. Manufacturer: Company specializing in the manufacturing of vapor emission remediation systems for no less than 10 consecutive years.

2. Installer: Application shall be performed by manufacturer's employed personnel or certified applicators.

1.04 SUBMITTALS

A. Submit results of Anhydrous Calcium Chloride tests. Include the following:

1. Time and date of placement and retrieval.
2. Ambient air temperature and humidity during test duration.
3. Manufacturer's instructions and relative technical data.

B. Submit Results for in situ relative humidity probe tests. Include the following:

1. Date and time measurements were made.
2. Location and depth of probe holes.
3. Temperature and Relative humidity in each probe hole.
4. Ambient air temperature.

C. Submit results for pH tests.

D. Provide 5 project references documenting at least 10 years of manufacturer's experience in vapor emission remediation treatment production, and 3 project references documenting at least 3 years of applicators experience in applying vapor emission remediation treatments.

E. Include copy of warranty to be issued for vapor emission remediation system and certificate of underwriter's coverage of manufacturer's warranty.

1. Submit manufacturers certificate of liability insurance by product liability insurance carrier, with minimum "A" rating from Best or equivalent rating system, in the amount of $5,000,000 per occurrence, and naming the Owner, Architect and General Contractor as co-insured.

1.05 SEQUENCING

A. Initiate in situ relative humidity probe testing a minimum 28 days after the placement of the concrete slab and no later than 60 days prior to scheduled installation of the finish floor covering.

B. Conduct Anhydrous Calcium Chloride testing and pH testing a minimum 30 days prior to schedule installation of the finish floor covering.

C. Apply Treatment to areas with moisture vapor emission rates exceeding floor covering manufacturer's written limits, as determined by moisture testing. Coordinate with installation of floor coverings. Ensure flooring installation complies with vapor emission control system manufacturer's warranty requirements.

1.06 WARRANTY

A. Manufacturer's Warranty: Warrant vapor emission control treatment against manufacturing defects and improper installation for a period of 10 years.

1. Cover costs of treatment materials, cementitious compounds, and labor costs of application and preparation.

2. Extend warranty to flooring material, adhesive, and installation labor for same period against moisture vapor emission related failure.

3. Guarantee moisture vapor and alkalinity emission rates to be at or below published requirements of floor covering manufacturers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Moisture & Alkalinity Testing Systems.

1. Vaprecision, Inc., Testing Systems, Phone: (800) 449-6194.
2. Or approved equal.

B. Vapor Emission Remediation Systems.

1. Floor Seal Technology, Inc., MES 100, Phone: (714) 641-3660.
2. Koster American Corp., Koster Vap I ® 2000 System, Phone: (757) 425-1206.
3. Ardex MC™, Phone: (724) 203-5000.

PART 3 - EXECUTION

3.01 TESTING PROCEDURES FOR ANHYDROUS CALCIUM CHLORIDE TEST.

A. Conduct Anhydrous Calcium Chloride test per ASTM F1869

B. Environmental requirements of area to be tested are to match that of the finished floor covering. Doors, windows, roofing, etc. must be installed and the temperature of the building controlled to a finished building atmosphere. Do not execute tests when building interior is below 65 degrees for 72 hours prior to, and throughout the duration of the tests.

C. The number of test kits required is determined by the square footage of areas scheduled to receive finish flooring. A minimum of three test kits are required in the first 1,000 sq. ft. a minimum of one test kit per each additional 1,000 sq. ft. with consideration given to separation of test areas. Time of exposure is a minimum of 60 hours and a maximum of 72 hours.

D. A prepackaged calcium chloride test kit is equipped with a sealed dish of anhydrous calcium chloride, a metering dome with gasket and instructions.

E. Clean substrate in area to be tested by removing dust solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation, or laitance, mold mildew and other foreign materials.

F. Weigh the tape sealed dish on a gram scale with 1/10th gram gradation. Record start weight, date and time on dish's label and instruction document.

G. Unseal dish and expose test according to preprinted test kit instructions.

H. Allow 60 to 72 hours of exposure. Retrieve test dish re-seal and re-weigh according to instructions.

I. Provide a diagram of the building, with calculations, documenting each test location with its results to the District, in writing.

J. Acceptable moisture emission rates typically are 3 lbs. per 1000 sq. ft. or less, in 24 hours. Verify higher rate up to 5 lbs. for certain flooring manufacturers.

3.02 TESTING PROCEDURE FOR IN SITU RELATIVE HUMIDITY PROBE TEST

A. Conduct in situ relative humidity probe testing per ASTM F2170.

B. Concrete floor slabs shall be at the service temperature and the occupied air space above the slab shall be at the service temperature service relative humidity far at least 48 hours before taking relative humidity measurements in the concrete slab.

C. Perform 3 tests for the first 1,000 sq/ft. and a minimum of 1 test for every 1,000 sq/ft. thereafter.

D. For slabs on-grade and below-grade choose a testing location within 3 feet of each exterior wall.

E. Drill probe holes 40% into depth of slab for slabs drying from the top only and 20% into the slab for slabs drying from top and bottom.

F. Remove dust from hole using vacuum cleaner and allow 72 hours to achieve moisture equilibration within hole before taking relative humidity measurements.

G. After inserting probe allow necessary amount of time for probe to reach temperature equilibrium before measuring relative humidity.

H. Use the relative humidity probe to measure the ambient air temperature and relative humidity above the slab in the vicinity of the hole.

3.03 TESTING PROCEDURES FOR ALKALINITY

A. Conduct pH test per ASTM F710.

B. Concrete floors shall be tested for alkalinity prior to the installation of any flooring materials. pH levels shall not exceed the written recommendations of the flooring manufacturer and/or the adhesive manufacturer.

C. Concrete floor slab pH range from 5-9 optimum, not to exceed 9 pH.

D. Place several drops of water on a clean surface of concrete, to form a puddle approximately 1” (25mm) in diameter. Allow the puddle to set for 60 (+/-5) seconds, then dip the pH paper into the water. Remove immediately and compare to chart to determine pH reading. Readings in excess of 9.0 have been known to affect flooring materials and/or adhesives. Refer to flooring manufacturer’s written instructions for guidelines on acceptable pH levels.

3.04 VAPOR EMISSION REMEDIATION SYSTEM APPLICATION

A. For areas emitting moisture and alkalinity at rates exceeding floor covering manufacturer’s published limits, apply treatment as follows:

1. Mask and protect adjacent wall and floor surfaces from effects of scarification and application.

2. Scarify slab surface in area of application by shot blasting or other method acceptable to coating treatment manufacturer.

3. Prepare and treat cracks, control joints and cold joints per treatment requirements.

4. Apply two-component epoxy coating with roller and squeegee over entire treatment area; saturate surfaces to ensure a thorough mechanical bond.

5. Clean and fill divots, chips, voids and other surface irregularities with 100 percent Portland cement based patching compound or cementitious fill.

6. Apply cementitious surfacing over coating in areas to where required to facilitate adhesion.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring (VTC, Linoleum, and Cork)

1. Resilient Flooring shall be stable, firm, and slip resistant. CBC Section 11B-302.1

B. Resilient base.

C. Installation accessories.

1.02 RELATED SECTIONS

A. Drawings and provisions of the Contract including General and Supplementary Conditions and other Division 01 Specification Sections apply to this section as if repeated herein.

B. Section 03 39 23.13 – Special Coatings Vapor Emission Treatment System.

C. Section 09 60 26 – Concrete Moisture Testing.

D. Section 09 68 00 – Carpeting: Coordination and transitions.

1.03 REFERENCES

A. California Building Code

B. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

D. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.

E. ASTM F1861 - Standard Specification for Resilient Wall Base.

F. FS L-F-475 - Floor Covering Vinyl, Surface (Tile and Roll), with Backing; Federal Specifications and Standards; Revision A.

G. ASTM F2034 Standard Specification for Sheet Linoleum Floor Covering: Type 1

1.04 PERFORMANCE REQUIREMENTS

A. Conform to 2016 CBC for fire performance ratings as follows:

1. Interior floor covering shall be class I, 1.45 watts/cm² or greater, or II, 0.22 watts/cm² or greater, classified in accordance with NFPA 253.

2. Flame spread index per ASTM E648.

3. Optical density smoke rating not to exceed 450, per ASTM E662.

B. Coefficient of Friction: 0.6 minimum per ASTM D2047

1.05 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures: for Administrative Requirements.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for StudioWC's initial selection.

D. Verification Samples: Submit two samples, 12 x 12 inch in size illustrating color and pattern for each resilient flooring product specified.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

F. Certification for Fire Performance: Submit certification from an independent laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.

1.06 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Provide resilient flooring and accessories as produced by a single manufacturer including primers, adhesives sealants and leveling compounds for each floor type.

B. Installer's Qualifications: Firm specializing in the installation of resilient flooring products with not less than three years experience in the installation of resilient flooring products similar to that required for this project.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Protect roll materials from damage by storing on end.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F. Verify with specified manufacturer requirements.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F. Verify with selected manufacturer requirements.

1.09 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements: for additional provisions.

B. Tile Flooring: Furnish not less than one box for each fifty boxes or fraction thereof for

each type, color, pattern and size installed.

C. Top Set Rubber Base: Furnish not less than 50 lineal feet of each type, color, pattern and size installed.

D. Sheet Flooring: Furnish not less than 5 percent additional stock for each type, color, pattern and size installed.

1.10 SUSTAINABILITY

A. Provide sustainability certificates/letter for the following:

IEQ Credit 4.3
MR Credit 4
MR Credit 5

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Basis-of-Design: Heterogenous Sheet Flooring, Armstrong Rejuvenations with Diamond 10 Technology.

B. Acceptable Manufacturers: Equal manufacturers that can demonstrate compliance with Diamond 10 Technology equal to Armstrong.

C. Architect shall select from the full palette of available colors.

2.03 RESILIENT RUBBER BASE

A. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style A, Straight, and as follows:

1. Height: 4 inch or as indicated.
2. Thickness: 0.125 inch thick.
3. Finish: Matte.
4. Length: Roll.
5. Color: Per Architect
6. Manufacturers:

a. Roppe Corp.
b. BurkeMercer Flooring Products: www.burkemercer.com.
c. Johnsonite, Inc: www.johnsonite.com.

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers and Seaming Materials: Waterproof; types recommended by flooring and adhesive manufacturer.

C. Edge Strips: Metal.

D. Mouldings: Thermoplastic vinyl carpet to resilient transition. Color to be determined by architect.

E. Filler for Coved Base: Plastic.

F. Sealer and Wax: Types recommended by flooring manufacturer.

G. Adhesive: Shaw 6500 Ultra Premium VCT Adhesive.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

B. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

C. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - TILE FLOORING

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent when tile is placed.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

F. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Before installation of flooring, secure metal strips with stainless steel screws.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

I. Install flooring in recessed floor access covers. Maintain floor pattern.

J. At movable partitions, install flooring under partitions without interrupting floor pattern.

K. Install feature strips and floor markings where indicated. Fit joints tightly.

L. Install flooring within adjacent accessible knee space area at casework sinks and workspace recesses. Maintain floor pattern.

3.04 INSTALLATION – BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install pattern where indicated.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions. Provide a minimum of 4 coats of wax. Buff to a high shine.

3.06 PROTECTION OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 72 hours after installation.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This section includes the following:

1. Tufted carpet tile.

B. Related sections:

1. 02 41 19 Selective Demolition

1.03 SUBMITTALS

A. Manufacturer's Data - Submit two (2) copies of manufacturer's specifications and installation instructions for carpet tile and related items specified. Manufacturer shall also submit a plan for recycling the specified carpet tile and related items at the end of useful life of the carpet.

B. Fiber and backing verification - Certification from the producer verifying use of the branded fiber and backing in the submitted carpet product. Certification should include the % recycled content by weight for fiber and backing, describing the source of this recycled content. If virgin nylon or backing is used, the manufacturer shall include as part of the fiber and backing certification, the precise method that will be used to recapture the nylon and backing at the end of the useful life of the carpet tile. State how it will be returned to carpet production, fiber into fiber and backing into backing. Fiber types shall not be mixed to facilitate future recycling.

C. Shop Drawings - Submit shop drawings for areas to be carpeted showing installation of carpeting, seam diagram, pattern direction, necessary installation accessories, and provisions for work of other trades. Show location of different patterns or styles of carpet. Also, show locations of any threshold conditions.

1. The construction manager will supply reproducible prints on request, to facilitate shop drawing preparation.

D. Samples - Submit standard size carpet samples of each type of carpet, in each specified pattern, color and construction.

1. Any alternates to specified products) must be submitted for approval by a representative of the end user at least ten (10) working days prior to bid or proposal.

2. Final Sample Submittal - Submit two (2) sets of samples for each carpet type.

3. No carpet shipments are permitted until acceptance of final samples by representative of the end user or architect/design firm, certifying that samples are the approved color, pattern, and texture. No carpet shipments are permitted until the fiber and backing certifications and recycling plans are approved by the end user or architect/design firm.

4. Custom Color Only - Quality color samples shall be signed by a representative of the end user or architect/design firm, certifying that samples are the approved color, pattern, and texture.

5. Samples submitted will be assumed to be the manufacturer's best obtainable match to the carpet described under Materials section.

E. Maintenance Instructions - Submit to the District two (2) copies of the manufacturer's carpet maintenance instructions, including information needed for the removal of common stains from each type of carpet required.

F. Recycling Instructions - Submit to the District two (2) copies of the manufacturer's instructions on post-consumer recycling of the specified carpet tile and related items.

1. A representative from the carpet manufacturer shall meet with the Construction Manager in the presence of a representative of the end user and architect/design firm to review the recommended procedures, prior to occupancy of the finished spaces.

1.04 QUALITY ASSURANCE

A. Manufacturer - Carpet manufacturer shall have no less than three years of production experience with recyclable carpet tile (fiber to fiber and backing to backing) similar to type specified in this document; and whose published product literature clearly indicates compliance of products with requirements of this section.

1. Single source responsibility - provide product material by a single manufacturer for each recyclable carpet type specified.

2. Commitment to sustainability - carpet manufacturer must practice environmental responsibility through programs of source reduction, recycling, reuse, and conservation.

B. Trade Contractor - firm with not less than five years of successful carpet tile experience similar to work of this Section and recommended and approved by the carpet manufacturer. Upon request, submit letter from carpet manufacturer stating certification qualifications and acceptance of all environmental requirements.

1. Participant in environmental program including responsible carpet removal, recycling and installation

C. Substitutes - Where a selected manufacturer or product has been specified, an equal or superior product may be accepted only upon review and written acceptance by the architect. It is mandatory that such review and approval be obtained prior to bidding, or the substitution will not be considered. All such proposed substitutions shall be submitted to the architect with appropriate manufacturer's specifications, literature, environmental compliance assurance, and independent laboratory testing data. The architect's

decision as to whether a product is equal or superior to the one specified shall be final. This section applies to any "or equal" noted in the specification.

1.05 PRODUCT DELIVERY AND STORAGE

A. Deliver carpeting materials in sealed protective packaging for carpet tile and sealed containers for related materials. Carpet materials shall be bound with secure protective wrapping. Consideration should be given to bulk packaging of carpet tile when delivery is made to the jobsite for immediate installation to reduce packaging waste.

B. Storage and staging area at the site must be coordinated with the Construction Manager.

C. Provide 3% overage of calculated yardage for each type of carpet (calculated yardage shall include carpet needed for complete installation plus waste and usable scraps).

1. Deliver specified overrun and usable scraps of packages to owner's designated storage space, properly packaged (boxed) and identified. (Redirect small pieces of waste carpet to be appropriately recycled.)

D. Materials shall be stored in an enclosed and dry area protected from damage and soiling.

1.06 PRE-INSTALLATION MEETING

A. The manufacturer shall meet at the project site with representatives of end user, Construction Manager and the Trade Contractor to review the carpet installation procedure and coordination with other trades. The Trade Contractor must have available at this meeting the carpet manufacturer's installation procedures, instructions for the carpet types specified in the various applications required, and recycling procedures outlined in the manufacturer's environmental program.

B. Store carpet in working areas which have been enclosed and have maintained environmental conditions as those planned for occupancy. Carpet shall be allowed to reach room temperature or minimum temperature recommended by manufacturer before installation.

1.07 WARRANTY

A. Provide warranties by Carpet Manufacturer and Trade Contractor agreeing to replace defective materials and workmanship of carpet work during one (1) year warranty period following Notice of Completion. Also, submit carpet manufacturer's warranties as follows:

1. Wear - Surface wear shall not be more than 10% by weight throughout the life of the product.

2. Static - Carpet will maintain static generation at less than 3.5 KV at 70 degrees F, and 20% R.H. throughout the life of the product.

3. No delamination throughout the life of the product.
4. No edge ravel throughout the life of the product.

5. No dimensional instability, i.e. shrinkage, curling, and doming which adversely affect the ability of the tile to lay flat throughout the life of the product (per installation instructions). See Aachen test.

6. Colorfastness Warranties: Lifetime Colorfastness to Light, Lifetime Colorfastness to Atmospheric Contaminants for 100% solution dyed nylon products.

7. Stain Removal: Lifetime Stain Removal Limited Guarantee

8. Manufacturer must take back carpet free of charge for quantities above 500 yds.

B. Submit manufacturer's certified independent test results to show that carpet meets or exceeds product performance specification criteria for carpet testing requirements (i.e. see section 2.3 flame, smoke, Aachen test, etc.).

C. Lifetime Commercial Limited Warranty (Owner's Option) - Owner will be completely satisfied with the performance of the carpet product when installed in accordance with the manufacturer's current installation specifications and is maintained in accordance with the current carpet care recommendations and such maintenance continues throughout the duration of the original installation when owned and maintained by the original end user. Further, owner will be satisfied with the recycling of the product at the end of its useful life as outlined in the manufacturer's environmental program.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Preferred Manufacturer: Tarkett (Tandus)
1. Pattern (Architect shall select up to (3) types:
   a. Main: Haphazard II 03366; Seahorse 13513
   b. Accent 1: Plexus Colour IV 02875; Glacier Bay 18571
   c. Accent 2: Plexus Colour IV 02875; Wind Wave 18566

B. Acceptable Manufacturers: Equal products only.

2.02 CARPET TILE

A. Package Marking - Mark each carpet package according to style, color, pattern, dye lot, run number and quantity. Within each continuous carpet area, install carpet from same dye lot and run.

B. Carpet Construction Specification - All yarn and carpet shall be manufacturer's first quality and 100% recyclable.

2.03 CARPET SHALL MEET THE FOLLOWING PERFORMANCE STANDARDS:

A.	Flooring Radiant Panel (ASTM E648):	Class I
B.	Smoke Generation (ASTM E662):	< 450

2.04 PRODUCT SPECIFICATIONS

A.	Product recyclability	100%
B.	Format Type	Modular 24” Tile
C.	Fiber System	TDX Nylon

D.	Dye Method	Solution Dyed
E.	Face Weight	14 oz/yd²
F.	Total Thickness (ASTM F386)	0.280” (7.06 mm)
G.	Recycled Content	29% Pre-Consumer 36% Post-Consumer
H	Cradle to Cradle Certified	Must be MBDC Cradle to Cradle Certified
I.	Size	24 in. x 24 in.
J.	NSF140	Platinum Certified

2.05 MINIMUM CONSTRUCTION STANDARDS IN ADDITION TO PRODUCT SPECIFICATIONS

A. Conform to 2016 CBC for accessibility as follows: CBC Section 11B-302.2

1. Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture, with a maximum pile height of ½”, per 11B-302.2.

2. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC Section 11B-303.

B. Nylon Specification - All nylon fiber shall be branded nylon containing pre-consumer recycled content.

C. Average pile thickness as determined by ASTM D418.

D. Appearance Retention Rating (see performance standards)

E. Carpet tile backing shall contain pre consumer and post consumer recycled content.

2.06 RELATED CARPET MATERIALS

A. Leveling Compound - Latex type as recommended by carpet manufacturer and is compatible with carpet adhesive and curing/sealing compound on concrete.

B. Releasable pressure sensitive type adhesive - Use the following as recommended by the carpet manufacturer which will allow removal of carpet at any time without damage or adherence to carpet: N5000 low VOC (no solvents) carpet tile adhesive.

C. Multi-purpose Adhesive - Provide the following adhesive as recommended by carpet manufacturer for direct glue-down of carpet on steps.

D. Carpet Edge Guard, Nonmetallic - Extruded or molded heavy duty vinyl or rubber carpet edge guard of size and profile indicated and with minimum 2 inch wide anchorage flange; colors selected by architect/designer from among standard colors available within the industry.

E. Miscellaneous Materials - As recommended by manufacturer of carpet, cushion and other carpeting products and selected by Trade Contractor to meet project circumstance and requirements.

PART 3 - EXECUTION

3.01 PRE-INSTALLATION REQUIREMENTS AND PREPARATORY WORK

A. The Trade Contractor shall measure carefully and check all dimensions and other conditions in the field to insure proper fit in the areas designated. Trade Contractor shall be totally responsible for the accuracy of his measurements on total yardage requirements, individual floor yardage requirements and dye lot yardage requirements. No request for carpet or installation extras from the owner will be considered due to measurement or takeoff errors by the Trade Contractor. The Trade Contractor shall confirm total yardage required, including 3% attic stock along with bid.

B. The Trade Contractor shall coordinate all installation activities with the Construction Manager.

C. Removal of carpet to be replaced (if applicable) should be handled according to preapproved plan for reuse and/or recycling. See carpet reclamation specification.

D. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period. Carpet installation must not commence until painting and finishing work is complete and ceiling and other overhead work has been tested, approved and completed, unless specifically approved by owner's Project Manager, in writing.

E. Trade Contractor and manufacturer's representative must examine substrates for conditions over which carpeting is to be installed.

1. New concrete shall be allowed to cure for ninety (90) days before carpet installation.

2. Trade Contractor shall perform moisture content testing as required in manufacturer's instructions to ensure pH readings of no more than 9. Moisture transmission of 5.5 pounds per sqm per 24 hours is acceptable. If values exceed this level manufacturer's recommendations must be followed for moisture transmission mitigation. Do not proceed until unsatisfactory conditions are corrected.

3. Cracks 1/16 inch or more, holes, unevenness and roughness must be filled, leveled and made smooth with a compatible latex floor patching compound. Prior to filling, the floor must be swept clean of all loose granular debris. After filling, allow filler to dry. Then damp mop the floor with warm water and allow to dry. Vacuum after mopping, to ensure all loose granular debris is removed and provide a proper substrate to install carpet.

F. All surfaces to receive carpet shall be clean and dry, and in a condition satisfactory to the Trade Contractor. Trade Contractor shall notify Construction Manager in writing of any conditions which will prevent him from producing satisfactory finish work after above specified preparatory work is completed.

G. Trade Contractor shall vacuum floors again immediately before installation of carpeting.

H. Confirm compatibility of adhesive with curing compounds on concrete floors. All adhesives and curing compounds shall comply with the CRI Green Label Certification program for low VOC.

I. Environmental Conditions - Areas to be carpeted must be pre-heated at a minimum of 68° F. for 72 hours prior to installation with the relative humidity not more than 65%. A minimum temperature of 50° F. shall be maintained thereafter. Carpet and adhesive must be stored at a minimum temperature of 68° F. for 72 hours prior to installation.

J. Once the Trade Contractor commences installation work under this contract, it shall be assumed that the condition of the floor has been accepted and any repairs or further corrections in the floor surface shall become the responsibility of the Trade Contractor.

3.02 INSTALLATION

A. General

1. Comply with manufacturer's instructions and recommendations for uniformity of direction of carpet installation.

2. Install carpet under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.

3. Provide cut outs where required. Conceal cut edges with protective edge guards or overlapping flanges.

4. Run carpet under open-bottom items such as heating convectors and install tight against walls, columns and cabinets so that the entire floor area is covered with carpet. Cover over all floor type door closures.

5. Install edging guard at all openings and doors wherever carpet terminates, unless indicated otherwise. Prior to installation, report to the Construction Manager all other obstructions which may occur.

6. Cutting shall be done in accordance with the manufacturer's recommendation, using the tools designed for the carpet being installed. Scraps shall be retained or disposed of per the manufacturer’s environmental program.

7. Edges shall be butted together with the proper pressure to produce the tightest joint possible without distortion.

8. All carpet shall be installed with pile-lay in the same direction except when directed to use a quarter turned method as specified in the drawings.

9. Use leveling compound where necessary. Any floor filling or leveling shall have a minimum of 4'0" of feather.

10. Expansion joints - Do not bridge building expansion joints with continuous carpeting. Provide for movements.

B. Installation

1. Install carpet according to carpet manufacturer's printed instructions.

2. Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be ½" maximum.

3. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC Section 11B-303.

4. Measuring - Divide the room into four quadrants and snap a chalk line. Make sure quadrants meet at right angles (offset the center line, if necessary, to ensure that perimeter tiles will be cut no less than half size (9 inches).

5. Apply environmentally approved adhesive as per instructions in the area to be carpeted first.

6. Note carefully if the product is designed to be installed "quarter turned" only. Arrows should point in the same direction every other tile and diagonally. Arrows on alternating tiles should be turned 90^{o} in either direction, consistently.

7. Begin installing by laying an anchor row of tiles on one side of the center chalk line. Ensure straight lines and square corners. Repeat anchor rows in each quadrant, extending out from center. Fill in each quadrant with tiles using a stair step technique.

8. Tip individual tiles into place to avoid catching pile in the joint. Frequently check tile joints for proper alignment and firm abutment.

9. Although tiles are nominally 24 inches by 24 inches square, there will be slight gain due to joints. To check, measure 10 installed tiles from edge to edge, spanning 10 joints. This measurement should be no greater than 240 and 1/8 inches for tufted product. If more gain is measured, tiles are not butted tightly enough. Reposition and check again. Use this method to continually check for excessive gain. See manufacturer's instructions for 24" x 24" modular tiles.

10. Fixtures, architectural elements, and perimeters will require tile cutting. Cut tiles from the back. Secure cut or partial tiles with adhesive.

11. Electrical floor outlets are usually wired after tile installation. Install tile over electrical boxes and mark locations with a piece of tape. Tiles can be lifted for cut-outs later.

12. Center trench headers directly under a full tile row.

13. In open perimeter designs, use a fixed reducer strip to secure the tile area.

14. Use an environmentally acceptable permanent adhesive for tiles installed on stairs. Compatible edge trim and nosing products may also be required.

3.03 CLEANING AND PROTECTION

A. On completion of the installation in each area, all dirt, carpet scraps, etc., must be removed from the surface of the carpet. Any soiling sports or excessive adhesive on the carpet shall be removed with the proper spot remover. (See Section 1.3.7)

B. Construction traffic other than as may be required to fit up specific carpeted area will not be allowed to traverse the completed work.

C. Remove debris, and sort pieces to be saved from scraps to be redirected and recycled.

D. Protect carpeting against damage during construction. Cover with 6-mil thick polyethylene covering with taped joints during the construction period, wherever protection is required, so that carpet will be without any indication of deterioration, wear, or damage at the time of acceptance. Damaged carpeting will be rejected and recycled. As the carpet is laid, remove all trimmings, excess pieces of carpet and laying materials.

E. At the completion of the work and when directed by the Construction Manager, vacuum carpet using commercial dual motor vacuum of type recommended by carpet manufacturer. Remove spots and replace carpet where spots cannot be removed. Remove rejected carpeting and replace with new carpeting. Remove any protruding yarns with shears or sharp scissors.

F. Protection of carpeting shall be maintained on each floor or area until accepted.

3.04 INSPECTION

A. Preliminary Acceptance - Upon completion of the carpet installation of each floor, it shall be inspected by Owner, the Construction Manager and Trade Contractor.

B. Upon completion of the installation, verify that work is complete, properly installed and acceptable. Remove and replace all work not found acceptable to the owner at the installer's expense.

C. Upon completion of the installation the manufacturer shall deliver a certificate of recycling describing the method by which the uplifted carpet was recycled, and shall provide a promise of recycling specifying the method of recycling of the newly installed carpet tile at the end of its useful life.

END OF SECTION

SECTION 09 72 00

VINYL WALL COVERINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Wallcovering for fixed walls, including preparation of surfaces.

1. Furnishing wallcovering for operable walls, and vinyl wrapped wall panels provided under other Sections.

B. Related Work:

1. Substrate materials
2. Wall texturing
3. Section 08 43 33 – Folding Glass Walls.
4. Section 09 29 00 – Gypsum Board.

1.02 SUBMITTALS

A. Samples: Provide 12 inch by 12 inch samples of selected wallcovering for review of quality, color, texture and weight. Provide from dye lots to be used on project only.

B. Manufacturer's Instructions:

1. Provide copies of maintenance instructions for wallcovering.

2. Provide recommendation of cleaning materials and application methods, including precautions in use of cleaning materials which may be detrimental to surfaces if improperly applied.

1.03 QUALITY ASSURANCE

A. Three full length panels of each type wallcovering to be used shall be installed in areas selected by Architect. Approved test panels shall be used as standard of quality of appearance and installation for Work.

1. Test panels found deficient by Architect per specification standards or application shall be replaced.

B. Conform to 2016 California Building Code, Title 24, Part 2, Chapter 8 and ASTM E112.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store wallcovering in clean and dry area where temperatures are maintained at 55 degrees F. minimum, with normal humidity. Do not store in an upright position. Do not cross stack wallcovering.

B. Take reasonable precautionary measures to prevent fire hazards with adhesives and solvents.

C. Where toxic materials and both toxic and explosive solvents and adhesives are used, take appropriate precautions and provide proper ventilation.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:

1. Maintain substrate surfaces and ambient temperatures above 60 degrees F. seven days before, during, and after application period.

2. Ensure maximum surface moisture of substrate conforms to wallcovering manufacturer's requirements and does not exceed 5 percent. Surface shall exhibit negative alkalinity.

3. Lighting: Provide a minimum of 80 foot candles per square feet on surfaces to be covered.

4. Provide continuous and adequate ventilation during work and after installation of wallcovering.

5. Install specified materials only when normal temperature and humidity conditions approximate the interior conditions that will exist when the building is occupied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Vinyl wallcovering shall be the product of one manufacturer. Design is based on the use of products manufactured by the following:

1. Koroseal Interior Products Group, a Division of RJF International Corporation, Fairlawn, Ohio.

2. Wallscape, East Brunswick, NJ, (866) 216 4483.

3. Len-Tex Corporation, North Walpole, NH, (603) 445-2342.

2.02 MATERIALS

A. Vinyl Fabric:

1. Vinyl-coated fabric shall comply with Federal Specifications CCC-W-408-A and with the CFFA-W-101-D Quality Standard for Vinyl Coated Fabric Wallcovering. Wall covering shall be Type II, with minimum weight of 20 ounces per lineal yard in 54-inch width. Wall covering shall be Class A rated, when tested in accordance with ASTM E84. Material shall have a flame spread rating of 25 or less, a fuel contributed rating of 10 or less and a smoke density rating of 450 or less.

2. Koroseal, “Esquire” and “Linden”, or equal. Architect may select up to five different colors for the project.

3. Engraving roller die marks, roller repeat marks, glossy surface appearance or other imperfections will be proper basis for TOTAL REJECTION by the Architect, if evidenced in either the submitted samples, or the manufactured materials supplied and delivered to the job.

B. Primer and Adhesives: Provide manufacturer's recommended strippable types that allow for future removal of wall coverings without damage to substrate.

C. Provide Owner with one can of adhesive and additional wall covering equal to 3 percent of each color used.

D. Protective Coating: The vinyl wallcovering shall have a protective coating applied to its surface to minimize migration of stains into the vinyl and, therefore offer stain protection from a variety of staining agents and provide greater ease of cleanability.

2.03 SOURCE QUALITY CONTROL

A. Tests: Perform in accordance with Federal Standard, FED-STD-191A, except as follows:

1. Each roll of material delivered to the job site, must be affixed with U.L. labels, attesting to the maximum ratings specified herein, as determined by the ASTM E84 tunnel test.

2. The vinyl wallcovering shall contain thermo-particulating ingredients, which when exposed to a direct heat of 300 degrees F., emits a colorless and odorless vapor that activates ionization type smoke detectors, when installed according to manufacturer's specifications.
Certified copies of ASTM E603 Standard Guide for Room Fire Experiments, must be submitted to the Architect attesting to conformance of materials with this test.

3. Toxicity shall be determined by the National Institute of Standards and Technology (NIST).

4. Adhesive of vinyl coating to the fabric backing, shall be tested in accordance with ASTM D751.

5. Resistance to strong cleaning solutions, shall be tested by immersing one-half of the material into a solution of 1% sodium hydroxide (NaOh) or a common cleanser, for a period of twenty-four (24) hours, then rinsed, dried and observed for possible discoloration.

6. Materials shall have a zone inhibition rating of "0" to resist the growth of mildew and bacteria, as determined by test method ASTM G21.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine the areas and conditions under which wallcovering is to be installed and notify in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in an approved manner.

3.02 PREPARATION

A. Remove wallcovering from packaging and allow acclimatizing to the area of installation

24-hours before application.

B. Remove switchplates, wall plates, escutcheons, and surface-mounted fixtures, where wallcoverings are to be applied.

C. Prime and seal substrates in accordance with the wallcovering manufacturer's printed recommendations for the type of substrate material to be covered.

3.03 INSTALLATION

A. Place wallcovering panels consecutively in the order they are cut from rolls, including filling spaces above or below openings. Hang by reversing alternate strips except on match patterns.

B. Apply adhesive to back of wallcovering and place in accordance with the manufacturer's printed instructions. Install seams vertically and plumb, and at least 6 inches away from corner; horizontal seams will be permitted only where specifically approved by Architect. Place wallcovering continuously over internal and external corners. Overlap seams and double-cut to ensure tight closure. Roll, brush, or use a broad knife to remove air bubbles, wrinkles, blisters and other defects. Cut wallcovering evenly to the edges of openings.

C. Trim selvages as required to ensure color uniformity and pattern match at seams.

D. Remove excess adhesive along finished seams and clean well.

E. Install the wallcovering with an intimate substrate bond, smooth; clean, without wrinkles, gaps and overlaps.

F. Replace removed plates and fixtures to verify accuracy of concealment of cut edges.

3.04 CLEANING

A. Upon completion of work, remove surplus materials, rubbish, and debris resulting from this material installation and leave area of work in a neat, clean condition.

3.05 WARRANTY

A. Upon completion of work, contractor shall provide a written five (5) year warranty

END OF SECTION

SECTION 09 77 23

FABRIC- WRAPPED PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Fabric and vinyl-wrapped panels on tackboard and fabric wrapped acoustical panels for walls including coordination with electrical and mechanical trades as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 09 29 00 – Gypsum Board: for walls and ceilings.
2. Section 09 72 00 – Wall Coverings.
3. Electrical work, Division 26.
4. Mechanical work, Division 23.

1.02 SUBMITTALS

A. Submit samples of fabric-wrapped materials and core for review.

B. Provide Architect with Shop Drawings showing vertical joints, as well as details of panel attachment to substrates, and details at inside and outside corners.

1. Describe materials, fabrics, adhesives, and mechanical fasteners or clips.
2. Provide Certifications for Low-emitting materials.

C. Submit certified test reports showing the acoustical properties as required in this Specification.

1.03 QUALITY ASSURANCE

A. Ensure installation of these systems by persons thoroughly experienced with this type of installation and approved by the manufacturer of the systems being installed.

B. Comply with requirements of Title 19 and Title 24, Part 2, California Building Code, 2016, Chapter 8.

C. Acoustical measurements shall be performed in accordance with ASTM C423 performed in type A mounting per ASTM E795. The test shall be performed within the last 5 years by a laboratory accredited under the National Voluntary Laboratory Accredited Program for ASTM C423.

D. Low-Emitting Materials: Provide tackable wallcovering that is third-party certified to have been tested and passed the following indoor air quality standard:

1. Comply with the volatile organic compound emissions requirements of California Department of Public Health Standard Method, Section 01350.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products and materials to the project and store in a safe, dry place with shop supplied protection and labeling intact and legible until set applied or installed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Vinyl Wrapped Panels: Provide wrapped-edge design panels with shop applied fabric finishes as scheduled by Architect and specified in Section 09 72 00 – Wall Coverings. Fabric shall not lap the back face more than 1-1/2" from edge.

1. Core: Lamvin, Chatfield-Clarke, or equal - ½" fiberboard, noncombustible with flame spread less than 75, smoke density less than 450, ASTM E84. Fiber board ironed core 18lbs per cubic foot, Class C complying with ASTM C208, flame spread of 45 or less, and smoke density of 45.

2. Vinyl: As specified in Section 09 72 00, with flame spread of 25 or less.

B. Minimum NRC of 0.70 for vinyl wrapped panels and 0.85 for fabric wrapped panels.

2.02 ACCESSORIES

A. Fastening: Provide adhesive spread over entire contact surface with a 1/8-inch notched trowel or apply 1 inch dabs no more than 12 inches o.k. and 2 inches from edge of panel.

B. Metal Trim: Where metal J-Trim is used, metal trim shall be clear anodized aluminum.

C. Provide vinyl plastic 1/2-inch J-Bead Trim, as manufactured by Trim-Tex® Co. 3700 W. Pratt Ave. Lincolnwood, IL, 60712, or equal. Finish shall be glued on vinyl fabric to match wall panel finish. Install J-Bead Trim full height and where wall panels abut:

1. Hard ceilings (gypsum board or plaster);
2. At all dissimilar wall surfaces.

E. Adhesives: Use adhesive to fasten fabric onto backing, per manufacturer's recommendations. Provide mildew-resistant, moisture-proof type which will not discolor or stain exposed surfaces of the fabrics.

1. Apply adhesive to wall panel, full skim coat over the entire panel, level for an even, straight line appearance.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine building before beginning work to determine that it is properly enclosed and the structure is in proper condition to receive installation.

3.02 INSTALLATION

A. Prime subsurface with GL3210 Gripper Primer-Sealer, by Glidden, or equal as approved by adhesive manufacturer. Provide panel manufacturer approved adhesive over entire panel.

B. Layout work in accordance with reviewed and approved shop drawings. Install panels over entire area of scheduled walls including areas to be covered by casework.

C. Install system as scheduled on the Drawings. Ensure that no fasteners are exposed.

D. Contiguous panels are to be in identical planes with no more than 1/8-inch variation in plane in 12 foot area.

E. Coordinate installation of vinyl wrapped panels with gypsum wall board installer, at walls where channel screed molding occurs.

3.03 CLEANING

A. Clean surfaces, including floors and walls which have become soiled from this work.

B. Replace materials which have become broken, chipped or abraded.

3.04 WARRANTY

A. Submit manufacturer's limited written warranty against manufacturing defects.

1. Warranty Period: Five Years.

END OF SECTION

SECTION 09 84 13

FIXED SOUND-ABSORPTIVE PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide materials, labor and equipment necessary for the completion of acoustical panels as indicated on the Drawings and specified herein.

B. Related Work:

1. Section 09 90 00 – Painting and Coating.

1.02 SUBMITTALS

A. Provide manufacturer's product literature to show compliance with requirements.

1.03 STORING AND HANDLING

A. Deliver and store materials at job site in a safe area, out of traffic and shored up off ground surface.

B. Do not store material outside. Do not deliver any material project until spaces or other surfaces to receive it are prepared.

C. Protect products with adequate waterproofing.

D. Exercise care in off-loading items to prevent damages, chips, splitting and breaking.

1.04 REFERENCES

A. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

PART 2 - PRODUCTS

2.01 SOUND-ABSORPTIVE PANELS

A. Standard rigid fiberglass acoustical core panel, 6lb to 7lb density by Lamvin, Inc., 800.446.6329.

B. Fabric – Guilford of Maine, FR701, Style 2100, or equal, as shown on the drawings. Architect shall select up to 3 colors.

C. Flame spread rating: 25 or less in accordance with ASTM E84 test method.

D. Smoke developed index: 450 or less

E. Panel Thickness: One inch.

F. Panel Edges: Beveled.

2.02 MOUNTING

A. Mechanical “Z” Clip, per manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install panels with mechanical “Z” clip, per manufacturer’s recommendation.

B. Edges shall be clean and true. Chipped edges will not be acceptable.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Provide materials, labor and equipment necessary for the completion of a completely painted project, including preparation of painted surfaces. Provide finishes based on materials and products scheduled in these specifications and on the drawings. If not otherwise specified, provide prime coat and two finish coats on all exposed to view or weather surfaces. This shall include painting all pigmented exterior plaster (integral color stucco) in not less than three colors. The following miscellaneous items shall also be painted:

1. Areas shown to be painted on the Room Finish Schedule or Exterior and Interior Elevations. Items called out to be painted in Divisions 23 and Division 26. All hollow metal.

2. Exposed site plumbing items, such as PIV's, backflow preventors, exposed pipes and standpipes, fire hydrants, irrigation air relief valve covers, exposed valves, exposed roof drainpipes, etc.

3. Exposed interior mechanical ductwork, piping, and electrical conduits (except in electrical rooms and closets), wall and ceiling access covers, hatches, panel covers, and plates, and exposed cable tray and supports. **Roof top mechanical units that are above the height of the roof parapet, paint to match exterior plaster.**

4. Priming and sealing of gypsum wallboard that is to receive vinyl wall covering.

5. Roof hatches (interior and exterior), exterior galvanized ladders, sheet metal parapet copings on both sides and top. Exposed metal components that arrive on job with only prime finish. Signposts. Decorative metal fence and gates. Metal railings and bollards. Exposed steel connectors, bolts, and plates.

6. Stain and seal exposed wood components.

B. Specific items NOT to be painted or finished: Factory finished items (as opposed to factory primed), chain link fence, volleyball and basketball posts, football goals, chin-up bars, concrete benches, wood casework finished by casework fabricator.

C. Related Work:

1. Section 32 12 16 – Asphalt Paving.
2. Section 07 92 00 – Joint Sealants.
3. Section 09 24 00 – Cement Plastering.
4. Section 09 29 00 – Gypsum Board.
5. Section 09 72 00 – Wall Coverings.
6. Mechanical, Division 23.
7. Electrical, Division 26.

1.02 REFERENCE STANDARDS

A. Conform to California Air Resources Board (CARB) Rules, especially 1113, Architectural Coatings.

B. Title 19, California Code of Regulations (CCR), Public Safety, State Fire Marshal Regulations

1.03 SUBMITTALS

A. Prepare eight, 8-1/2-inch by 11-inch samples of finishes, to be provided to District's Maintenance and Operations Department. When possible, apply finishes on identical type materials to which they will be applied on job.

B. Identify each sample as to finish formula, color name, reflectance number and sheen name and gloss units.

C. Colors will be selected by Owner and Architect prior to commencement of work, from manufacturer's full range of standard and custom colors.

D. State Fire Marshal, Fire and Life Safety Approval: Flame retardant coatings shall be listed by the California State Fire Marshal's office. A copy of this listing and a material specification sheet shall accompany the submittal.

E. Submittal to be reviewed and signed by District's Maintenance and Operations Department prior to Architects approval.

1.04 QUALITY ASSURANCE

A. Mock-up: Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials and workmanship. If approved, sample area will serve as a minimum standard for work throughout.

1.05 MAINTENANCE MATERIALS

A. Leave on premises where directed, not less than one full gallon of each color, of each type of paint, in new unopened containers. Label each container for identification.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver paint materials in sealed original labeled containers bearing manufacturer's name, type of paint, brand name, solids content, color designation and instructions for mixing and/or reducing.

B. Provide adequate storage facilities. Store paint materials at a minimum ambient temperature of 65 degrees F., in well ventilated area.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 PROJECT CONDITIONS

A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following minimums: gypsum board - 12 percent; cementitious materials - 12 percent.

B. Ensure surface temperatures and surrounding temperatures are above 50 degrees F., before applying finishes.

C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 50 degrees F., for 24 hours before, during, and 48 hours after application of finishes.

D. During painting, provide minimum of 25-foot candles of lighting on surfaces to be painted.

1.08 EQUAL PRODUCTS

A. All products specified herein, may be substituted with a product that is equal to better than the product specified. Products must be equal in all ways, including chemical and physical make up, as well as performance.

B. Substitutions will be reviewed by the District and a determination will be made on the acceptability of the product submitted. If a determination is made that the substituted product is not equal, the original project specified herein will be provided at no cost to the owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and coatings manufactured by one of the following companies noted in Section 2.02, D and referrer to cross-reference guide for acceptable alternates.

2.02 PAINT MATERIALS

A. Accessories: Provide linseed oil, turpentine and other materials not specifically specified but required to achieve finishes.

B. Paints and Coatings: Provide ready-mixed type except field catalyzed coatings; pigments fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixtures.

C. Provide paints and coatings with good flowing and brushing properties and capable of drying or curing free of streaks and sags.

D. **Painting**
Provide equivalent paint types according to the following schedule. Colors are Dunn Edwards. Provide Matching colors in Frazee or Sherwin Williams.

Interior

New Drywall (Semi Gloss Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

New Drywall (Low Sheen Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee 126 Mirro Glide Low-Sheen
3rd coat (to cover*)	Frazee 126 Mirro Glide Low-Sheen

New Drywall (Eggshell Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee/UltraTech C106 Eggshell Enamel
3rd coat (to cover*)	Frazee/UltraTech C106 Eggshell Enamel

New Wood Painted Surfaces (Semi Gloss Finish)

1st coat	Frazee/UltraTech C312 100% Acrylic Wood Primer
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

New Steel Door / Door and Window Frames

1st step	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

New Ferrous Metal (including steel doors and hollow metal frames)

Pretreatment	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

New Galvanized Metal

Pretreatment	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

Ceilings

1st coat	Zinsser Cover Stain
2nd coat (to cover*)	Frazee/UltraTech C157 Latex Dry Fall Flat

Previously Painted Drywall and Wood Surfaces (Semi Gloss Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

Previously Painted Drywall and Wood Surfaces (Low Sheen Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee 126 Mirro Glide, Low-Sheen
3rd coat (to cover*)	Frazee 126 Mirro Glide, Low-Sheen

Previously Painted Drywall and Wood Surfaces (Eggshell Finish)

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee/UltraTech C106 Eggshell Enamel
3rd coat (to cover*)	Frazee/UltraTech C106 Eggshell Enamel

Previously Painted Metal Surfaces (Semi Gloss Finish)

1st coat (spot)	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
3rd coat	Frazee 124 Mirro GlideSemi-Gloss
4th coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

Previously Painted Metal Surfaces (Low Sheen Finish)

1st coat (spot)	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
3rd coat	Frazee 126 Mirro Glide, Low-Sheen
4th coat (to cover*)	Frazee 126 Mirro Glide, Low-Sheen

Previously Painted Metal Surfaces (Eggshell Finish)

1st coat (spot)	Frazee/UltraTech C309 Universal Metal Prime
2nd coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
3rd coat	Frazee/UltraTech C106 Eggshell Enamel
4th coat (to cover*)	Frazee/UltraTech C106 Eggshell Enamel

Vinyl Covered Walls

1st coat	Frazee/UltraTech C152 Multi-Solution Primer/Sealer
2nd coat	Frazee 124 Mirro GlideSemi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro GlideSemi-Gloss

Exterior

New and Previously Painted Stucco-Plaster-Concrete (Low Sheen Finish)

1st coat	Frazee/Flex Lox C251 High pH Masonry Primer
2nd coat	Frazee 215 Royal Supreme
3rd coat (to cover*)	Frazee 215 Royal Supreme

New and Previously Painted Wood (Gloss Finish)

1st coat	Frazee/UltraTech C312 100% Acrylic Wood Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

New and Previously Painted Wood (Semi Gloss Finish)

1st coat	Frazee/UltraTech C312 100% Acrylic Wood Primer
2nd coat	Frazee 124 Mirro Glide Semi-Gloss
3rd coat (to cover*)	Frazee 124 Mirro Glide Semi-Gloss

New and Previously Painted Wood (Low Sheen Finish)

1st coat	Frazee/UltraTech C312 100% Acrylic Wood Primer
2nd coat	Frazee 215 Royal Supreme
3rd coat (to cover*)	Frazee 215 Royal Supreme

New Steel Doors / Door and Window Frames

1ST step	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

New Steel Doors / Door and Window Frames

1ST step	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

New Ferrous Metal

1ST step	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

New Galvanized Metal

Pretreatment	Krud Kutter Metal Clean & Etch
1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

Previously Painted Steel Doors / Door and Window Frames

1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

Previously Painted Ferrous Metal

1st coat	Frazee/UltraTech C309 Universal Metal Primer
2ndcoat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

Previously Painted Galvanized Metal

1st coat	Frazee/UltraTech C309 Universal Metal Primer
2nd coat	Frazee 143 Mirro Glide Gloss
3rd coat (to cover*)	Frazee 143 Mirro Glide Gloss

E. **SPECIAL COATINGS (HIGH PERFORMANCE) –** Exterior metal stairs (including handrails, railings and guard rails), roof sheet metal flashing, roof equipment, metal wall louvers and other metal surfaces requiring High Performance Coatings.

Unprimed or shop primed ferrous metal

1st coat	Comex Industrial Coatings E-100 Low VOC Epoxy
2nd coat	Comex Industrial Coatings U-100 Low VOC Polyurethane
3rd coat (to cover*)	Comex Industrial Coatings U-100 Low VOC Polyurethane
OR	
1st coat	Macropoxy 646 B58 Series
2nd coat	High Solids Polyurethane B65 Series
3rd Coat (to cover*)	High Solids Polyurethane B65 Series

Galvanized or Aluminum

1st coat	Comex Industrial Coatings E-100 Low VOC Epoxy
2nd coat	Comex Industrial Coatings U-100 Low VOC Polyurethane
3rd coat (to cover*)	Comex Industrial Coatings U-100 Low VOC Polyurethane
OR	
1st coat	Macropoxy 646 B58 Series
2nd coat	High Solids Polyurethane B65 Series
3rd Coat (to cover*)	High Solids Polyurethane B65 Series

Previously Painted Metal

Pre-Prime	Comex Industrial Coatings E-550 Epoxy Pre-Primer
1st coat	Comex Industrial Coatings E-100 Low VOC Epoxy
2nd coat	Comex Industrial Coatings U-100 Low VOC Polyurethane
3rd coat (to cover*)	Comex Industrial Coatings U-100 Low VOC Polyurethane
OR	
1st coat	Macropoxy 646 B58 Series
2nd coat	High Solids Polyurethane B65 Series
3rd Coat (to cover*)	High Solids Polyurethane B65 Series

F. **Other** – Wood, metal and concrete steps and ramps attached to buildings indicated will be painted as follows:

Concrete Steps/Ramps

1st coat	Comex Industrial Coatings E-100 Low VOC Epoxy
2nd coat	Comex Industrial Coatings U-100 Low VOC Polyurethane *(Broadcast anti-skid in wet film)*
3rd coat (to cover*)	Comex Industrial Coatings U-100 Low VOC Polyurethane Include yellow stripes
OR	
1st coat	Macropoxy 646 B58 Series
2nd coat	High Solids Polyurethane B65 Series
3rd coat (to cover*)	High Solids Polyurethane B65 Series with sand for non slip finish. Include yellow stripes

Metal Steps/Ramps

1st coat	Comex Industrial Coatings E-100 Low VOC Epoxy
2nd coat	Comex Industrial Coatings U-100 Low VOC Polyurethane *(Broadcast anti-skid in wet film)*
3rd coat (to cover*)	Comex Industrial Coatings U-100 Low VOC Polyurethane Include yellow stripes
OR	
1st coat	Macropoxy 646 B58 Series
2nd coat	High Solids Polyurethane B65 Series
3rd coat (to cover*)	High Solids Polyurethane B65 Series with sand for Non-slip finish. Include yellow stripes

Wood Steps/Ramps

1st coat	Superdeck 3100 Deck & Dock Elastomeric Coating
2nd coat	Superdeck 3100 Deck & Dock Elastomeric Coating *(6310 Anti-Skid added to 2nd coat)* Include yellow stripes
OR	
1st coat	Armorseal TreadPlex Primer B90 Series
2nd coat	Armorseal TreadPlex Finish B90 Series
3rd coat (to cover*)	Armorseal Treadplex B90 Series with sand for non-slip finish. Include yellow stripes.

*"to cover" is defined – coverage must meet district's approval
**"spot prime" is defined as priming all bare metal areas

G. **Fire Retardant Coating**: Must meet UBC No. 42-1. UL No. 723, ANSI - 2.5, NFPA 255,

State Fire Marshal #C-10000, and ICBO No. 3656.

1. Flamort Flam-Gard clear fire-retardant varnish flame spread less than 75, a clear intumescent fire-protective interior varnish for natural wood finishes. Apply two coats, base coat, 8 gallons per coat per 1000 square feet and one coat, finish coat, 2-1/2 gallons per 1000 square feet. As manufactured by Flamort Company.

2. GLIDDEN: Contact Flame Control Coatings (see attached information).

3. Dunn-Edwards Corp.

4. Frazee Paint Co.

   Note: Provide 12" x 12" samples of each of the systems listed in AD. Fire Retardant Coating above, and Architect will select system to be used, based on finish achieved.

5. Vista Paint: Clear or Fire-Retardant Intumescent Paint. For use on exterior wood surfaces requiring weather protection. Clear product is used over interior surfaces on wood and paneling where natural finish is required.

H. **Anti-Graffiti Coating**

1. Preferred Product: Surpro HDWB: by Surtec, Inc., Surface Technology, 1880 N. MacArthur Drive, Tracy, CA 95376, Phone: (209) 820-3700.

2. VandlGuard™: by Rainguard International, 1079 Culpepper Drive, Conyers, GA, 30094, Phone: 949-675-2811

I. **Paint Guide**

SURFACES	FRAZEE
Interior	126 Aro-Thane S/G
Interior	129 Aro-Thane L/S
Interior	022 LoGlo
Exterior	215 Royal Supreme
Exterior	146 Aro-Thane Gloss
Exterior	136 Aro-Thane S/G

J. **Primer Guide**

SURFACES	FRAZEE
Interior – New Gypsum Board	Zinsser 123 Primer/Sealer
Interior – New Wood	Zinsser 123 Primer/Sealer
Interior – New Metal Surfaces	C309 Universal Metal Primer

Interior – Previously Painted Gyp Board, Wood	Zinsser 123 Primer/Sealer
Interior – Previously Painted Plaster, Metal	Zinsser 123 Primer/Sealer
Exterior – New and Previously Painted Wood	Zinsser 123 Primer/Sealer
Exterior – New and Previously Painted Stucco, Concrete, and Plaster	Zinsser 123 Primer/Sealer
Exterior – New and Previously Painted Metal	Zinsser 123 Primer/Sealer

PART 3 - EXECUTION

3.01 EXAMINATION

A. Thoroughly examine surfaces scheduled to be painted prior to commencement of work. Report in writing of conditions potentially detrimental to proper application. Do not commence until satisfied that defects and deficiencies in surfaces have been rectified.

3.02 PROTECTION

A. Adequately protect other surfaces from paint and damages. Repair damages as a result of inadequate or unsuitable protection.

B. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation areas.

C. Place cotton waste cloths and materials which may constitute a fire hazard in closed metal containers and remove daily from site.

D. Remove or cause to have removed, electrical plates, fittings, fastenings, escutcheons, and hardware prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvents or other harsh cleansers on surfaces which could be damaged by such use of materials.

3.03 PREPARATION OF SURFACES

A. Thoroughly clean surfaces to be painted with hydro-cleaning process to remove chalk, dirt and other deleterious materials where such cleaning methods are practical. Spot prime before application of finish coats.

B. Remove dirt, grease and oil from canvas and cotton covered insulated materials such as pipes and ducts.

C. On surfaces to be cleaned which cannot be hydro cleaned, where possible, wash with solution of TSP and thoroughly rinse.

D. Patch and prime cementitious materials.

E. Remove contamination from gypsum board surfaces and prime to conceal defects. Paint after defects have been remedied.

F. Remove surface contamination and oils from zinc coated/galvanized surfaces, wash with solvent, apply etching primer or as recommended by paint manufacturer and confirmed with metal manufacturer.

G. Remove dirt, loose scale, powder, mortar and other foreign matter from cementitious surfaces which are to be painted or to receive sealer. Remove oil and grease with TSP solution, rinse well and allow to thoroughly dry.

H. Remove stains from cementitious surfaces caused by weathering of corroding materials with a solution of sodium metasilicate after being thoroughly wetted with water. Allow to thoroughly dry.

I. Fill hairline cracks, small holes and imperfections. Smooth off to match adjacent surfaces. Smooth off to match adjacent surfaces. Wash and neutralize high alkali where they occur.

J. Remove grease, rust, scale, dirt and dust from steel and iron surfaces. Where heavy coatings of scale are evident, remove by wire brushing, sandblasting or other method necessary, practical and in accordance with Steel Structures Painting Council.

K. Clean non-primed steel surfaces by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring welded joints, bolts and nuts are similarly cleaned. Prime surfaces to indicate defects. Paint after defects have been remedied.

L. Sand and scrape shop primed steel surfaces to remove loose primer, and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare surfaces.

M. Wipe off sanding dust and grit from miscellaneous wood and carpentry items prior to priming. Spot coat knots, pitch steaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried and sand between coats. Back prime interior and exterior woodwork.

N. Doors:

1. Painting Contractor shall not remove or reinstall any door hardware.

2. Except for door hinges, painting of doors must be completed prior to installation of hardware.

3.04 APPLICATIONS

A. Apply each coat at proper consistency.

B. Each coat of paint is to be slightly darker than preceding coat unless otherwise directed, or finish is clear.

C. Sand lightly between coats to achieve required finish.

D. Do not apply finishes on surfaces that are not sufficiently dry.

E. Allow each coat to dry before following coats are applied.

F. Backprime wood which is to receive paint or enamel paint, with enamel undercoater paint.

G. Prime top and bottom edges of wood doors with enamel undercoater when they are to be painted.

H. Apply flame retardant coating to the wood surface prior to applying stain and/or paint per manufacturer's instructions. Furnish certification of application of flame-retardant coating.

3.05 MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to mechanical and electrical sections of these specifications, as well as Drawings, with respect to painting and finishing requirements, color coding, identification banding of equipment, ductwork, piping and conduit.

B. Remove grilles, covers and access panels for mechanical and electrical systems from location and paint separately.

C. Finish paint primed equipment to colors selected.

D. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with a pre-finished coating, or are not exposed-to-view.

E. Replace identification markings on mechanical and electrical equipment when painted over or spattered.

F. Paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sightline. Paint dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels, as applicable.

G. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

H. Color code equipment, piping, conduit, and exposed ductwork of mechanical and electrical work. Color banding and identification shall include flow arrows, naming, numbering, stenciling, etc.

3.06 CLEANING

A. As work progresses and upon completion, promptly remove paint where spilled, splashed, smeared and splattered.

B. During progress of work, keep premises free from unnecessary accumulations of tools, equipment, surplus materials and debris.

C. Upon completion of work, leave premises neat and clean, to satisfaction of Owner.

END OF SECTION

10 00 00

SPECIALTIES

SANTEE SCHOOL DISTRICT

SECTION 10 11 00

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Markerboards and tackboards, fixed units of widths and heights shown including marker trays, map rails, hooks, flag holders, and other components as indicated on the Drawings and specified herein.

B. Related Work:

1. Markerboards shown on portable or operable walls.
2. Section 06 10 00 – Rough Carpentry.
3. Section 09 72 00 – Wall Coverings.

1.02 SUBMITTALS

A. Provide material list of items proposed to be provided.

B. Submit data sufficient to demonstrate compliance with specifications and drawing requirements.

C. Submit shop drawing and catalog cuts of items to be provided. Manufacturer or producer's standard drawings and technical information may be acceptable where complete enough to determine acceptability.

D. Submit samples of products and materials where options of color, finish, pattern or texture exist.

1.03 QUALITY ASSURANCE

A. Products and materials to be provided are to be from manufacturers and producers regularly engaged full-time in the manufacture or production of this and similar items, with a history of successful manufacture or production acceptable to the Owner.

B. In addition to complying with pertinent codes and regulations, comply with industry and trade standards normally associated with this product or material, except where specified product or material is superior in quality to industry and trade standards.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products and materials to the project; and store in a safe, dry place with shop-supplied protection and labeling intact and legible until set, applied, or installed.

B. Use reasonable means necessary to protect products and materials before, during, and after installation.

C. In the event of damage, regardless of responsibility and culpability, make repairs and replacements necessary to satisfaction of Owner, and at no additional cost to Owner.

1.05 WARRANTY

A. Provide owner with a five year written warranty as a condition of work acceptance, signed by Contractor and Installer (where applicable), agreeing to maintain, repair and/or replace products and materials for five years following Notice of Completion date, and without additional cost to Owner, as specified in Section 01 78 30 – Warranties, Guarantees, and Bonds.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. For purpose of determining minimum performance and quality standards, these specifications are based on Claridge Company. Other manufacturers such as PolyVision, and US Markerboard, whose products meet or exceed the requirements of this section, may be submitted for approval, with necessary information and samples.

2.02 MARKERBOARDS

A. Whiteboards LCS II Gauge- No. 32 LCS porcelain enameled steel dry-erase marker writing surface shall comply with the Porcelain Enamel Institute Recommendations PEI-1002 for Porcelain Enamel Chalkboards and be free of projections or depressions, free of dents, cracks and or other similar defects. Color - light gray low gloss finish. Bond under pressure to aluminum foil backed 1/2-inch plywood or 1/2-inch hardboard. Flame test rating per ASTM E84.

B. Horizontal Sliding Markerboard: Manually operated - 4 ft. high by length shown on Plans and Interior Elevations.

C. 1” tack strip with natural cork insert over marker board.

2.03 COMPONENTS

A. Markertray: Extruded aluminum, alloy No. 6063-T5 anodized, (mill finish not acceptable), with aluminum end closures. Minimum weight .803 lbs. per linear foot. Drill and countersink 24-inches on center maximum, top and bottom flange, ends rounded. Unless otherwise specified, each board shall be equipped with markertray the same length as boards.

B. Trim at Markerboard and Tackboard: Perimeter trim extruded aluminum alloy shapes in alloy No. 6063-T5 anodized (mill finish not acceptable). Joint strap "H" bar same color as markerboard.

C. Map Rail and Hooks: Extruded aluminum alloy, with insert (color: Specify Color; submit sample for approval), drill 24 inches on center maximum. Furnish one hook per each 24 inches of board. Provide additional map rails and hooks wall mounted where shown on the drawings; one hook for each 24 inches of rail. Map hooks equipped with spring clips, provide map rail end closures in matching finish; map hooks must be smooth finished non-hazardous type with no rough edges and/or projections.

2.04 TACKBOARDS

A. Cork covered with vinyl fabric with flame spread rating of 25 or less, as specified in Section 09 72 00 – Wall Coverings, 1/4-inch thick cork, bonded to 1/4-inch plywood or 1/4-inch hardwood.

2.05 FASTENINGS

A. Screws for fastening trim, chalktray and map rail oval head, Phillips type, of proper length for 1-1/2-inch penetration of studs or blocking, 1/4-inch diameter toggle bolts at steel stud wall, spacing for each, 24-inches on center.

B. Fasteners are to be tamperproof where exposed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fasten board standards over the wall with screws or bolts as detailed and specified. Trim mitered at corners; chalk trays rounded at ends.

B. Between finished wall surface and chalkboards wider than four feet, provide spaces or blocks to prevent deflection of boards.

C. Whiteboards with three sliding panels must be installed to ensure that no cupping or rubbing of boards occurs. Sliding panels shall be checked to ensure there are no clearance issues after installation.

3.02 CLEANING

A. Keep areas clean during the progress of work. After completion of the work clean up rubbish, containers, debris, etc., and remove from the site.

3.03 WARRANTY

A. Provide unlimited warranty on writing surface for scratch, damage, ghosting, semi-permanent ink, and abrasion resistance.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Site signs, room identification (door) signs, and code-required informational signs, except electrical light exit signs.

B. Related Work Not Included: Electrical light exit signs.

1.02 SUBMITTALS

A. Provide all submittals in accordance with the requirements of Section 01 33 00.

B. Product Data: Submit manufacturer's technical data related to materials, component dimensions, profiles, finishes, and installation.

C. Shop Drawings: Submit shop drawings for fabrication and erection of site signs. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

1. Submit full-scale layout for each sign larger than 48 inches in any dimension required for review of wording, spacing, and letter design.

D. Samples: Submit sample of each product and material indicating color, finish, pattern, and texture.

1. Submit samples of each color and finish of exposed materials and accessories required for specialty signs.

2. Submit one full-size sample sign of type, style, and color specified, including method of attachment. If accepted, sample will become part of the job.

1.03 QUALITY ASSURANCE

A. In addition to complying with pertinent codes and regulations, comply with industry and trade standards normally associated with this product or material.

B. Design Data: Design, fabricate, and install exterior signs to withstand a wind pressure of 100 mph on the total sign area in all directions.

C. Mock-up: Construct full-size mock-up, in medium of supplier's choice, of school site sign for approval.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect signs components and surfaces against damage during transportation and unloading.

1.05 WARRANTY

A. Provide written warranty to maintain, repair and replace products and materials for one year following Notice of Completion date, without additional cost to Owner, as specified in

Section 01 78 30 – Warranties, Guarantees, and Bonds. Provide 20-year life expectancy for legibility, color retention and resistance to climatic elements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide products from Best Sign Systems - 1-800-235-2378, or ASI Sign Systems - 800-247-7732, or equal.

2.02 MATERIALS

A. All signage shall conform to CBC, 2016, Title 24, Part 2, Sections 11B-603.2.3, 11B-604.8.1.2, and 11B-703. Tactile exit signage shall be provided per Section 1011.4.

B. Fiberglass - Glass fiber reinforced thermosetting resin – 1/4-inch 2.48 lb/SF.

C. Metal: Cast aluminum with baked enamel finish. Engraved areas shall be filled with contrasting color paint. Use only where existing signage is metal.

D. Character and Letters:

1. Character Type: Characters on signs shall be raised 1/32-inch (0.794 mm) minimum and shall be Sans Serif uppercase characters accompanied by California Contracted Grade 2 Braille, see Braille symbols paragraph 2.02D.5.

2. Character Size: Raised characters shall be a minimum of 5/8-inch (15.9mm) and a maximum of 2 inches (51 mm) high.

3. Finish and Contrast: Contrast between characters, symbols and their background shall be non-glare finish. Characters and symbols shall contrast with background, either light on a dark background or dark on a light background, per CBC, Title 24, Part 2, Section 11B-703.5.1, Section 11B-703.6.2, and Section 11B-703.7.1.

4. Proportions: Visual characters on signs shall be selected from fonts where the width of the uppercase letters “O” is 60 percent minimum and 110 percent maximum of the height of the uppercase letter “I”. Stroke thickness of the uppercase letter “I” shall be 10 percent minimum and 20 percent maximum of the height of the character, per CBC 2016, Title 24, Part 2, Sections 11B-703.2.4, 11B-703.2.6, 11B-703.5.4, and 11B-703.7.

   All letters measured must be uppercase. After choosing a type style to test, begin by printing the letters, **I**, **X** and **O** at 1-inch height. Place the template’s 1:1 square over the **X** or **O**, whichever is narrower. If the character is not wider than 1 inch, nor narrower than the 3:5 rectangle, the proportions are correct. Use the 1:5 rectangle to determine if the stroke of the **I** is too broad, and the 1:10 rectangle to see if it is too narrow. If all the tests are passed, the type style is compliant with proportion codes.

5. Braille Symbols: California Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards and per CBC 2016, Title 24, Part 2, Sections 11B-703.3, 11B-703.3.1, and 11B-703.3.2.

2.03 SIGNS

A. Exterior Room Identification Signs: Equal to Best Sign Systems FG, Graphic Blast®, Format: borderless. Color as selected by Architect from manufacturer's standard colors. Color to contrast building background. Sign material 1/4-inch thick, non-glare, Fiberglass, 9” x 9” (unless detailed otherwise) with 1/2-inch radius rounded corners and beveled edges. Tactile character/symbols shall be raised 1/32-inch from sign face.

All text shall be accompanied by California Contracted (Grade 2) Braille. Provide one (1) sign per exterior door. Each sign to bear a room number and up to 16 letter text.

Unless shown otherwise on the Drawings, room number shall be 2 inches high, text shall be 1 inch high. Letter styles shall be Helvetica, medium. Signs shall comply with CBC 2016, Title 24, Part 2, Sections 11B-216 and 11B-703.

B. Interior Room Identification Signs and Room Exit Signs: Equal to Best Sign Systems FG, Graphic Blast®, Format- as specified in drawings. Color as selected by Architect from manufacturer’s standard colors. Color to contrast building background. Sign material 1/8-inch, non-glare, phenolic ES plastic laminate, 9" x 9" with 1/2-inch radius rounded corners and beveled edges.

Tactile character/symbols shall be raised 1/32-inch from sign face. All text shall be accompanied by California Contracted Grade 2 Braille.

Provide one sign per interior door. Each Room Identification sign to bear a room number and up to a 16-letter text; each Room Exit sign to bear the words “Exit” or “Exit Route”. Unless shown otherwise on the Drawings, room number shall be 2 inches high, room name text shall be 3/4- inch high, “exit” text shall be 3” high. Letter styles shall be Helvetica, medium. Signs shall comply with CBC 2016, Title 24, Part 2, Sections 11B-216 and 11B-703.

C. Toilet Room Signs: Equal to Best Sign System FG, Graphic Blast®. Provide 1/4-inch thick, non-glare fiberglass with International symbols for WOMEN and MEN and RESTROOM. Locate 5'-0" above floor to center line of sign. (No Braille or raised Pictograms on door signs.) Sign color to contrast 70% with door leaf.

1. For men provide a door-mounted 12-inch equilateral triangular sign per CBC, Title 24, Part 2, Section 11B-703.7.2.6.1.

2. For women provide a door-mounted 12-inch diameter circular sign per CBC, Title 24, Part 2, Section 11B-703.7.2.6.2.

3. For all gender toilets, provide a door-mounted sign consisting of a circle 1/4-inch thick and 12 inches in diameter with a 1/4-inch thick triangle, 12 inches in diameter, with a vertex pointing upward, superimposed on the circle. Triangle shall contrast in color with circle, and circle shall contrast 70% with door leaf. Entire background color of geometric symbol sign must contrast with door. Sign shall comply with CBC, Title 24, Part 2, Section 11B-703.7.2.6.3.

D. Site Signs

1. Equal to Nelson-Harkins ES200 Series: Baked enamel finish with silk screen copy and Helvetica medium letter style. Single post and double post construction where indicated on the Drawings. 2"x 2" posts (post design ‘A’) enclosed with a

.090 aluminum double panel background. Where shown on the Drawings, provide Nelson-Harkins RS 250 Series Regulatory Signs with square corners, silk screen copy, and post 2" x 2" Design 'A', mounting PM. If bottom of sign is less than 80 inches above finish grade, edges of sign shall be rounded, minimum radius of 1/8-inch.

OR

1. Equal to Stop Signs and More, Carlsbad, CA., Phone (888) 931-1793. Parking stall signs shall be heavy gauge aluminum .063 gauge for parking, direction, and information. and .080 for stop signs with 3M Engineer Grade Reflective sheeting and 3M inks. Corners shall be rounded minimum1/2-inch. Posts shall be square tube 2-inch x 2-inch .062 wall thickness extruded aluminum tube.

E. Entrance Signs: All building entrances that are accessible to and usable by physically disabled persons shall be identified with at least one (1) Accessible to persons with disabilities sign, equal to Best Sign Systems FG, Graphic Blast®, ¼" – Fiberglass. Provide a 9-inch square with the International Symbol of Accessibility (ISA) on doors or adjacent glass indicated in the Door Schedule.

F. Metal Letters for Building Sign: By Matthews Bronze, (888) 838-8890. School sign shall be cast aluminum alloy C443.2, baked enamel, medium bronze color, Helvetica medium, all caps, 18 inches high letters, 3/8-inches deep, flush concealed mounting. Copy to be verified with Owner prior to ordering.

G. Occupancy Load Sign: Size as indicated on Drawings to match sign per paragraph 2.03B above, reading: "MAXIMUM OCCUPANCY 000 PERSONS", Verify occupant number with Drawings.

H. Assistive Listening Signs: Size as indicated on Drawings to match sign per paragraph 2.03B above, bearing international symbol of access for hearing impaired with contrasting color, reading: "ASSITIVE LISTENING DEVICE AVAILBLE AT 'XXX' MAKE ARRANGEMENTS IN ADVANCE FOR USE OF EQUIPMENT DURING NON-BUISINESS HOURS", verify location with Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Locate signs where indicated on Drawings, and at heights as detailed, or where required by CBC, Title 24, using mounting methods appropriate to application and in compliance with manufacturer's instructions.

B. Install signs level, plumb, and at required height.

C. Interior Wall and Door Mounted Signs:

1. Glass Surfaces or Doors: Use double-sided foam tape and liquid silicone adhesive. At glass surfaces, provide a blank 9" x 9", 1/8-inch sign panel with 1/2-radius corners, at the opposite side of glass. Color to match sign panel.

2. Irregular, Porous, or Vinyl-Covered Surfaces: Use one-way tamper proof screws, painted to match signs, in pre-drilled holes. Provide adequate spaces behind signs so signs are in a plumb, square, level plane.

3. Brick, Masonry, and Concrete Surfaces: Use one-way tamperproof screws, painted to match signs, in pre-drilled holes. Provide adequate spaces behind signs so signs are in a plumb, square, level plane.

D. Exterior Wall and Door Mounted Signs:

1. Wood, or Plaster Surfaces: Use tamper proof screws, painted to match signs, in pre-drilled holes; one at each corner, and set in liquid silicone adhesive. Provide adequate spaces behind signs so signs are in a plumb, square, level plane.

2. Brick, Masonry, Plaster and Masonry Surfaces: Use tamper proof screws, painted to match signs, in pre-drilled holes; one at each corner, and set in liquid silicone adhesive. Provide adequate spaces behind signs so signs are in a plumb, square, level plane.

3.02 CLEANING

A. Clean sign and surrounding surfaces to remove all dirt and debris from work of this section.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Toilet accessories including attachment devices and required rough-in frames as indicated on the Drawings and specified herein.

B. Related Work:

1. Blocking and unframed mirrors.

1.02 SUBMITTALS

A. Samples: Submit one sample, if requested, of each item and model specified. If approved sample may be incorporated into project.

B. Manufacturer's catalog and data sheets, parts list, and installation requirements for each unit specified.

C. Maintenance, operation instructions and keys required for each type of equipment and lock.

1.03 QUALITY ASSURANCE

A. Manufacturers: Model numbers are for washroom accessories manufactured by Bobrick Washroom Equipment, Inc. and are listed as a standard of quality. Equivalent products of other manufacturers may be acceptable, if, in the judgment of the architect, they meet the intent of the specification in terms of design, function, materials, and quality of workmanship. Products by other manufacturers may be provided, if approved equal by Architect.

B. Accessories shall be products of a single manufacturer. Keyed (tumbler lock) accessories shall be keyed alike with the exception of coin receiving boxes on vending equipment.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver items in manufacturer's original unopened protective packaging.

B. Store material in original protective packaging to prevent soiling, physical damage, or wetting.

C. Handle so as to prevent damage to finished surfaces.

D. Maintain protective covers on units until installation is complete. Remove covers at final clean-up of installation.

1.05 GUARANTEE

A. Mirrors guaranteed 15 years against silver spoilage. Accessories guaranteed to be free from defects in workmanship and material for a period of one year, as specified in

Section 01 78 30 – Warranties, Guarantees, and Bonds.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Contract documents are based on Bobrick Washroom Equipment, Inc., and are listed as a standard of quality. Products by other manufacturers may be acceptable if approved equal by Architect in terms of design, function, materials and quality of workmanship.

B. Accessories shall be product of one manufacturer. Keyed accessories shall be keyed alike with exception of coin receiving boxes on vending equipment. Provide recessed accessories at all accessible compartments.

C. Toilet Accessories required to be accessible shall be mounted at heights according to CBC, Title 24, Part 2, Section 11B-213.

D. Dispensing controls must be accessible without pinching, grasping, or twisting of the wrist, per CBC, Title 24, Part 2, Section 11B-309.4

2.02 REFERENCES

A. Toilet Accessories required to be accessible shall be mounted at heights according to CBC, Title 24, Part 2, Section 11B-213

1. Toilet paper and feminine napkin disposal located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches from the finish wall surface nor be located closer than 1-1/2-inch clear of the tangent point of the grab bar.

2. Toilet tissue dispensers to be continuous flow type, CBC, Title 24, Part 2, Section 11B-604.7.

3. Toilet paper dispenser in accessible toilet compartment to be recessed, or semi-recessed so as not to project more than 3 inches (76.2 mm) from face of wall.

B. Grab *Bars (CBC, Title 24, Part 2, Section 11B-213.3, 11B-604.5, and 11B-609)*

1. Length for rear and side walls:

a. 36 inches (914 mm) min. for rear wall, per Section 11B-604.5.2
b. 42 inches (1,067 mm) min. for side wall, per Section 11B-604.5.1

2. Maximum and minimum diameters:

a. 1 1/4 - 1 1/2 inches (32-38 mm) diameter or equivalent gripping surface
b. 1 1/2 inches (38 mm) min. clearance between grab bar and wall.

C. Following (but not limited to) operable parts (including coin slots) of table room accessories to be mounted within 40 inches (1,016 mm) max above finish floor per CBC 2019, Title 24, Part 2, Section 11B-603.5:

1. Towel dispensers

2. Sanitary napkin dispenser/receptacles

3. Waste receptacles

4. Other similar dispensing and disposal fixtures

5 Bottom of reflective surface of mirrors to be 40 inches (1,0616 mm) maximum above finish floors per CBC, Title 24, Part 2, Section 11B-603.3

2.03 ACCESSORIES

A. Recessed Toilet Tissue Dispenser: Bobrick B-3888

B. Surface Mounted Soap Dispenser: B-2111

C. Stainless Steel Welded Frame Mirror: B-165
One-piece channel frame, 1/2" x 1/2" x 3/8" type 430 stainless steel with bright-polished finish and mitered corners. Phillips-head frame screw. No. 1 quality 1/4**"** glass mirror. See Specifications section 08 83 00 for mirror. Mirror corners and back protected by shock-absorbing material. Back is galvanized steel secured to conceal wall hander with theft resistant locking device.

D. Recessed Toilet Seat Cover Dispenser: B-301

Constructed of type 304 Stainless Steel, welded construction. Door shall be equipped with full-length piano hinge and tumbler lock.

E. Grab Bars:

1. 1-1/2 inches diameter, 48 inches length: B-6806x48

Flanges shall be 1/8" thick stainless-steel plate and each shall have two screw holes for attachment to wall. Flange covers shall be 22-gauge stainless steel and snap over mounting flange to conceal screws.

F. Recessed Paper Towel Dispenser and Trash Receptacle Combination: B-43944.

PART 3 - EXECUTION

3.01 INSPECTION

A. Check wall opening for correct dimensions, plumbness of blocking, or frames, and other preparation that would affect installation of accessories.

3.02 INSTALLATION

A. Install manufacturers recommended anchor system for grab bars.

B. Refer to Drawing details for mounting heights.

C. Conceal evidence of drilling, cutting, and fitting on adjacent finishes.

D. Fit flanges of accessories snug to wall surfaces. Provide for caulking in gaps between 90-degree return flanges and finish wall surface after accessories are installed.

3.03 ADJUSTING

A. Adjust accessories for proper operation.

3.04 CLEANING

A. Clean and polish exposed surfaces prior to final inspection.

3.05 PROTECTION

A. Deliver accessory schedule, keys and parts manual as part of project-closeout documents. For Owner's permanent records, provide two sets of the following items of manufacturer's literature:

1. Technical Data sheets of each item used for the project.

2. Service and Parts Manuals.

3. Name of local representative to be contacted in the event of need of field service or consultation.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Fire extinguishers and fire extinguisher cabinets as indicated on the Drawings and specified herein.

B. Related Work:

1. Section 06 10 00 – Rough Carpentry.
2. Section 09 24 00 – Cement Plastering.
3. Section 09 29 00 – Gypsum Board.

1.02 SUBMITTALS

A. Provide materials list of items proposed to be provided.

B. Submit data sufficient to demonstrate compliance with specifications and drawing requirements.

C. Submit shop drawing and catalog cuts of items to be provided. Manufacturer or producer's standard drawings and technical information may be acceptable where complete enough to determine acceptability.

D. Submit samples of products and materials where options of color, finish, pattern, or texture exist.

1.03 QUALITY ASSURANCE

A. Products and materials to be provided are to be from manufacturers and producers regularly engaged full-time in the manufacture or production of this and similar items, with a history of successful manufacture or production acceptable to the Owner.

B. In addition to complying with pertinent codes and regulations, comply with industry and trade standards normally associated with this product or material, except where specified product or material is superior in quality to industry and trade standards.

C. Comply with the requirements of Chapter 3, Title 19, California Code of Regulations (CCR), and California Building Code (CBC) Title 24, Sections 11B-205, 11B-307, 11B-308, 11B-309, and 11B-403.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products and materials to the project and store in a safe, dry place with shop-supplied protection and labeling intact and legible until set, applied, or installed.

B. Use reasonable means necessary to protect products and materials before, during, and after installation.

C. In event of damage, regardless of responsibility and culpability, make repairs and replacements necessary to satisfaction of Owner, and at no additional cost to Owner.

1.05 WARRANTY

A. Provide Owner with a written warranty as a condition of work acceptance, signed by Contractor and Installer (where applicable), agreeing to maintain, repair and/or replace products and materials for one year following acceptance, and without additional cost to Owner, as specified in Section 01 78 30 – Warranties, Guarantees, and Bonds.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fire Extinguisher Cabinets: Larsen's Manufacturing Company, Model SS-2409-R1-FG recessed cabinet or equal by Potter-Roemer or JL Industries by Activar, Inc. Full clear acrylic door with Larsen-Loc® (clear anodized aluminum) trim and door. Provide pressure sensitive decals or paint red letters, 1-inch high, reading:

FIRE EXTINGUISHER

Small instruction letters reading:

"IN CASE OF FIRE ONLY - PULL FIRMLY ON HANDLE".

Equip door with keyed-alike Yale tumbler locks with trip-bar-release inside.

B. Extinguishers: 5 lb., Tri-Class, dry chemical by Larsen's Manufacturing Company, enameled steel extinguishers. Extinguishers shall be Model MP5 2A-10B:C or equal by Potter-Roemer or JL Industries, UL rated, conforming to the requirements of California Code of Regulations, Title 19, Division 1, Chapter 3 and California Fire Code, Title 24, Part 9, Section 906.

C. Where indicated, at Custodial, Mechanical and Electric Rooms, provide surface mounted bracket with retainer straps. Larsen's Model 846 or equal.

2.02 VERIFICATION OF PERFORMANCE

A. Fire extinguisher cabinets latching and locking hardware to be operable with a single effort by lever-type hardware, panic bars, push-pull activating bars or other hardware designed so as not to require the ability to grasp the opening hardware and not require a force greater than 5 lbs. (22.2 N) to open. Force required to activate controls shall not exceed 5 lbs.

B. Cabinets shall be recessed or semi-recessed in order not to protrude more than 4 inches (102 mm) from face of wall, mounted between 15-48 inches (381-1,219 mm) above finish floor for forward approach, and mounted between 9-54 inches (229-1,372 mm) above finish floor for side approach.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment in strict accordance with manufacturer's instructions.

B. Install fire extinguisher cabinet so that fire extinguisher handle is not more than 48 inches above finished floor.

3.02 CLEANING

A. Keep areas clean during entire operation and leave spaces broom clean.

B. After completion, clean up and remove resultant debris from the site.

END OF SECTION

11 00 00

EQUIPMENT

SANTEE SCHOOL DISTRICT

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Manually operated projection screens.

B. Related Sections:

1. Section 05 50 00 – Metal Fabrications: for metal support framing for projection screens.

1.03 DEFINITIONS

A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.

B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.04 SUBMITTALS

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

B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:

1. For manually operated projection screens:

a. Drop lengths.
b. Anchorage details.
c. Accessories.

2. Maintenance Data: For projection screens to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Source Limitations for Projection Screens: Obtain projection screens from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Environmental Limitations: Do not deliver or install projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.07 COORDINATION

A. Coordinate layout and installation of projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.08 WARRANTY

A. Provide Owner with a written warranty as a condition of work acceptance, signed by contractor and installer agreeing to maintain, repair and/or replace products and materials for one year following Notice of Completion, and without additional cost to Owner, as specified in Section 01 78 30 – Warranties, Guarantees, and Bonds.

PART 2 - PRODUCTS

2.01 MANUALLY OPERATED PROJECTION SCREENS, CEILING MOUNTED

A. General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

1. Screen Mounting: Top edge securely anchored to a 3-inch diameter, rigid steel roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and with a saddle and pull attached to slat by screws.

B. Recessed, Ceiling-Suspended, Metal-Encased, Manually Operated Screens: Units designed and fabricated for suspending from wall brackets or ceiling, fabricated from formed-steel sheet not less than 0.027-inch-thick or from aluminum extrusions; with vinyl covering or baked-enamel finish and matching end caps. Provide mounting brackets unless otherwise indicated.

1. Products: Subject to compliance with requirements, provide the following product or comparable, or equal product:

a. Draper, Inc.; Access Fit/ Series M; 16:10 (Basis of Design)

2.02 FRONT-PROJECTION SCREEN MATERIAL

A. High Contrast Grey Viewing Surface: Peak gain not less than 0.9 and gain not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.

1. Products: Subject to compliance with requirements, provide the following or equal:

a. Draper, Inc.; Access Fit/ Series M with Contrast Grey.

B. Material: Vinyl-coated, glass-fiber fabric.

C. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G21.

D. Flame Resistance: Passes NFPA 701.

E. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.

F. Seamless Construction: Provide screens, in sizes indicated, without seams.

G. Edge Treatment: Black masking borders.

H. Size of Viewing Surface: 16:10 with nominal diagonal length 109 inches

I. Provide extra drop length of dimensions and at locations indicated.

1. Color: Black.

J. Options:

1. Provide Auto-Return spring roller with built-in inertia reduction mechanism.

PART 3 - EXECUTION

3.01 FRONT-PROJECTION SCREEN INSTALLATION

A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.

B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.

a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.

3. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

3.02 PROTECTING AND CLEANING – PROJECTION SCREENS

A. Provide temporary covering of projection screens until time of Substantial Completion. Use type of covering approved by screen manufacturer that will effectively protect screen from abrasion, breakage, or other damage.

B. Clean projection screens on both faces immediately before date scheduled for inspection intended to establish date of Substantial Completion. Use methods and cleaning materials recommended by screen manufacturer, taking care not to scratch or damage optical coatings or screen substrates.

END OF SECTION

12 00 00

FURNISHINGS

SANTEE SCHOOL DISTRICT

SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roller Shades, manual operation and accessories.

B. Shade fabric.

1.02 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09 29 00 – Gypsum Board: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

1.03 REFERENCES

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701 – Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

1. Prepare shop drawings on AutoCAD or Revit format using base sheets provided electronically by the Architect.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-10 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: 'No Growth' per ASTM G21 results for fungi ATCC 9642, ATCC 9644, ATCC 9645.

F. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window designated by Architect.
2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.08 WARRANTY

A. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating warranty.

a. Shade Hardware: 10 years unless otherwise indicated/

b. Standard Shadecloth: Manufacturers standard 25-year warranty.

c. Roller Shade Installation: One year from date of Notice of Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

d. All warranties shall comply with Section 01 78 30 – Warranties, Guarantees, and Bonds.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: MechoShade Systems, Inc.; 42-03 35th Street, Long Island City, NY 11101. ASD. Tel: (718) 729-2020. Fax: (718) 729-2941. Email: info@mechoshade.com, www.mechoshade.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 – Product Requirements.

C. Alternates: The following products and manufacturers may be bid as an alternate product in accordance with Section 01 23 00. Any pricing for alternate products shall be listed separately from the base bid specified product. Any alternate pricing must include line-by-line compliance or non-compliance with the specifications. If the alternate product is acceptable to the Architect, the specified manufacturer will be given the opportunity to provide an equivalent proposal.

1. Draper, Inc – Flexshade. www.draperinc.com
2. Skyco Shading – www.skycoshade.com

2.02 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES

A. Shade System; General:

a. Components capable of being removed or adjusted without removing mounted shade brackets, or cassette support channel.

b. Smoothly operation raising or lowering shades.

c. Cradle-to-Cradle certified and listed in C2C (DIR).

B. Basis of Design: Mecho/5 System as manufactured by MechoShade Systems LLC.

a.

1. Description: Manually operated fabric window shades.

a. Shade Type: Single Roller

b. Drop Position: Regular roll.

c. Mounting: Wall Mounted.

d. Size: As indicated on drawings.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.

a. Material: Steel, 1/8 inch (3 mm) thick.

b. Radiused Center Support Brackets: Provide brackets and connectors for radiused window applications.

1) Maximum Offset: Eight degrees on each side for a 16 degree total offset.

3. Roller Tubes:

a. Material: Extruded aluminum.

b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.

c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.

4. Hembars: Designed to maintain bottom of shade straight and flat.

a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.

5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.

a. Permanently lubricated brake assembly mounted on an oil-impregnated hub with wrapped spring clutch.

b. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.

c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.

6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound (43 kg) minimum breaking strength. Provide upper and lower limit stops.

a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.

7. Managed Lift: Required lifting force of 3 pounds (1.4 kg) to a maximum of 8.5 pounds (3.9 kg) for single band or multi-band shades up to 5 bands and a maximum of 30 pounds (13.6 kg) hanging weight.

8. Accessories:

a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.

1) Finish: Baked enamel. Color to be determine by Architect.

2.03 SHADE CLOTH

A. Shade fabric as manufactured by MechoShade Systems LLC.

1. Solar Shadecloths:

a. Fabric: ThermoVeil Basket Weave: 1300 (5 percent open).

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2.04 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design.

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

F. Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.

1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

2. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.05 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Motorized Shade Hardware and Shade Brackets:

1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.

2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).

3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer’s design criteria).

2.09 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.

2. Fascia shall be able to be installed across two or more shade bands in one piece.

3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.

4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the roller shade installer/dealer, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. Main Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
2. Main Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
3. Roller shade installer/dealer shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
4. Roller shade installer/dealer shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.
5. Main Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

22 00 00

PLUMBING

SANTEE SCHOOL DISTRICT

SECTION 22 01 00

PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide items, articles, materials, operations and methods listed, mentioned and scheduled on drawing and specifications, including labor, material, equipment or fixtures, and incidentals necessary or required for the completion, testing, inspection, adjusting, re-testing and readjusting to provide the various systems operable and complete in all respects.

B. Provide fixtures and equipment which have been listed in the Material Standards by Santee School District.

1.02 RELATED SECTIONS

A. Section 22 07 00 Plumbing Insulation

B. Section 22 20 00 Plumbing Systems

1.03 DRAWINGS AND SPECIFICATIONS

A. Examine and become familiar with all project drawings and sections of the specifications, and coordinate the work accordingly. Make reasonable modifications in the layout and installation as needed to prevent conflict with work of other trades and for proper execution of the work, without additional cost.

B. The drawings indicate approximate locations of equipment, fixtures, piping, etc., however, prior to ordering any equipment, fixtures or materials, or performing any work, all dimensions, locations, and clearances shall be verified by the Contractor, based on actual field conditions, following the necessary coordination with other trades.

C. The substitutions of equipment or fixtures may not be the same as that which was used as a basis for design. The term substitutions only refers to items listed in our specification that are not used as the basis of design on our drawings. Provide all necessary revisions to the installation, or work of all other trades to accommodate the substituted equipment or fixtures, maintaining comparable clearances and provisions for maintenance shall be provided, with all related costs, by the Contractor. Submit substituted working drawings and submittals that have been coordinated with all other associated trades, showing the proposed installation.

D. It is the intention of the specifications and drawings to call for finished work, tested and ready for operation.

E. Where any device or part of equipment or fixtures is herein referred to in the singular number, such reference shall be deemed to apply to as many such devices as are required to complete the installation or as shown.

1.04 SUBMITTALS - SHOP DRAWINGS/PRODUCT DATA/MATERIAL CERTIFICATIONS

A. Submittals shall include six copies of all shop drawings, product data and material certifications for the project. These submittals shall be sent to the Santee School District Representative.

B. Santee School District Representative will review the shop drawings, product data and material certifications for the project. Do not fabricate pipe or order any equipment or fixtures without shop drawings and product data being approved. All pipe systems, equipment, fixtures and other accessories require submittal review.

C. Shop drawings, product data and material certifications shall be complete in every respect so that a thorough review and evaluation can be performed. All required shop drawings, product data and material certifications shall be submitted at one time. Incomplete submittals, those without shop drawings, those that are not prepared properly, or submittals with less than the required number of copies, shall be returned for resubmittal.

D. It is intended that only a one-time review of all shop drawings and submittals will be performed.

E. All shop drawings, product data and samples submitted by the Contractor shall illustrate details of work, equipment, fixtures, materials, products, systems, designs or workmanship that the Contractor intends to use in order to comply with the design concept established in the contract documents. The review of these submittals is only for the limited purpose of checking the same for conformity with the design concept of the work as established in the contract documents. The review is not intended to be for the purpose of determining the accuracy of other matters that may be contained in such submittals, including but not limited to such matters as dimensions, quantities and performance of equipment. Contractor shall furnished construction means, methods, techniques, sequences, procedures or safety precautions, the correctness of which as set forth in the contract documents or submittal shall be the sole responsibility of the Contractor.

F. Only equipment, fixtures, material and components of those manufacturers indicated in this specification are acceptable. Products that have not been reviewed and accepted by the Santee School District Representative before the bidding period will not be accepted.

To be considered as a acceptable confirm that the alternate manufacturers' equipment or fixture is comparable with regard to such features as noise level, power requirements, metal gauges, vibration attenuation, finish, appearance, certification of recognized testing agencies and standard bureaus, allowable working pressures, physical size and arrangement. The Contractor shall also consider the effect of installation in the available space, factory-applied insulation, electrical devices, controls, access to internal parts, operating efficiencies, and all other features and capacities specified herein. The Santee School District Representative shall be the judge of the ability of any equipment, fixture or material to meet the requirements of this specification and the burden of proof shall be the responsibility of the Contractor.

G. Format: Each type of equipment, fixture or material shall be submitted in a separate section of the submittal package and each such section shall have:

H. A cover sheet identifying the equipment or fixture by the numbers or letter identical to those listed on the Drawings and/or Specifications, the manufacturer, the model number and size, and the technical data required for each piece of equipment or fixture. Materials shall be identified by system type.

I. Dimensional drawings (including optional accessories appropriate to this project).

J. Electrical data tables showing voltage, phase, horsepower (or kW), full load (or rated load) amperes and maximum fuse protection for each piece of equipment.

K. Capacity data tables.

L. Each submittal shall specifically reply to every item of equipment, fixture or material specified or scheduled. All information shall be listed on the submittal cover sheet and shall be marked in the submitted manufacturer's literature. All exceptions to the individual specifications shall be listed separately on the submittal cover sheet and shall be noted on submittal "cut sheet".

M. Shop drawings are required for the plumbing systems. Submit one set of original drawings suitable for reproducing clear copies and provide six copies of drawings. The shop drawings will be reviewed. Contractors shall reproduce copies for their use. Shop drawings, equipment, fixture and material submittals shall be delivered at the same time.

1.05 INVESTIGATION OF CONDITIONS

A. 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 conductor shall be responsible for immediate repairs to existing underground utilities damage 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 it the independent locating service before start of construction to determine location of existing utilities.

B. This project is on an existing site with new building and with existing utilities and an examination of the site is mandatory.

C. Examine the existing conditions bearing on labor, transportation, handling and storage of materials, etc. Visit the site to understand the nature and scope of all work to be performed. The submission of a bid will be taken as evidence that such an examination has been made and all conditions have been considered.

1.06 EXISTING INSTALLATION AND CONFLICTS

A. Existing active services, water, sewer, electric, other piping systems, when encountered, shall be protected against damage due to construction work. Do not disturb operation of active services that are to remain.

B. If existing active services are encountered which require relocation, make request to the Santee School District Representative for determination of procedures. Where existing services are to be abandoned, they shall properly terminate in conformance with requirements of the Santee School District Representative.

C. If work makes temporary shut-downs of services unavoidable, consult with Santee School District Representative as to dates, procedures and estimated duration of shut-down period in advance of the date work is to be performed.

D. Work shall be performed to assure that the existing operating services will be shutdown only during the time allowed and required to construct necessary connections. If a system cannot be shutdown, temporary bypass jumpers shall be installed until connections are complete.

E. Be responsible for all costs incurred by the above shut-downs, including bypass or jumper installations for work performed under Division 22.

F. If existing active utility services are encountered which require relocation, make request to Santee School District Representative or other proper authorities for determination of procedures. Where existing services are to be abandoned, they shall properly terminated and capped.

1.07 ORGANIZATIONS

A. Below is a list of organizations that may be identified throughout the specifications by the letters in parenthesis only.

1. American Society of Mechanical Engineers (ASME)
2. American Society for Testing and Materials (ASTM)
3. American Water Works Association (AWWA)
4. Factory Mutual Laboratories (FM)
5. National Electrical Manufacturer's Association (NEMA)
6. Underwriters' Laboratories, Inc. (UL)
7. American National Standards Institute (ANSI)

1.08 DEFINITIONS

A. Furnish: To purchase and supply equipment, fixtures, materials or components and deliver to the jobsite.

B. Install: To place, fix in position, secure, anchor, etc., including necessary appurtenances and labor so the equipment, fixtures or material of the installation will function as specified and intended.

C. Provide: To furnish and install.

D. Piping: Includes, in addition to pipe, all fittings, flanges, valves, hangers, and other accessories related to such piping.

E. Concealed: Means hidden from sight in chases, furred spaces, shafts, hung ceilings, or embedded in construction.

F. Exposed: Means not installed underground or "concealed" as defined above. Tunnels, trenches, attic spaces and crawl spaces are considered exposed.

G. Accepted/Acceptable: Items, that in the opinion of the Santee School District Representative, are acceptable alternates for the item specified.

1.09 CODE, PERMITS AND FEES

A. The drawings and specifications take precedence when they are more stringent than codes, ordinances, standards and statutes. Codes, ordinances, standards and statutes take precedence where they are more stringent than the drawings and specifications.

B. Secure and pay for permits, tests, Certifications of Inspection, and all other costs incidental to the work.

1.10 GENERAL COORDINATION OF WORK AND WORKING PROCEDURES

A. All equipment, fixtures and materials shall be covered or otherwise protected from the weather, theft, etc., both when stored on the site and after installation, until final acceptance by the Santee School District Representative. All open ends of installed piping for partially completed systems shall temporarily be plugged and capped.

B. All materials of construction shall be new and shall bear the manufacturer's labels and trademarks.

C. The specifications indicate general requirements for the installation of all equipment, fixtures and materials however, follow the specific instructions and directions furnished by the equipment or fixture manufacturer.

D. All equipment or fixtures shall be installed with full consideration of future maintenance. Equipment or fixtures that are installed such that it cannot be readily serviced shall be removed and installed correctly as directed to facilitate servicing.

E. Unions, valves, and other components that may require lubrication or maintenance shall be located to provide sufficient accessibility. When necessary, provide access doors as hereinafter specified at all locations where these items are concealed within walls, chases, or above ceilings which do not have an inherent accessibility feature.

F. Prior to testing clean and flush all piping systems.

G. Surfaces to be painted shall be wiped, scraped, or wire-brushed as necessary to a clean, smooth painting surface, free from oil, rust and dirt. All material and equipment that is furnished with a factory prime coat of paint, which is damaged in transit, during storage, or from exposure to weather, shall be prime painted.

H. Contractor shall be responsible for costs related to damage caused by leaks in piping systems, or any other malfunction of the equipment, fixtures, materials, systems, or work, including repairs, replacements, etc.

I. Contractor shall provide information to other Contractors relative to all required pipe penetrations in walls, floors, roofs etc. The Contractor shall provide information to other Contractors relative to heights of piping systems. Structural work shall not be altered in any way.

J. All necessary cutting and patching of roofs, walls, floors, ceilings, etc., as required for the proper installation of the work under this section, shall be performed, and in a neat and workmanlike manner. No joists, beams, girders, columns, or other structural member shall be cut.

K. Contractor to provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises for all equipment, fixtures and materials, and remove same from premises when no longer required.

L. Carefully lay out work on the premises and make proper provision for the other work. The exact location of each item shall be determined by reference to the drawings, by measurements at the building, and in cooperation with other contractors. Be responsible for accurately locating all openings for pipes, etc., and all access doors required.

M. Schedule and coordinate work so as to execute expeditiously the contract and to avoid unnecessary delays.

N. Examine fully the specifications and drawings for other trades, to become familiar with all conditions affecting work, and consult and cooperate with other trades for determining space requirements and adequate clearances with respect to other equipment in the building.

O. If the work is installed without coordinating with other trades, and the installation interferes with their installation, the contractor shall make any changes necessary in this work to correct conditions without extra charge.

1.11 ELECTRICAL

A. Coordinate the voltage and phase characteristics of each electrical item such as electrical water heaters, fixture electrical sensors and motors with the electrical shop drawings.

B. NEMA Standards shall be taken as minimum requirements for design and performance.

C. Motors shall be suitable for load, duty, voltage, frequency, hazard and for service and location intended. Motors shall be high efficiency type. Motors shall have name plate giving manufacturers name, shop number, HP, RPM and current characteristics.

1.12 MOTOR STARTERS

A. Provide motor starters for all plumbing equipment. Provide correct size and voltage characteristics per electrical requirements. Motor starters shall be provided by Division 22 and coordinated with electrical drawings.

1.13 EQUIPMENT SUPPORTING PROVISIONS

A. Contractor shall confirm locations with Santee School District Representative before installation of hangers, platforms, equipment frames, etc. Contractor shall coordinate all related work with other trades.

B. Equipment schedules on the drawings indicate a particular manufacturer for all equipment and the architectural and structural drawings indicate supports and other design considerations which were based on the use of this equipment.

C. Contractor shall confirm all support dimensions and locations based on the actual equipment to be installed and shall coordinate all related work with other Contractors.

D. Where supports, foundations, stands, suspended platforms for equipment are indicated on drawings or specified in specifications design and construct supporting structures of strength to safely withstand stresses to which they may be subject and to distribute properly the load and impact over building areas. Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction. Contractor shall provide sufficient supports as required. These supports are for foundations, supporting stands, platforms and they shall be connected to the building structural members. All equipment shall be bolted to supports, foundations, stands and platforms. Design of the supports, foundations, supporting stands and platforms must be approved by a California State Licensed Structural Engineer.

1.14 PIPE SLEEVES

A. Sleeves shall be schedule 40 galvanized steel pipe.

B. Pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulation. Check floor and wall construction and finishes to determine proper length of sleeves for various locations. Terminate sleeves flush with walls, partitions and ceiling. Extend sleeves 1/4" above finish floor, except in equipment rooms and other areas where water may accumulate on floor, extend to 1-1/2".

C. Set sleeves in ample time to permit pouring of concrete or to allow progression of other work as scheduled. Fasten sleeves securely so that they will not become displaced when concrete is poured or when other construction around them. For sleeves in fire walls, pack space between sleeve and pipe with approved non-combustible material and as otherwise required by local code; for floors where water is to be kept out, fill with graphite packing and caulking compound.

D. Sleeves in underground walls shall be 1-1/2" larger than outside diameter of pipe. The space between sleeve and pipe shall be sealed with 1" long wool and 1/2" water tight flex caulking on both sides of the wall. The seal shall be guaranteed watertight.

1.15 ESCUTCHEONS

A. Provide 20 gauge escutcheons at all pipe penetrations in walls, ceilings and floors. Escutcheons shall be one piece or hinged two piece type with positive latch or setscrew, and shall be polished chrome plated in finished rooms, and polished brass in other areas. Escutcheons shall have tempered springs or other means to insure positive attachment to pipe. The escutcheon opening shall be of sufficient diameter to fit around the insulation of insulated pipes, and the outside diameter of the escutcheon shall be of sufficient size to conceal the pipe sleeves.

1.16 EXPANSION AND FLEXIBILITY

A. Install all work with regard for expansion and contraction to prevent damage to the piping, equipment, fixtures and the building and its contents. Provide piping offsets, expansion loops, approved type expansion joints, anchors or other means to control pipe movement and to minimize pipe forces.

1.17 ACCESS PANELS/DOORS

A. Provide access panels/doors. Refer to other Division 22 Sections for further reference. Provide access panels/doors with have same fire rating as ceiling, wall in which they are installed, and shall be of sufficient size to provide the required accessibility.

B. Provide access panels/doors where necessary to provide access to concealed water hammer arrestors, trap primers, cleanouts, shut off valves, control valves etc.

C. Access doors:

1. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. Equal to MIFAB UA-SS. All MIFAB cylinder locks are keyed alike.

2. Sizes shall be 14" X 14" at easily accessible valves, water hammer arrestors, trap primers, cleanouts etc; 18" X 18" where partial body access is required; 24" X 24" where entire body access is necessary.

3. Confer with other contractors with respect to access panel locations and shall wherever practicable group mechanical and electrical equipment in such a way as to be accessible from a single panel and reduce number of doors required.

1.18 TRENCHING, EXCAVATING AND BACKFILLING

A. Perform all trenching, excavation and backfilling necessary for the installation of underground piping sewers, natural gas, water piping, receivers, and other piping as required.

B. Obtain the services of an "Underground Locator Service". This Underground Locator Service shall identify all utilities or structures that may be in the path of the underground piping.

C. Concrete and asphalt shall be removed by first providing saw cut lines. These new saw cut lines shall be at existing joints. For concrete cut and removal, a whole section of concrete from joint line to joint line shall be cut and removed.

D. Dig trenches to required grade and depth with only sufficient earth material removed to provide working space. Trenches dug below the required depth shall be refilled to proper depth with sand.

E. Restore to original condition all paved surfaces, including concrete, asphalt, landscaping and any other work which was cut or disturbed through the performance of work under this contract. New concrete and asphalt shall match the existing thickness, density, quality, material characteristics and surface appearance.

F. All testing and inspections shall be complete, and approvals obtained, before backfilling is performed.

G. Backfill material around pipe shall consist of sand. Provide a minimum of 4 inches of sand all round piping systems. The remainder of the backfill materials shall be free of rocks, debris, and other foreign materials and shall consist of earthy sand.

H. Provide tracer wire around site non metallic water piping systems. Provide tracer wire around site non metallic natural gas piping systems. Tracer wire shall be 14 gauge copper wire with plastic covering. Tracer wire shall extend 6 inches above grade at the ends of the piping systems. Provide warning tape a minimum of 18" above pipe.

I. Water puddle and tamp backfill material in layers of approximately 6" up to finish grade, and as otherwise required so that no settling will occur.

J. All excess excavated materials shall be disposed of.

1.19 CORROSION PROTECTION

A. All metallic piping underground shall wrap with 2 layers of 10-mil plastic tape.

B. No pressurized water lines or natural gas lines will be permitted under building the concrete slab.

C. All natural gas and water valves, water pressure regulators and other devices shall installed in pre-cast concrete yard boxes with galvanized steel lids. All natural gas and water valves, water pressure regulators and other devices will not be installed in any soil.

D. Any piping passing through concrete floors, walls or roofs shall be sleeved and wrapped 3 times with plastic foam wrap. Provide epoxy joint sealer, non-shrink, waterproof caulking around all piping risers coming up through concrete floors & sidewalks. If the floors, walls or roofs are existing then core these areas. Provide foam sealant and epoxy joint sealer (non-shrink) waterproof caulking around the space between the pipe and the floors, walls or roofs.

E. Provide one piece natural gas transition riser from PE pipe to steel pipe. The schedule 80 steel section of the riser shall be epoxy coated. The transition riser shall meet NFPA-58 and ASTM D2513.

1.20 FIRE STOPPING

A. Provide fire stopping at all rated floors, walls or roofs. Use UL listed materials and methods for sealing these areas.

1.21 IDENTIFICATION OF EQUIPMENT

A. Each item of equipment shall be permanently labeled with a plastic nameplate of sufficient size to clearly indicate the identification designation appearing on the construction drawings. Letters shall be a minimum of 2 inches high.

1.22 GENERAL TESTING REQUIREMENTS FOR EQUIPMENT AND FIXTURES

A. The following requirements are supplementary to tests specified for individual equipment, fixtures or systems in other Division 22 sections:

1. Furnish labor, materials, instruments, electric power, etc., and bear all costs in connection with these tests.

2. Give a minimum of 72 working hour notification to the Santee School District Representative when tests will be conducted. Coordinate test with other trades.

3. After the work has been completed, subject all systems to acceptance tests under normal operating conditions for periods of 5 working days to show compliance with Contract requirements. Submit to the Santee School District Representative a written certificate that all tests have been performed in accordance with the specification requirements.

4. All motors shall run at their required speed without showing undue vibration, objectionable noise, or sparking for a period of 5 working days.

5. The drainage system shall be tested in accordance with the rules and regulations of the authoritative agencies.

6. Submit to the Santee School District Representative a written certificate that all tests have been performed in accordance with the specification requirements.

B. Adjustments, repairs, and re-tests:

1. Make adjustments, repairs and alterations, as required to meet specified test results.

2. Correct defects disclosed by tests or inspections, and replace defective parts when directed.

3. In replacing defective parts, use only new materials, and in the case of pipe, replace with same length as defective piece.

4. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

5. Bear the cost of repairs, and restoration of the work by other Contractors that have been damaged by the tests.

1.23 RECORD DRAWINGS

A. Maintain at the site, a set of record drawings, upon which shall be clearly indicated (by shading, coloring, or some other acceptable method) the day by day extent of the work installed. Indicate all changes to the original design at the end of each day.

B. At the completion of the construction phase, furnish to the Santee School District Representative all necessary drawings showing work which was not installed as shown in the contract drawings. A minimum of one set of originals and three copied sets shall be furnished. Indicate all pertinent information, i.e., valve locations, pipe routing (dimensionally located), etc. All underground piping shall be located on the record drawings by two or more dimensions. All elevations (inverts) shall be shown with the point of elevation change clearly located. All valves shall be numbered and lettered to correspond with the numbers and letters on the site.

1.24 EMERGENCY REPAIRS

A. The Owner reserves the right to make emergency repairs as required to keep systems in operation without relieving the Contractor of his responsibilities during the post/partial beneficial occupancy.

1.25 OPERATION BY OWNER

A. The Santee School District may require operation of parts or all of the respective installations prior to final acceptance. The Owner shall pay for cost of utilities for such operation. Operation of the installation shall not be construed as acceptance of the work.

1.26 INSTRUCTION MANUAL

A. Prior to completion of installation and final inspection of work, furnish to the Santee School District Representative a minimum of three copies of complete instruction manual, bound in booklet form and indexed for each respective trade.

B. Manual shall contain the following items:

1. List of all equipment with manufacturer's name, model number and local representative, service facilities, and normal channel of supply for each item.

2. Manufacturer's literature describing each item of equipment or fixtures with detailed parts list.

3. Detailed step-by-step instructions for starting and shutdown of each system.

4. Detailed maintenance instructions for each system and piece of equipment or fixtures.

5. Copy of each automatic control diagram with respective sequence of operations.

6. Individual equipment or fixtures guarantees.

7. Certificates of inspections.

8. Copies of as-built construction and related shop-drawings.

9. All written material contained in manual shall be typewritten.

1.27 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to acceptance of work and during time designated by the Santee School District Representative provide necessary qualified personnel to operate each system and fully instruct Santee School District Facility Representatives in complete operations, adjustment, and maintenance of each respective installation.

1.28 GUARANTEES AND WARRANTIES

A. All work shall be guaranteed to be free from defects in material and workmanship for a period of one year from the date of final acceptance of the work, or a longer period if stipulated under specific headings. Replace at no additional cost any material, fixtures or equipment developing defects and also pay for any damage caused by such defects, or the correction of defects.

B. Use warrantee terms for specific items of equipment, relative to the work guarantee requirements of this specification.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3- EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide labor, equipment and materials, and perform all operations necessary for the installation of insulation as indicated. This section includes thermal insulation for piping and equipment.

B. Provide complete Insulation Submittals and Shop drawings. Refer to Plumbing General Provision Section 22 01 00 Paragraph 1.4 Submittals - Shop Drawings/Product Data/Material Certifications.

1.02 RELATED SECTIONS

A. Section 22 01 00 Plumbing General Provision

B. Section 22 20 00 Plumbing Systems, Fixtures and Equipment

1.03 FIRE HAZARD CLASSIFICATION

A. Insulation shall have a composite (insulation, jacket or facing, and adhesive to secure jacket or facing) fire hazard rating as tested by ASTM E-84, NFPA 255, or UL 723 not to exceed 25 flame spread and 50 smoke developed. Materials labeled accordingly.

B. Insulation shall conform to current California Plumbing and Mechanical Code.

1.04 QUALITY ASSURANCE

A. Furnish insulation systems to the project site bearing the manufacturer's label.

B. Appearance shall be of equal importance with its mechanical correctness and efficiency.

1.05 PROTECTION

A. Protect insulation against dirt, water, chemical, or mechanical damage before, during and after installation. Any such insulation or covering damaged prior to final acceptance of the work shall be satisfactorily repaired or replaced.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

1.07 SUBMITTALS

A. Comply with specification Section 22 01 00 General Provision for Plumbing.

B. Required Submittals

1. Piping insulation, jackets and accessories.

2. Equipment insulation and covering.

3. For each product being submitted, provide product description, list of materials, thickness, location of use and manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable manufacturers for insulation are Johns Manville Corporation, Owens-Corning and Knauf Insulation.

B. Acceptable manufacturers in addition to insulation manufacturers for adhesives, sealants and coatings are Foster Construction Products Inc.

C. Duct tape is not an approved sealer tape and shall not be used on this project.

2.02 PIPING SYSTEM INSULATION

A. Insulation Type

B. Glass Fiber: Johns Manville Micro-Lok meeting ASTM C547 or equal; rigid molded, noncombustible, Class 1 not to exceed 25 flame spread and 50 smoke developed.

1. 'K' ('KSI') Value: 0.23 at 75 degrees F (0.033 at 24 degrees C).

2. Maximum Service Temperature: 850 degrees F (454 degrees C).

3. Vapor Retarder Jacket: AP-T PLUS White kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed. All insulation and jacket material shall be plenum rated.

4. Provide 18 gauge galvanized metal insulation shields at pipe hangers. Insulation shields shall provide an expanded surface area to carrier the weight of the piping without distorting or damage to insulation.

C. Elastomeric Foam: K-Flex Insul-Tube or equal; meeting ASTM C534, flexible, cellular elastomeric, molded or sheet, Grade 1 not to exceed 25 flame spread and 50 smoke developed:

1. 'K' ('KSI') Value: 0.28 at 75 degrees F (0.04 at 24 degrees C).

2. Maximum Service Temperature of 220 degrees F (104 degrees C).

3. Maximum Flame Spread: 25.

4. Maximum Smoke Developed: 50.

5. Connection: Waterproof vapor retarder adhesive, as needed; K-Flex 373 Contact Adhesive.

6. UV-Protection: Outdoor protective coating; K-Flex 374 Protective Coating.

7. Provide 18 gauge galvanized metal insulation shields at pipe hangers. Insulation shields shall provide an expanded surface area to carrier the weight of the piping without distorting or damage to insulation.

D. Field Applied Jackets

1. Aluminum Jacket: 0.016 inch (0.045 mm) thick sheet, (smooth / embossed) finish, with longitudinal slip joints and 2 inch (50 mm) laps, die shaped fitting covers with factory attached protective liner.

2.03 FIRE STOPPING INSULATION

A. Fire stop insulation shall be ceramic fiber blanket equal to Cerablanket by Morgan Thermal Ceramics or USG Thermafiber 6 lb. density, Class 1 not to exceed 25 flame spread and 50 smoke developed.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that piping has been pressure tested for leakage before applying insulation materials.

B. Verify that all surfaces are clean, dry and free of foreign material. Apply insulation on clean, dry surfaces free of any foreign matter and only after tests and approvals required by the specifications have been completed.

3.02 GENERAL INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations except where prohibited by code.

C. Insulation shall be installed by workmen regularly engaged in this kind of work in accordance with the manufacturer's recommendations.

D. All exposed raw edges shall be finished with finishing cement.

E. If staples are used, all must be coated with adhesive to maintain vapor barrier integrity. Thickness per ASHRAE Standards Table.

3.03 PIPING SYSTEM INSULATION INSTALLATION AND SCHEDULE

A. Pipe insulation shall be continuous through walls and floor openings except where walls and floors are required to be fire stopped or required to have a fire resistance rating. Where this occurs, the open space remaining between the sleeve and pipe shall be filled with fire stop insulation.

B. Insulation on piping indicated must be applied with a continuous, unbroken vapor seal. Supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

C. Insulated pipes shall be insulated continuously through hangers. Rigid insulation inserts and metal shields are to be provided at all pipe hangers and supports. Pipe insulation shall abut the rigid insulation insert. Apply a wet coat of vapor barrier lap cement on all butt joints and seal the joints with 3" wide vapor barrier tape or band.

D. Butt all joints firmly together and smoothly, secure all jacket laps and joint strips with lap adhesive.

E. Locate insulation and cover seams in least visible locations.

F. Neatly finish insulation at supports, protrusions, and interruptions.

G. Provide insulated pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.

H. For insulated pipes conveying fluids above ambient temperature, secure jackets with self sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions.

I. Provide shield between isolation inserts and hanger supports. Shields shall be minimum of 20 gauge galvanized metal. Fabricate of Johns Manville Thermo-12 or other heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths;

	1 1/2" to 2 1/2" pipe size	10" long
3" to 6" pipe size	12" long	
8" to 10" pipe size	16" long	
12" and over	22" long	

J. For pipe exposed in equipment rooms or unfinished spaces provide field applied aluminum jacket.

K. For exterior piping applications, provide field applied protection jacket or coating. Insulated pipe, fittings, joints, and valves shall be covered with field applied aluminum jacket. Jacket seams shall located on bottom side of horizontal piping.

L. For return air plenum areas provide non-combustible jacket.

M. Fittings and valves shall be covered with premolded one-piece insulated covers.

N. Piping Insulation Schedule, shall comply with 2016 Building Energy Efficiency Standards Table 120.3-A or below, whichever is more stringent:

1. Fiber Glass Insulation

   a. Domestic Hot Water (supply and return piping):

pipe: up to 2"	1 inch thick
pipe: 2 1/2" to 4"	1 1/2 inch thick

   b. Condensate piping system

pipe: up to 2"	3/4 inch thick

O. All fixtures that are accessible shall have an OFF-set grid drain permitting the trap to be installed flush with the wall. In addition provide PROWRAP insulation kit for exposed hot water pipe, tailpiece, and trap as manufactured by MCGUIRE, and secured per manufacturers recommendations. ADA fixtures only.

END OF SECTION

SECTION 22 20 00

PLUMBING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping and including the demolition and removal of certain existing fixtures, equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Santee School District.

B. Provide fixtures and equipment which have been listed in the Material Standards by Santee School District / specified on drawing P0.2.

C. This section describes interior and exterior plumbing systems.

D. Provide Plumbing Submittals and Shop drawings.

E. A complete system of sanitary sewer piping and venting.

F. Roof drains, overflow drains and rainwater piping systems.

G. Complete domestic hot and cold water piping distribution system, including provisions for all plumbing fixtures and equipment. Provide connections to fixtures and equipment. Provide disinfection.

H. Condensate system for HVAC equipment.

I. Natural gas piping systems.

J. Pipe hangers and other necessary support items.

K. Plumbing equipment such as circulating pumps and water heaters.

L. Excavating and backfilling.

M. All Testing required and provide certificates.

N. Record Drawings.

1.02 RELATED SECTIONS

A. Section 22 01 00 Plumbing General Provisions

B. Section 22 07 00 Plumbing Insulation

1.03 SUBMITTALS

A. Comply with specification Section 22 01 00 Plumbing General Provisions.

B. Required Submittals

1. Plumbing fixtures and components.

2. Plumbing equipment and accessories.

3. Plumbing materials including piping, valves, and fittings.

1.04 REGULATIONS

A. All work covered by this Section shall conform to the latest requirements of the following regulations:

1. National Fire Protection Association.

2. State Division of Industrial Safety.

3. California Code of Regulations (CCR).

4. California Plumbing Code (CPC), California Code of Regulations, Title 24, Part 5.

5. California Fire Code, California Code of Regulations, Title 24, Part 9.

6. County Health Department.

7. Any other legally constituted bodies having jurisdiction thereof.

8. California Building Code (CBC), Title 24, Part 2:

9. Access plumbing fixtures shall comply with all of the requirements of CBC Section 1115B.

10. Heights and location of all fixtures shall be according to CBC Table 1115B-1.

11. Fixture controls shall comply with CBC Section 1117B.6.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Santee School District representative.

1.05 GENERAL

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices, which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown.

C. All permits; inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

D. See Drawings for Points of Connection.

E. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, obtain direction from the Owner's representative before proceeding with this work.

F. Gas Service and Meter Assembly: Arrange with the serving utility company for the installation of new gas service with complete meter assembly of the capacity indicated and in the location as shown on the drawings. All items served with gas shall be adjusted while being operated at full fire. In cooperation with Gas Company, make all required adjustments to main gas pressure regulator and individual gas pressure regulators at each building. The Santee School District shall pay for all required fees.

G. Before bidding on this work, make a careful examination of the premises to get thoroughly familiarized with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

H. Protect all work, equipment and materials at all times. Repair all damage caused either directly or indirectly by Contractor’s workers. Close all pipe openings with caps or plugs during installation. Protect all equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

I. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Santee School District Representative that his work has been accepted.

J. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

K. Coordinate work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. In advance of the work, furnish instructions to the General Contractor for the requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

L. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixtures and equipment schedules.

M. Manufacturer's submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

N. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

A list of names is not a valid submittal. To be valid, all submittals must:

1. Be delivered to the Santee School District Representative within thirty-five (35) days of award of the contract. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

2. Include all pertinent construction, installation, performance and technical data.

3. Have all copies marked to indicate clearly the individual items being submitted.

4. Have each item cross-referenced to the corresponding specified item and be marked to show how differences will be accommodated.

5. Contain calculations and other detailed data justifying how the item was selected for proposal. Data must be completed enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

6. Include, for every item, which differs in size, configuration, connections, service, accessibility, or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

O. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Santee School District Representative or authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

P. Requests for substitutions shall be in accordance with the requirements of Division I. Provide and perform tests required by Engineer for purpose of judging acceptability of proposed substitutions. Provide sufficient information to allow the Engineer to analyze any proposed alternate; the substitution will not be accepted and re-submittal will not be allowed if adequate information is not provided. The Contractor shall make all changes to the work of this trade and the work of all other trades resulting from a substitution at no additional cost to the District. The Representative shall be the sole judge as to the quality and suitability of proposed Santee School District alternate equipment, fixtures, and materials; decisions of the Santee School District Representative shall be final and conclusive.

Q. Provide record drawings in accordance with the requirements of Division 1.

R. Keep up-to-date a complete "as-built" record set of prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work the as-built drawings shall be delivered to the Santee School District Representative. Upon approval the contractor shall make a digital scanned copy of the as built drawings. The scanned file name shall match the sheet number of the drawings.

S. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the District.

T. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

U. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship and shall not be less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials and equipment as indicated on the drawing, as specified, and required in the work shall be new and free from defects and imperfections.

B. See the fixture and equipment schedules and notes on the drawings for additional information including manufacturers, model numbers, accessories, capacities, electrical data, weights, and installation requirements.

2.02 PIPE AND FITTINGS

A. Soil and Waste System

1. Piping below and above grade within the building and outside within five feet (5') of the foundation shall be Solid Wall Schedule 40 Polyvinyl chloride (PVC) Gravity Sewer Pipe and Fittings. Schedule 40 Solid Wall Polyvinyl chloride (PVC) DWV Gravity Sewer Pipe and Fittings. Solid wall PVC pipe and fittings shall be made by virgin PVC compounds meeting the ASTM D-2665. PVC shall comply with ASTM

D-1785. For glue joints, provide Weld-On #2721 medium bodied blue glue. Provide protection at penetrations of walls, floors, ceilings and fire resistance rated assemblies in accordance with ASTM E814. The "F" rating must be a minimum of the hourly rating of the fire resistance rated assembly that the plastic pipe penetrates.

B. Water System

1. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.22.

2. Water piping underground shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.22.

3. Water piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings.

Natural Gas System

1. Piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger except all medium pressure gas shall be welded. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all medium pressure gas piping and piping 2-1/2" and larger. All outdoor pipes shall be galvanized and shall be painted with oil base prime coat and oil base enamel finish to match exterior color.

2. Gas piping underground shall be Schedule 40 SDR-11 Polyethylene PE 2406 (Yellow) as manufactured by Performance Pipe. Fittings shall be socket fusion weld Polyethylene as manufactured by Performance Pipe or Central, PE 2406 (Yellow) complying with ASTM D2513. Where required provide "Lyco" or Double "O" seal transition fittings between steel and polyethylene as manufactured by Central, all identified and approved for gas service. A No. 16 copper tracer wire shall be installed with and attached to PVC piping and shall terminate above grade at each end. Gas piping extending to above grade, within valve yard boxes, below structures such as porches, steps, roofed patios, covered walks, uncovered walks adjacent to building or similar structures covered or uncovered shall be Schedule 40 steel pipe with 150 pound Buttweld fittings. Piping below concrete slab shall be installed within a schedule 40 PVC pipe sleeve extending between building and vented shut-off valve yard box. Galvanized pipe and fittings below grade shall be wrapped with 20 MIL identified polyethylene tape, two (2) layers, each half-lapped for a total thickness of 80 MILS. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative.

3. Contractors not having certified personnel will be required to have a factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. This Contractor will pay for all required cost for training and certification. Upon completion of the gas piping underground installation, this Contractor shall submit a written report directly to the Santee School District Representative stating that all materials installed are as specified and approved, that installation was done by factory certified personnel, that where required, steel pipe buried had received a minimum of 80 mils thick pipe

wrap and finally that the entire system was wire traced, installed to a depth of thirty inches (30") within a sand bed and tested to 60 P.S.I.

4. Gas Risers: Provide gas risers with epoxy primer on coated transition fitting, wrap in 2 layers of tape (see buttweld fittings) and provide suitable size sleeve. Seal around pipe and sleeve with silicone sealant.

C. Storm Drain System

1. Piping and fittings shall be cast iron as specified for soil and waste piping. All exposed storm drain pipe and fittings shall be galvanized steel pipe as specified for exposed vent piping.

D. Indirect Waste Piping

1. Shall be the same as Soil and Waste Piping.

Condensate Drain System

2. Piping: (Air Conditioning units) shall be Type "M" copper as specified for water piping.

E. Exposed drain piping at plumbing fixtures shall be chrome plated yellow brass except exposed pipes in shop or utility areas.

F. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions or flanges shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following schedule.

1. Unions:

a. Black Steel Pipe: 250 pound screwed black malleable iron, ground joint, brass to iron seat.

b. Galvanized Steel Pipe: 250 pound screwed galvanized malleable iron, ground joint brass to iron seat.

c. Copper or Brass Tubing: 150 pound cast bronze or copper, ground joint, nonferrous seat with ends, by NIBCO or Mueller Industries.

2. Flanges shall be raised face 150 pound class forged steel, weld, neck or slip-on type conforming to ANSI B16.5 and ASTM A181. For copper piping systems, provide flanges conforming to ASME-ANSI B16.24. The faces of the flanges being connected to be alike in all cases. Locate flanges so that the piping can be easily disconnected for removal of the equipment or valve. Gasket material shall be of material suiting the service of the opening system in which installed and which conforms to its respective ANSI Standard (ANSI-AWWA C111/A21.11, ASME-ANSI B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

M. Underground cast iron, ductile iron, copper, steel or other metallic piping located both inside and outside of building shall be encased within a minimum of 10 mil polyethylene plastic sleeve sealed water tight with polyvinyl chloride tape. Sleeve shall terminate 3” above grade or floor slab.

N. Underground non-metallic piping shall have 16 gauge copper "Tracer Wire" continuous

for entire length.

2.03 VALVES

A. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of piping systems throughout the building, and locates so all parts are easily accessible and maintained.

B. Valve Design: Provide full port red brass ball valves. Gate valves are not allowed.

1. Sizes: Same size as upstream pipe, unless otherwise indicated.

C. Approved Manufacturers:

1. Hammond Valve
2. Watts
3. NIBCO
4. Apollo Valves

Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

D. Ball Valves, 2 Inches and Smaller: Hammond 8501, MSS SP-110, U.S. Safe drinking water act (SDWA) Rated for 150 psi saturated steam pressure, 600 psi WOG pressure; two-piece construction; with bronze body and single reduce bore or better, chrome plated solid brass ball, "Teflon" seats and seals, separate adjustable packing gland and nut, blowout-proof stem and vinyl covered steel handle.

E. Gas Valves Hammond Ball Valve, 8901 UL, FM, MSS-SP-110, Rated at 150 wsp-600 WOG; UL listed, brass body, stainless steel ball, and threaded ends. Valve shall be C.S.A. certified.

F. Swing Check Valves, (Hammond IB 944), MSS SP-80; Class 200, cast-bronze body and cap conforming to ASTM B61; with horizontal swing, Y-pattern, and bronze disc. Provide valves capable of being refitted while the valve remains in the line.

G. Non-Slam Check Valves (Hammond IR 9253). Provide non slam check valves on the discharge of pumps. Check valves to be silent closing, class 125, iron body, bronze mounted spring leaded center guide, Miller, Williams Hager or Smolensky approved equal.

2.04 HOSE BIBBS

A. Hose Bibbs shall be Acorn, Zurn or approved equal, as specified on drawing P0.2.

2.05 COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVES

A. McDonald, Watts, or approved equal, bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Relief valves shall be factory set for 210 degree F. and 150 p.s.i. pressure. Relief valves shall be type as recommended by water heater manufacturer.

2.06 WATER PRESSURE REGULATORS

A. Shall be of the manufacturer, model and sizes as indicated on the drawings, complete with shut-off valves (inlet and outlet of assembly), valve bypass, pressure gauges, strainers and pressure relief valves.

2.07 GAS PRESSURE REGULATORS

A. Shall be of the manufacturer, model and sizes as indicated on the drawings. Regulators installed in vaults shall be entirely corrosion proof and approved by the Gas Company.

2.08 TRAPS, STRAINERS AND TAILPIECES

A. Every sanitary fixture, unless otherwise specified, shall be provided with a seventeen (17) gauge tailpiece chromium tailpiece, a Los Angeles pattern chrome plated cast-brass trap, and wall flanges. Provide chromium plated brass casing between the trap and wall flanges with each fixture. All sanitary waste system floor drains (3 inch minimum) and floor sinks shall have cast iron "P" traps.

2.09 CLEANOUTS

A. J.R. Smith, Zurn or Mifab cast-iron ferrule and countersunk brass clean-out plug with round cast iron access frame and heavy duty secured top cover.

B. Wall Cleanouts: Zurn No. Z-1468 for steel pipe and Zurn No. Z-1446 for cast iron pipe.

C. Floor Cleanouts: Zurn No. Z-1400, watertight ABS bronze plug and polished nickel bronze top.

D. Cleanouts to Grade: Zurn Heavy Duty Clean-out Housing Z-1474 with bronze plug set flush with surface for concrete areas. Asphalt or non-surfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box.

2.10 ACCESS PANELS

A. Wall access panels shall be minimum 14" x 14" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum.

B. Wall Panels: Elmdor, DW 14” X 14”– AKL, 14-gage Stainless Steel, Allen Key Latch, for all tile walls and dry wall walls in toilet rooms.

C. Ceiling Panels Elmdor, DW 18” X 18” –SS-AKL, prime coated steel, type as required for plaster, or dry wall ceilings. Allen Key Latch.

D. Fire Rated Walls: Elmdor, FR 14” X 14” –SS-CL, for all Fire rated tile walls and dry walls in toilet rooms provide stainless steel panels with cylinder Lock.

2.11 ROOF FLASHING

A. Provide for all pipe penetrations through roof a Elmdor / Stoneman No. 1100-7, one (1) piece, six (6) pound, series with cast iron counterflashed and equipped with Vandal flash hood assembly for all vent piping. Seal joint between flashing and pipe with waterproofing compound.

2.12 ESCUTCHEONS

A. Shall be chrome plated cast brass with set-screw locking device or slip on.

2.13 WATER HAMMER ARRESTORS

A. Provide where indicated on drawings of type indicated on equipment schedule and shall be sized per the manufacturer's recommendations. Install behind access panel.

2.14 DIELECTRIC UNION ISOLATORS

A. Where incompatible materials come in contact, isolate from each other with material best suited for the characteristics of materials to be isolated. Dielectric union isolator for connection piping or non-compatible materials shall be of standard commercial design with threaded connections.

2.15 PIPE SUPPORTS

A. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to California Plumbing Code requirements.

B. All horizontal runs of piping within the building, except for copper water supply stub-outs at fixtures and copper supply headers within walls, to be supported from the structural framing with steel rods and split ring hangers: Cooper B-Line, Grinnell Company, Tolco, or approved equal. Copper stub-outs and copper headers within walls to be supported from the wall framing with Holdrite pipe hangers and supports as specified at item 9, below. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, Copper B-Line, or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

C. Makeshift, field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. These shall be Hubbard Enterprises/HOLDRITE support systems or Owner-approved equivalent.

D. Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal piping systems, in accordance with MSS SP-69, IAPMO PS 42, and manufacturer’s published information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

1. Adjustable Steel Clevis Hangers: (MSS Type 1) B-Line B 3100

2. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B 3690

3. Split Ring: (MSS Type 11)

4. Pipe Alignment and Support Brackets: (Per IAPMO PS 42) HOLDRITE products (see section.9.)

E. Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

1. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

2. For vertical mid-span supports of piping 4" and under, use Hubbard Enterprises/HOLDRITE Stout Brackets™ with Hubbard Enterprises/HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).

F. Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with ANSI-MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

1. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

G. Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

1. For existing concrete construction, provide expansion shields.

H. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

I. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

J. When securing copper water supply piping directly to the DWV piping or to the wall framing (horizontal water headers and fixture stub-outs), the following copper-plated components of the "HOLDRITE" system are to be used as a support system:

1. For positioning supply/flush valve for wall-hung water closet, use model 114C (attaches to carrier) and 114C-EXT (extension for above, e.g., for fixtures to be used by handicapped).

2. For attachment to wall framing, use models 101-26, 102-26.

K. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Seismic Restraint Manual: Guideline for Mechanical Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

L. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports where engineered supports are not available.

M. 2.17.13 Isolators: All water piping shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Elmdor/ Stoneman, "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

N. Shields: Provide 20 gauge galvanized sheet metal shields at piping hangers for all insulated piping. Size shields for exact fit to mate with pipe insulation.

O. Roof Mounted Piping: Pipe supports installed on roof shall be as manufactured by PHP Systems, Model No. PP10 with galvanized metal strut or approved equal. Support shall include all required clamps and devices for a complete system. Set base in adhesive onto clean roof surface in accordance with manufacturers' installation instructions. Proposed installation procedure shall have approval of roofing contractor. Alternate system shall be Pipe Pier, flexible resilient closed-cell polyethlene foam (ETHAFOAM brand - trade mark of the Dow Chemical Company), with strut system built into foam block.

2.16 FIXTURES

A. See schedule on drawings.

B. Accessible plumbing fixtures shall comply with all of the requirements of California Building Code Section 1115B. Heights and locations of all fixtures shall be according to California Building Code Section 1115B.4 and DSA Check List Fig. 15-A. Fixture controls shall comply with California Building Code Sections 1115B.4.4.4 for showers, 1115B.4.3, Item 1 for lavatories, 1115B.4.1, Item 5 for toilets, and 1115B.4.2, Item 3 for urinals. Each accessible sink shall be a maximum of 6-1/2" deep. Sinks shall be mounted with the counter or rim no higher than 34" above the finish floor. CBC Section 1117B.9, Item 2.

C. Fixtures:

1. All floor drains shall be minimum 3" sanitary sewer pipe outlet.

2. Furnish complete with necessary trim, including stops. All trim and fittings shall be chrome-plated brass including handles, supply tailpieces, traps and escutcheons.

3. Connections to fixtures shall be in accordance with code requirements except as exceeded herein or on the drawings and in no case less than the supply stop size.

4. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California TITLE 24, PART 5, ARTICLE I, "Energy Conservation Standards". ARTICLE I, T20-1406; ARTICLE 2, T20-1525 and ARTICLE 4, 1604 and 1606.

5. Minimum waste sizes shall be four inch (4") for water closets and two inch (2") for lavatories.

6. Steel plate supports shall be provided for all wall hung fixtures. Supports shall be 3/8 inch thick x 6 inch wide steel plates recessed and lag screwed to wood studs or welded to steel studs and tapped for fixture bolts. Length and number of plates as required to satisfactorily support the fixtures installed.

PART 3 - EXECUTION

3.01 FIXTURE INSTALLATION

A. Water piping and drain connections shall not be smaller than the sizes allowed by the plumbing code.

B. Furnish all fixtures complete with supplies, individual stops, traps, escutcheons, trim and all other accessories to provide a complete fixture. Fixtures shall be set in place and secured to walls. Provide ADA trap and piping wrap at lavatories and sinks per ADA requirements.

C. All plumbing fixtures shall be bedded and caulked along joint at walls, countertops, and other intersecting surfaces with DAP Kwik-Seal Tub and Tile adhesive caulk. DAP package code number shall be 18001 white caulk.

D. Caulk around the bases of toilets, urinals and vitreous china sinks.

E. All faucets to be installed using "Plumber Putty" under the base of the faucet for a watertight seal.

F. Plumbing fixture trim and exposed supplies and waste shall be brass with polished chrome plated finish. Polished chrome plated piping, fittings, and valves shall not bear tool marks.

G. Provide backing for each plumbing fixture requiring same, at the time roughing-in is done.

H. After the fixture installation is complete, cover and protect the rims, front, and all exposed parts until the completion of the construction phase. The plumbing contractor shall be responsible for all damage to fixtures, and shall assume all related costs.

3.02 LOCATIONS AND ACCESSIBILITY

A. Sleeves for piping through masonry walls or floors shall extend completely through the walls or floors. Sleeves shall finish flush on both sides. Provide risers clamps at all floor penetrations.

B. Unions shall be installed after each screw-type valve, connections for all equipment, appliances and as required for erection and maintenance. No unions shall be installed in concealed location.

C. All condensate drains to have clean-outs at each horizontal run. Clean-outs shall be F.I.P. thread brass plugs.

D. All roof drains shall be graded at a minimum of 1/4" per foot unless other wise noted on the drawings. The sections of the pipe shall be laid and fitted so when completed the sewer will have smooth and uniform invert.

E. All sanitary sewers, sanitary waste, and condensate lines and shall be graded at a minimum of 1/4" per foot unless other wise noted on the drawings. The sections of the pipe shall be laid and fitted so when completed the sewer will have smooth and uniform invert.

F. Site natural gas piping shall have a minimum of 30" of cover or be 30" below finished floor. Provide tracer wire around pipe. Tracer wire shall be 14 gauge copper wire with plastic covering. Tracer wire shall extend 6 inches above grade at the ends of the piping systems. Provide warning tape a minimum of 18" above pipe.

G. Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

H. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

I. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and accepted by the Santee School District Representatives. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

J. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. Should existing conditions prevent for installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Santee School District Representative for Direction.

3.03 EXCAVATION, TRENCHING AND BACKFILL

A. Do all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipe lines. Remove all surplus earth materials from site.

B. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping both inside and outside of building shall be installed in a minimum 6" sand bed and covered with 6" of sand prior to backfill. Continue backfill with materials free of rocks and debris, properly moistened and mechanically tapered and compacted to 90% of surrounding soil. Compaction by flooding or jetting is expressly prohibited.

C. Water, soil and waste piping shall have twenty-four (24") of cover minimum, except all PVC pipe material and all gas piping shall have thirty (30") of cover minimum. All other pipe shall have not less than eighteen inches (18") of cover, unless otherwise noted on the drawings such as gas piping. Offset gas and water piping as required to permit crossover of underground piping systems, and electrical conduit systems.

D. Bottoms of Trenches: Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.

E. Trees: When it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and roots. Where a ditching machine is run close to trees having roots smaller than 2" in diameter, the wall of the trench adjacent to the trees shall be hand trimmed making clean cuts through the roots. All cuts through roots 1/2" and larger in diameter shall be painted with "Tree-Seal", or equal. Trenches adjacent to trees should be filled within 24 hours after excavation, but where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas. Stockpiling of

earth or building materials within the drip line of trees is prohibited. Where any roots 2" and larger are encountered, the Contractor shall hand tunnel under root and protect it by burlap wrapping.

F. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the UPC as follows. The bottom of the water pipe at all points shall be at least twelve (12) inches above the top of the sewer or drain line. The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least twelve (12) inches from the sewer or drain line.

G. No piping shall run in, through or above any electrical equipment rooms or spaces at any time.

H. Horizontal soil and waste piping shall be installed to a uniform grade of not less than one fourth inch (1/4") per foot, unless otherwise indicated or directed.

3.04 PIPING INSTALLATION

A. Piping shall be concealed in finished portion of the building except where otherwise indicated or directed at the time the work is done. All piping shall be installed to clear all framing members and beams, even if drawings do not indicate same. Contractor shall constantly check the work of other trades so as to prevent any interference with the installation of this work.

B. Piping into stem walls and footings shall be double half lap wrapped with 1/8" thick "Armaflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower 8" of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.

C. Unions shall be installed on one side of all screwed shut-off valves, at both sides of screwed automatic valves and on all by-passes, at all equipment connections and elsewhere as indicated or required for ease of installation and dismantling.

D. Connections between copper tubing and equipment shall be with Mueller Industries, or approved equal, brass stream-line copper to P.P.S. ground joint unions.

3.05 CORROSION PROTECTION

A. All underground metallic piping such as cast iron (soil & storm drain), ductile iron (fire protection), copper (Water) or steel (gas) located both inside and outside of the building shall be encased within a minimum of 10 mil polyethylene plastic sleeve.

B. All underground metallic valves, unions, fittings, flanges, bolts & appurtenances that are unable to be encased within sleeve as noted above shall be protected as follows.

1. Provide heavy coating of “Henrys” oil base roof mastic over entire exposed surface.

2. After mastic coating is completed and inspected, wrap entire metallic component with a minimum of 10 mil. Polyethylene wrap overlapped 50% of the circumference and extended beyond ends of component as required for polyethylene to be secured to piping. The overlap seam shall be located to avoid backfill material from entering the encapsulated area. The ends and seam of the of the polyethylene material shall be secured to the piping and sealed with 3M Scotch/Wrap N. 50, 10 mil., 2” wide, printed, pipe wrap sealing tape.

3. The mastic coating shall be inspected and approved prior to the finish application of the polyethylene material, which shall also be inspected.

3.06 SLEEVES

A. Shall be schedule 40 galvanized steel where pipes pass through concrete foundation walls and 22 gauge galvanized sheet metal in all other walls, floors and partitions.

1. Isolate pipes through ground floor slabs with double wrap Kraft paper, unless pipe sleeves as specified above as indicated or required by code.

2. Pack space between pipe and sleeves with ceramic fiber rope so as to be absolutely watertight.

3. All sleeve penetrations in or through fire rated stud walls, ceilings or floors shall be protected & sealed per U.L. Fire Resistance System No. WL1001 for uninsulated pipe and No. WL5039 for insulated pipe. All sleeve penetrations in or through fire rated concrete/masonry walls, ceilings or floors shall be protected and sealed per U.L. Fire Resistance System No. C-AJ-1116 for un-insulation pipe and No. C-AJ-5002 for insulated pipe. See architectural plans for all locations of rated walls and other fire rated assemblies.

4. Hanger rods required to pass through fire rated finished ceilings shall be protected as specified here in above and an escutcheon plate provided at face of penetration.

B. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.

C. Pipe Joints and Connections:

1. Copper Tubing and Brass Pipe with Threadless Fittings:

a. Solder joints for copper shall be made with 95/5 lead free solder in accordance with manufacturer's recommendations for the service intended and shall be NSF-ANSI Standard 61 certified approved.

b. Use threaded adapters on copper tubing where threaded connections are required.

2. Welded Joints: All welding to be performed by welders certified as passing ASME Boiler and Pressure Code (Section IX) and shall comply with ASME Std. B31.1.0 and the American Welding Society, Welding Handbook.

D. All closet bends shall be adequately blocked and secured. Trap arms and similar connections installed below the floor level or under concrete slabs shall be adequately supported and anchored to prevent motion in any direction. All piping installed above grade within buildings shall be secured to structural framing with Unistrut or pipe clamps to provide a rigid installation. Piping utilizing gaskets as a seal shall be given prime consideration to providing adequate stability through proper supports and anchors because of its flexible nature.

E. Flexible piping of any kind will not be permitted except when indicated on drawings provide Hose Master Inc., flexible pipe appliance connector model UNP, female union, male nipple and plastic cover, AGA approved for kitchen equipment only.

F. Each pipe penetration of the roof shall be separated from other piping and any roof equipment by a minimum of 18" to insure a proper pipe flashing installation.

G. Floor, Wall and Ceiling Plates: Where pipes pierce finished surfaces, C.P. brass split flanges with set screw lock shall be provided.

H. Roof Flashings: Extend pipe a minimum of seven inches (7") above finished roof line, except where a vandal proof hood is required in which case pipe shall extend to a height required to receive the hood and also where specifically required to exceed this dimension by the local authority due to snow conditions.

I. Installation of Plumbing Fixtures:

1. Install each fixture at the exact height and location shown on the Architectural Drawings.

2. Set fixtures, supplies, trap and trap outlet square with the wall, in line with fixture outlets without any offsets, angles, or bends.

3. Grout joint between the fixtures and the walls or floors with polysulfide or silicone sealant to be smooth, even and watertight.

4. Watertight joints for drainage connections to all fixtures shall be made in accordance with the California Plumbing Code.

J. Completion of Installation:

1. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

2. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

3. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.07 CUTTING & PATCHING

A. The cutting and patching of existing construction shall be coordinated in advance of the work.

B. Where required to remove, cut or core drill existing building walls, partitions, floors, ceilings and roof and outdoor paved and landscaped areas in order to install the work as indicated, the Contractor shall cut and patch existing construction to match adjacent areas in a manner that will not result in visual evidence of any cutting or patching. The materials, finishes and methods of installation shall match the existing adjacent surfaces and shall be in accordance with the requirements of other applicable sections of these specifications.

C. Unless specified on structural drawings, any alterations or modifications to a structural element by cutting, drilling, boring, bracing, welding, etc., shall have written approval by Structural Engineer of record and DSA prior to start of work.

3.08 STERILIZATION OF DOMESTIC WATER LINES

A. Sterilize water lines by filling with a solution containing fifty (50) parts of chlorine per million parts water and holding the solution therein for at least twenty-four (24) hours with a water head of at least five feet (5') above the highest point in the system. Unless otherwise directed, thoroughly flush each line prior to sterilization. Introduction of sterilizing solution or materials into the lines shall be such as to provide thorough and uniform distribution throughout the system.

B. Operate all valves during the retention period. Following retention period, the heavy chlorinated water shall be flushed from the system with clean water.

C. Continue flushing until the residual chlorine at the end of 24 hours does not exceed the chlorine residual in the flushing water.

D. All work and certification of performance must be done by an approved laboratory utilizing qualified applications and personnel.

3.09 TESTING

A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the California Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration
Water	100 Pounds or 1½ times working pressure whichever is greater.	Water	8 Hours
Gas	60 Pounds	Air	8 Hours
Waste, Vent &	Minimum 10 Feet of Head	Water	8 Hours
Storm Drain	Minimum 10 Feet of Head	Water	8 Hours

3.10 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.11 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified, complete with a hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1½ ") in diameter. The contractor shall provide valve chart (framed and mounted in Custodial Room) with size, type and location of all shutoff valves. Valves shall be numbered to match corresponding valve tag.

B. Access Panel Markers: Provide manufacturers standard 1/16 inch thick engraved plastic laminate marker, with abbreviations and numbers corresponding to concealed valve.

C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1½ " high embossed letters.

D. All equipment shall be provided with name plate indicating all pertinent information on it.

E. Manufacturer's (Seton or Brandt) standard permanent, bright colored, continuous printed plastic tape, intended for all interior piping and direct-burial service, piping not less than 6 inches wide x 4 mils thick. Provide multi-ply tape consisting of solid aluminum foil core indicating type of service of buried pipe between two layers of plastic tape. The warning plastic (service identified) tape shall be placed one (1) foot above all buried pipe.

3.12 SCHEDULING OF WORK:

A. The facilities will be in operation during the entire period of construction. The Contractor shall be responsible for the proper scheduling of his work to insure that the existing mechanical systems to be replaced, modified and extended into existing utilities are kept in operation during the entire period of construction. When interrupted service are unavoidable, the Contractor shall confer with the Owner’s authorized representative to determine at what times the connections can be made to minimize the interruptions to the normal operation of the facilities.

B. Certain piping and equipment are presently insulated and asbestos compounds. The work required for this asbestos removal will be the responsibility of the Owner and shall be in full compliance with all governing authorities. The Owner shall certify that all asbestos removal has been completed prior to contractor’s start of work.

3.13 DEMOLITION

A. General: Provide all work necessary for demolition, dismantling, cutting & alterations as indicated, specified and required for completion of the work. The work shall include but not be limited to the following major items.

1. Protection of existing work to remain.
2. Disconnecting & capping sewers.
3. Removal of items as indicated on drawings.
4. Salvageable items to be retained by Owner.

B. Project Site Conditions:

1. Drawings may not indicate in detail all demolition to be carried out. Contractor shall carefully examine existing work to determine full extent of demolition required for completed work to conform to drawings and specifications.

2. Existing work to remain that is damaged during and by demolition operations shall be repaired or replaced to satisfaction of the Owner at no cost to the Owner.

3. Contractor shall be solely responsible for damage resulting from inadequate or improper support demolition procedures including dust containment.

C. Coordinate:

1. Prior to commencement of work, contact the owner's representative to confirm that all items identified to be removed are clearly marked.

2. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to operation of the facility.

D. Salvage: The Owner's representative shall determine with the contactor certain items that are to be kept by the Owner & these items shall be taken by the contractor to a place of storage as directed by the Owners. All other demolition items shall be removed from the premiers by the contractor.

E. Protection:

1. Do not demolition until temporary, barricades, warning signs and other forms of protection are installed.

2. Provide all safeguards, including warning sings and lights, barricades, and the like during demolition.

3. Noise, Dust and Water Controls: Containment shall be provided as required.

4. Safety: If at any time safety of exiting construction appears to be endangered, Contractor shall take immediate measures to support such endangered construction; operations and immediately notify the Owners representative.

F. Removal of Existing Plumbing, Piping, Fixtures, And Services: Contractor shall remove from site existing piping, plumbing g equipment, fixtures and services not indicated fro reuse and not necessary for completion of work. Cap services to their portion of work prior to commencement of, or during work of, this section.

G. Patching: Patch materials, which are to remain when damaged by this work. Finish material and appearance of patch or repair work shall match existing contiguous materials and finishes in all respects

H. Clean-Up/Disposal: Debris waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off site. Continuously clean up and remove these items and do not allow accumulating in building(s) or on site.

END OF SECTION

SECTION 22 47 13

DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS WITH BOTTLE FILLING STATION

A. Drinking Fountains: Stainless steel, wall mounted. Refer plumbing drawings fixture schedule.

1. Stainless-Steel Drinking Fountains:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Elkay Manufacturing Co.
2) Haws Corporation.

2. Type Receptor: On horizontal support.
3. Back Panel: Stainless-steel wall plate behind drinking fountain.
4. Bubblers: Two, with adjustable stream regulator, located on deck.
5. Control: Push button.
6. Drain: Grid type with NPS 1-1/4 tailpiece.
7. Supply: NPS 3/8 with shutoff valve.
8. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 chrome-plated brass P-trap and waste.
9. Support: ASME A112.6.1M, Type III lavatory carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball, gate, or globe shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

3.6 PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Division 6.

B. Heights and location of all accessible fixtures shall be mounted according to CBC Sections 11B-602 through 11B-612.

C. Fixture controls shall comply with CBC Sections 11B-601.3 for drinking fountains, 11B-604.6 for water closets, 11B-604.9.5 for children's water closets, 11B-605.4 for urinals, 11B-606.4 for lavatories and sinks, 11B-607.5 for bathtubs, 11B-608.5 for showers, and 11B-611.3 for washing machines and clothes dryers.

D. Accessible sinks shall be 6-1/2" deep maximum. Sinks shall be mounted with front of the higher of the rim and counter surface 34" maximum above the finish floor or ground.

E. Water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact. There shall be no sharp or abrasive surfaces under lavatories and sinks. CBC Section 11B-606.

END OF SECTION

23 00 00

HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

SANTEE SCHOOL DISTRICT

SECTION 23 01 00

HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS GENERAL PROVISIONS

PART 1- GENERAL

1.01 SUMMARY

A. Provide items, articles, materials, operations and methods listed, mentioned and scheduled on drawing and specifications, including labor, materials, equipment, and incidentals necessary or required for the completion, testing, inspection, adjusting, re-testing and readjusting to provide the various systems operable and complete in all respects.

B. Provide fixtures and equipment which have been listed in the Material Standards by Santee School District.

1.02 RELATED SECTIONS

A. Section 23 20 00 Heating, Ventilating and Air Conditioning Systems
B. Section 23 07 00 Heating, Ventilating and Air Conditioning Insulation
C. Section 23 09 00 Heating, Ventilating and Air Conditioning Instrumentation and Control

1.03 DRAWINGS AND SPECIFICATIONS

A. Examine and become familiar with all project drawings and sections of the specifications, and coordinate the work accordingly. Make reasonable modifications in the layout and installation as needed to prevent conflict with work of other trades and for proper execution of the work, without additional cost.

B. The drawings indicate approximate locations of equipment, ductwork, piping, etc., however, prior to ordering any equipment or materials, or performing any work, all dimensions, locations, and clearances shall be verified by the Contractor, based on actual field conditions, following the necessary coordination with other trades.

C. The substitutions of equipment may not be the same as that which was used as a basis for design. The term substitutions only refers to items listed in our specification that are not used as the basis of design on our drawings. Provide all necessary revisions to the installation, or work of all other trades to accommodate the substituted equipment, maintaining comparable clearances and provisions for maintenance shall be provided, with all related costs, by the Contractor. Submit substituted working drawings and submittals that have been coordinated with all other associated trades, showing the proposed installation.

D. It is the intention of the specifications and drawings to call for finished work, tested and ready for operation.

E. Where any device or part of equipment is herein referred to in the singular number, such reference shall be deemed to apply to as many such devices as are required to complete the installation or as shown.

1.04 SUBMITTALS - SHOP DRAWINGS/PRODUCT DATA/MATERIAL CERTIFICATIONS

A. Submittals shall include six copies of all shop drawings, product data and material certifications for the project. These submittals shall be sent to the Santee School District Representative.

B. Santee School District Representative will review the shop drawings, product data and material certifications for the project. Do not fabricate pipe, duct or order any equipment without shop drawings and product data being approved. All pipe systems, duct systems, equipment and other accessories require submittal review.

C. Shop drawings, product data and material certifications shall be complete in every respect so that a thorough review and evaluation can be performed. All required shop drawings, product data and material certifications shall be submitted at one time. Incomplete submittals, those without shop drawings, those that are not prepared properly, or submittals with less than the required number of copies, shall be returned for resubmittal.

D. It is intended that only a one-time review of all shop drawings and submittals will be performed, and any additional checking, which is required due to improper preparation by the Contractor, will be billed as an extra cost to the Contractor.

E. All shop drawings, product data and samples submitted by the Contractor shall illustrate details of work, equipment, materials, products, systems, designs or workmanship that the Contractor intends to use in order to comply with the design concept established in the contract documents. The review of these submittals is only for the limited purpose of checking the same for conformity with the design concept of the work as established in the contract documents. The review is not intended to be for the purpose of determining the accuracy of other matters that may be contained in such submittals, including but not limited to such matters as dimensions, quantities and performance of equipment. Contractor shall furnished construction means, methods, techniques, sequences, procedures or safety precautions, the correctness of which as set forth in the contract documents or submittal shall be the sole responsibility of the Contractor.

F. Only equipment, material and components of those manufacturers indicated in this specification are acceptable. Products that have not been reviewed and accepted by the Santee School District Representative before the bidding period will not be accepted.

G. To be considered as a acceptable confirm that the alternate manufacturers' equipment or fixture is comparable with regard to such features as noise level, power requirements, metal gauges, vibration attenuation, finish, appearance, certification of recognized testing agencies and standard bureaus, allowable working pressures, physical size and arrangement. The Contractor shall also consider the effect of installation in the available space, factory-applied insulation, electrical devices, controls, access to internal parts, operating efficiencies, and all other features and capacities specified herein. The Santee School District Representative shall be judge of the ability of any equipment, fixture or material to meet the requirements of this specification and the burden of proof shall be the responsibility of the Contractor.

H. Format: Each type of equipment, fixture or material shall be submitted in a separate section of the submittal package and each such section shall have:

I. A cover sheet identifying the equipment or fixture by the numbers or letter identical to those listed on the Drawings and/or Specifications, the manufacturer, the model number and size, and the technical data required for each piece of equipment or fixture. Materials shall be identified by system type.

J. Dimensional drawings (including optional accessories appropriate to this project).

K. Electrical data tables showing voltage, phase, horsepower (or kW), full load (or rated load) amperes and maximum fuse protection for each piece of equipment.

L. Capacity data tables (copies of catalog capacity tables) including fan curves for air moving devices.

M. Each submittal shall specifically reply to every item of equipment, fixture or material specified or scheduled. All information shall be listed on the submittal cover sheet and shall be marked in the submitted manufacturer's literature. All exceptions to the individual specifications shall be listed separately on the submittal cover sheet and shall be noted on submittal "cut sheet".

N. Shop drawings are required for the heating, ventilating and air conditioning systems. Submit one set of original drawings suitable for reproducing clear copies and provide six copies of drawings. The shop drawings will be reviewed. Contractors shall reproduce copies for their use. Shop drawings, equipment, fixture and material submittals shall be delivered at the same time.

1.05 INVESTIGATION OF CONDITIONS

A. 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 conductor shall be responsible for immediate repairs to existing underground utilities damage 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 it the independent locating service before start of construction to determine location of existing utilities.

B. This project is a new building on an existing site with existing utilities and an examination of the site is mandatory.]

C. Examine the existing conditions bearing on labor, transportation, handling and storage of materials, etc. Visit the site to understand the nature and scope of all work to be performed. The submission of a bid will be taken as evidence that such an examination has been made and all conditions have been considered.

1.06 EXISTING INSTALLATION AND CONFLICTS

A. Existing active services, water, sewer, electric, other piping systems, when encountered, shall be protected against damage due to construction work. Do not disturb operation of active services that are to remain.

B. If existing active services are encountered which require relocation, make request to the Santee School District Representative for determination of procedures. Where existing services are to be abandoned, they shall properly terminate in conformance with requirements of the Santee School District Representative.

C. If work makes temporary shut-downs of services unavoidable, consult with Santee School District Representative as to dates, procedures and estimated duration of shut-down period in advance of the date work is to be performed.

D. Work shall be performed to assure that the existing operating services will be shutdown only during the time allowed and required to construct necessary connections. If a system cannot be shutdown, temporary bypass jumpers shall be installed until connections are complete.

E. Be responsible for all costs incurred by the above shut-downs, including bypass or jumper installations for work performed under Division 23.

F. If existing active utility services are encountered which require relocation, make request to Santee School District Representative or other proper authorities for determination of procedures. Where existing services are to be abandoned, they shall properly terminated and capped.

1.07 ORGANIZATIONS

A. Below is a list of organizations that may be identified throughout the specifications by the letters in parenthesis only.

1. American Society of Heating, Refrigerating, Air Conditioning Engineers (ASHRAE)

2. American Society of Mechanical Engineers (ASME)

3. American Society for Testing and Materials (ASTM)

4. Factory Mutual Laboratories (FM)

5. National Electrical Manufacturer's Association (NEMA)

6. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

7. Underwriters' Laboratories, Inc. (UL)

8. American National Standards Institute (ANSI)

9. Air Conditioning and Refrigeration Institute (ARI)

1.08 DEFINITIONS

A. Furnish: To purchase and supply equipment, materials or components and deliver to the jobsite.

B. Install: To place, fix in position, secure, anchor, etc., including necessary appurtenances and labor so the equipment or material of the installation will function as specified and intended.

C. Provide: To furnish and install.

D. Piping: Includes, in addition to pipe, all fittings, flanges, valves, hangers, and other accessories related to such piping.

E. Concealed: Means hidden from sight in chases, furred spaces, shafts, hung ceilings, or embedded in construction.

F. Exposed: Means not installed underground or "concealed" as defined above. Tunnels, trenches, attic spaces and crawl spaces are considered exposed.

G. Accepted/Acceptable: Items, that in the opinion of the Santee School District Representative, are acceptable alternates for the item specified.

1.09 CODE, PERMITS AND FEES

A. The drawings and specifications take precedence when they are more stringent than codes, ordinances, standards and statutes. Codes, ordinances, standards and statutes take precedence where they are more stringent than the drawings and specifications.

B. Secure and pay for permits, tests, Certifications of Inspection, and all other costs incidental to the work.

1.10 GENERAL COORDINATION OF WORK AND WORKING PROCEDURES

A. All equipment and materials shall be covered or otherwise protected from the weather, theft, etc., both when stored on the site and after installation, until final acceptance by the Santee School District Representative. All open ends of installed piping and ductwork for partially completed systems shall temporarily be plugged and capped.

B. All materials of construction shall be new and shall bear the manufacturer's labels and trademarks.

C. The specifications indicate general requirements for the installation of all equipment and materials however, follow the specific instructions and directions furnished by the equipment or fixture manufacturer.

D. All equipment shall be installed with full consideration of future maintenance. Equipment that is installed such that it cannot be readily serviced shall be removed and installed correctly as directed to facilitate servicing.

E. Unions, valves, dampers, and other components that may require lubrication or maintenance shall be located to provide sufficient accessibility. When necessary, provide access doors as hereinafter specified at all locations where these items are concealed within walls, chases, or above ceilings which do not have an inherent accessibility feature.

F. Prior to testing and balancing of air systems, clean the interior of all duct systems and air handling equipment.

G. Surfaces to be painted shall be wiped, scraped, or wire-brushed as necessary to a clean, smooth painting surface, free from oil, rust and dirt. All material and equipment that is furnished with a factory prime coat of paint, which is damaged in transit, during storage, or from exposure to weather, shall be prime painted.

H. Contractor shall be responsible for costs related to damage caused by leaks in piping systems, or any other malfunction of the equipment, materials, systems, or work, including repairs, replacements, etc.

I. Contractor shall provide information to other Contractors relative to all required duct or pipe penetrations in walls, floors, roofs etc. The Contractor shall provide information to other Contractors relative to roof curbs. Structural work shall not be altered in any way.

J. All necessary cutting and patching of roofs, walls, floors, ceilings, etc., as required for the proper installation of the work under this section, shall be performed, and in a neat and workmanlike manner. No joists, beams, girders, columns, or other structural member shall be cut.

K. Contractor to provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises for all equipment and materials, and remove same from premises when no longer required.

L. Carefully lay out work on the premises and make proper provision for the other work. The exact location of each item shall be determined by reference to the drawings, by measurements at the building, and in cooperation with other contractors. Be responsible for accurately locating all openings for ducts, pipes, etc., and all access doors required.

M. Schedule and coordinate work so as to execute expeditiously the contract and to avoid unnecessary delays.

N. Examine fully the specifications and drawings for other trades, to become familiar with all conditions affecting work, and consult and cooperate with other trades for determining space requirements and adequate clearances with respect to other equipment in the building. Santee School District Representative shall determine space priority of the trades in the event of interference between ductwork, piping, conduit, and equipment of various trades.

O. If the work is installed without coordinating with other trades, and the installation interferes with their installation, the contractor shall make any changes necessary in this work to correct conditions without extra charge.

1.11 ELECTRIC

A. Coordinate the voltage and phase characteristics of each HVAC unit and motor with the electrical shop drawings.

B. Do not exceed electrical requirements of HVAC equipment without fully disclosing this information to the Santee School District Representative.

C. Motors shall be suitable for non-overloading operations, regardless of operating conditions, and shall be capable of continuous operation at full nameplate rating. Motor speed shall be a maximum of 1750 RPM, unless otherwise noted.

D. Motors for belt drive shall have adjustable bases with set screw to maintain belt tension. Motor horsepower indicated on the drawing equipment schedules are the minimum size acceptable.

E. NEMA Standards shall be taken as minimum requirements for motor design and performance. Motors shall be suitable for load, duty, voltage, frequency, hazard and for service and location intended. Motors shall be high efficiency type.

F. Motors shall have name plate giving manufacturers name, shop number, HP, RPM and current characteristics. Motors for outdoor service shall be TEFC.

1.12 MOTOR STARTERS

A. Provide motor starters for all HVAC and other mechanical equipment. Provide correct size and voltage characteristics per electrical requirements. Motor starters shall be provided by Division 23 and coordinated with electrical drawings.

1.13 EQUIPMENT SUPPORTING PROVISIONS

A. Contractor shall confirm locations with Santee School District Representative before installation of hangers, curbs, platforms, equipment frames, etc. Contractor shall coordinate all related work with other trades.

B. Equipment schedules on the drawings indicate a particular manufacturer for all equipment and the architectural and structural drawings indicate supports and other design considerations which were based on the use of this equipment.

C. Contractor shall confirm all support dimensions and locations based on the actual equipment to be installed and shall coordinate all related work with other Contractors.

D. Mechanical equipment drawing schedules indicate a particular manufacturer for equipment and the structural drawings indicate supports and other design considerations that were based on the use of this equipment. If the Contractor chooses to furnish items other than those indicated, they shall assume all responsibilities and additional costs for the furnishing and installation of the proper steel framing.

E. Where supports, foundations, stands, suspended platforms for equipment are indicated on drawings or specified in specifications design and construct supporting structures of strength to safely withstand stresses to which they may be subject and to distribute properly the load and impact over building areas. Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction. Contractor shall provide sufficient supports as required. These supports are for foundations, supporting stands, platforms and they shall be connected to the building structural members. All equipment shall be bolted to supports, foundations, stands and platforms. Design of the supports, foundations, supporting stands and platforms must be approved by a California State Licensed Structural Engineer.

1.14 MACHINERY DRIVES AND ACCESSORIES

A. Belt drives: Use approved V-belts of the proper number and size, complete with the necessary grooved sheaves and other requisite accessories. Belts for motors shall be capable of not less than 20% in excess of actual motor size used on the job.

B. Belt guards: All belt drivers shall be protected with belt guards, enclosing both the driving and the driven pulleys, securely fastened in place and provided with removable covers at each shaft center. Belt guards shall comply with all code requirements.

C. Sheaves: All motor sheaves shall be of the variable pitch type unless otherwise noted. Pitch of variable pitch sheaves shall be selected at approximately 50% of the variable pitch range.

D. Provide guards for all exposed couplings on rotating equipment.

1.15 LUBRICATION

A. Lubricate as required all motors, bearings, fans, etc., before operation of any equipment.

B. Provide a final lubrication to all equipment requiring it before turning over the system to the Owner.

1.16 PIPE SLEEVES

A. Sleeves shall be schedule 40 galvanized steel pipe.

B. Pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulation. Check floor and wall construction and finishes to determine proper length of sleeves for various locations. Terminate sleeves flush with walls, partitions and ceiling. Extend sleeves 1/4" above finish floor, except in equipment rooms and other areas where water may accumulate on floor, extend to 1-1/2".

C. Set sleeves in ample time to permit pouring of concrete or to allow progression of other work as scheduled. Fasten sleeves securely so that they will not become displaced when concrete is poured or when other construction around them. For sleeves in fire walls, pack space between sleeve and pipe with approved non-combustible material and as otherwise required by local code; for floors where water is to be kept out, fill with graphite packing and caulking compound.

D. Sleeves in underground walls shall be 1-1/2" larger than outside diameter of pipe. The space between sleeve and pipe shall be sealed with 1" long wool and 1/2" water tight flex caulking on both sides of the wall. The seal shall be guaranteed watertight.

1.17 ESCUTCHEONS

A. Provide 20 gauge escutcheons at all pipe penetrations in walls, ceilings and floors. Escutcheons shall be one piece or hinged two piece type with positive latch or setscrew, and shall be polished chrome plated in finished rooms, and polished brass in other areas. Escutcheons shall have tempered springs or other means to insure positive attachment to pipe. The escutcheon opening shall be of sufficient diameter to fit around the insulation of insulated pipes, and the outside diameter of the escutcheon shall be of sufficient size to conceal the pipe sleeves.

1.18 EXPANSION AND FLEXIBILITY

A. Install all work with regard for expansion and contraction to prevent damage to the piping, ductwork, equipment and the building and its contents. Provide piping offsets, expansion loops, approved type expansion joints, anchors or other means to control pipe movement and to minimize pipe forces.

1.19 ACCESS PANELS/DOORS

A. Provide access panels/doors. Refer to other Division 23 Sections for further reference. Provide access panels/doors with have same fire rating as ceiling, wall or duct in which they are installed, and shall be of sufficient size to provide the required accessibility.

B. Provide access panels/doors where necessary to provide access to concealed volume dampers, water hammer arrestors, trap primers, cleanouts, shut off valves, control valves etc.

C. Access doors:

1. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. Equal to MIFAB UA-SS. All MIFAB cylinder locks are keyed alike.

2. Sizes shall be 14" X 14" at easily accessible valves, water hammer arrestors, trap primers, cleanouts etc; 18" X 18" where partial body access is required; 24" X 24" where entire body access is necessary.

3. Confer with other contractors with respect to access panel locations and shall wherever practicable group mechanical and electrical equipment in such a way as to be accessible from a single panel and reduce number of doors required.

1.20 CORROSION PROTECTION

A. Any piping passing through concrete floors, walls or roofs shall be sleeved and wrapped 3 times with plastic foam wrap. Provide epoxy joint sealer, non-shrink, waterproof caulking around all piping risers coming up through concrete floors & sidewalks. If the floors, walls or roofs are existing then core these areas. Provide foam sealant and epoxy joint sealer (non-shrink) waterproof caulking around the space between the pipe and the floors, walls or roofs.

1.21 FIRE STOPPING

A. Provide fire stopping at all rated floors, walls or roofs. Use UL listed materials and methods for sealing these areas.

1.22 IDENTIFICATION OF EQUIPMENT

A. Each item of equipment shall be permanently labeled with a plastic nameplate of sufficient size to clearly indicate the identification designation appearing on the construction drawings. Letters shall be a minimum of 2 inches high.

1.23 GENERAL TESTING REQUIREMENTS FOR EQUIPMENT

A. The following requirements are supplementary to tests specified for individual equipment or systems in other Division 23 sections:

1. Furnish labor, materials, instruments, electric power, etc., and bear all costs in connection with these tests.

2. Give a minimum of 72 working hour notification to the Santee School District Representative when tests will be conducted. Coordinate test with other trades.

3. After the work has been completed, subject all systems to acceptance tests under normal operating conditions for periods of 5 working days to show compliance with Contract requirements. Submit to the Santee School District Representative a written certificate that all tests have been performed in accordance with the specification requirements.

4. All equipment, fans, and motors shall run at their required speed without showing undue vibration, objectionable noise, or sparking for a period of 5 working days.

5. Balance individual units and adjust dampers, registers, diffusers, etc., so that they deliver air quantities indicated for each outlet, and inlet, or as required.

6. Submit to the Santee School District Representative a written certificate that all tests have been performed in accordance with the specification requirements.

B. Adjustments, repairs, and re-tests:

1. Make adjustments, repairs and alterations, as required to meet specified test results.

2. Correct defects disclosed by tests or inspections, and replace defective parts when directed.

3. In replacing defective parts, use only new materials, and in the case of pipe, replace with same length as defective piece.

4. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

5. Bear the cost of repairs, and restoration of the work by other Contractors that have been damaged by the tests.

1.24 RECORD DRAWINGS

A. Maintain at the site, a set of record drawings, upon which shall be clearly indicated (by shading, coloring, or some other acceptable method) the day by day extent of the work installed. Indicate all changes to the original design at the end of each day.

B. At the completion of the construction phase, furnish to the Santee School District Representative all necessary drawings showing work which was not installed as shown in the contract drawings. A minimum of one set of originals and three copied sets shall be furnished. Indicate all pertinent information, i.e., valve locations, pipe and duct routing (dimensionally located), etc. All underground piping shall be located on the record drawings by two or more dimensions. All elevations (inverts) shall be shown with the point of elevation change clearly located. All valves shall be numbered and lettered to correspond with the numbers and letters on the site.

1.25 EMERGENCY REPAIRS

A. The Owner reserves the right to make emergency repairs as required to keep systems in operation without relieving the Contractor of his responsibilities during the post/partial beneficial occupancy.

1.26 OPERATION BY OWNER

A. The Owner may require operation of parts or all of the respective installations prior to final acceptance. The Owner shall pay for cost of utilities for such operation. Operation of the installation shall not be construed as acceptance of the work.

1.27 INSTRUCTION MANUAL

A. Prior to completion of installation and final inspection of work, furnish to the Santee School District Representative a minimum of three copies of complete instruction manual, bound in booklet form and indexed for each respective trade.

B. Manual shall contain the following items:

1. List of all equipment with manufacturer's name, model number and local representative, service facilities, and normal channel of supply for each item.

2. Manufacturer's literature describing each item of equipment with detailed parts list.

3. Detailed step-by-step instructions for starting, summer operation, winter operation, and shutdown of each system.

4. Detailed maintenance instructions for each system and piece of equipment.

5. Copy of each automatic control diagram with respective sequence of operations.

6. Individual equipment guarantees.

7. Certificates of inspections.

8. Copies of as-built construction and related shop-drawings.

9. All written material contained in manual shall be typewritten.

1.28 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to acceptance of work and during time designated by the Santee School District Representative provide necessary qualified personnel to operate each system for a minimum period of two consecutive, full working days. During the two working days provide training for each system.

B. During operating period, fully instruct Santee School District Facility Representatives in complete operations, adjustment, and maintenance of each respective installation.

1.29 GUARANTEES AND WARRANTIES

A. All work shall be guaranteed to be free from defects in material and workmanship for a period of one year from the date of final acceptance of the work, or a longer period if stipulated under specific headings. Replace at no additional cost any material or equipment developing defects and also pay for any damage caused by such defects, or the correction of defects.

B. Use warrantee terms for specific items of equipment, relative to the work guarantee requirements of this specification.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 23 05 00

TESTING, ADJUSTING, AND BALANCING FOR HVAC SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Testing, adjusting, and balancing of air systems.

1.02 SUBMITTALS

A. Draft Reports: Submit for review prior to final acceptance of Project.

B. Test Reports: Submit prior to final acceptance of Project and for inclusion in operating and maintenance manuals. Assemble in soft cover, letter size, 3-ring binder, with table of contents page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.03 BALANCING AND ADJUSTING

A. This section covers testing and balancing of environmental systems including air distribution systems, and the equipment and apparatus connected thereto. The testing and balancing of all environmental systems shall be the responsibility of one Testing, Balancing and Adjusting (TBA) firm. The minimal standards to be met are those set forth in Chapter 40 in the latest edition of the ASHRAE Systems Handbook.

B. The balancing, testing and adjustments of the complete mechanical systems shall be the direct responsibility of the Contractor and he shall engage the services of an independent firm specializing in this work. The definition of independent shall mean the firm is not associated with any contracting or manufacturing firm and derives its income solely from testing, adjusting and balancing mechanical systems. Acceptable testing, adjusting and balancing firms are those which are AABC certified. NEBB firms must also be AABC certified.

C. The balancing work shall be performed by the same firm having total professional responsibility for the final testing, adjusting, and balancing of the entire system.

D. Testing and balancing work shall be directly supervised and the results confirmed by a Registered Professional Mechanical Engineer who shall represent the TBA firm in progress meetings as requested, and shall be available for interpreting all material found in the balance report.

E. The balancing firm shall provide all tools, equipment and instruments required and shall take all readings, and make all necessary adjustments.

F. After all adjustments are made, prepare a detailed written report and submit for review. Report shall bear the Registered Professional Mechanical Engineer's Stamp of the person supervising the work. Final acceptance of this project will not be made until a satisfactory report is received.

G. Verify the following conditions before proceeding with work:

1. Conduct site observations during construction to determine the location of required balancing devices and confirm that they are properly located and installed. Submit a written report of these observations to the Architect.

2. Installation of the designated system is complete and in full operation.

3. Outside temperature conditions, occupant loads, lighting loads, special equipment requiring extra sensible or ventilation requirements, and solar conditions are within a reasonable range relative to design conditions or provide for acceptable simulation of loads and conditions that will result in a properly balanced system.

H. All thermal overload protection shall be observed and noted on the data sheets. If the starter equipment is furnished and installed by the Contractor and thermal overload protection is incorrect, such information shall be tabulated, including required size thermal overloads, and included in the report. If thermal overload protection is incorrect, it shall be the responsibility of the Contractor to see that proper overload protection is installed.

I. Measure and set any special conditions such as minimum outside air quantities; check and adjust outside and return air intakes so that the system will deliver substantially the same volume on either; make tests and record data as required in the "Balancing Report" section. All balancing devices such as dampers and valves shall be clearly marked as to the final balanced position. Plug all test holes, replace access doors and belt guards.

J. Provide temperature recorders for spaces as necessary to verify acceptable space temperature conditions.

K. Upon request of the Santee School District Representative a representative of the balancing firm performing the work shall demonstrate fluid flow quantities shown in the report by re-measuring outlets or terminals selected at random by the Santee School District Representative to verify accuracy of settings.

L. Requirements for balancing air systems are as follows:

1. Before any adjustments are made; the major items of equipment shall have been checked to assure all bearings have proper lubrication; all belt drives shall have been adjusted for proper alignment and tension; and the systems shall have been checked for such items as dirty filters, duct leakage, filter leakage, damper leakage, equipment vibrations, correct damper operations, etc.

2. Adjust fan systems, major duct sections, registers, diffusers, etc., to deliver design air quantities within plus or minus 5%. If Individual air outlets serve more than one space, they may have a tolerance of 10% from the average. Design CFM is based on filters being approximately 50% loaded. Pressure drop across filters during balancing shall be simulated to that condition. After balancing is completed, verify that motor is not overloaded with the filters clean.

3. Check and adjust CFM settings on diffusers and grilles.

4. Check and adjust minimum and maximum CFM settings on VAV boxes to design values regardless of factory presetting of these devices.

5. Adjust distribution systems to obtain uniform space temperatures free from objectionable drafts and noise within the capabilities of the system.

6. Exchange and pay for sheaves and/or belts as required to adjust the rpm of fans to handle specified air quantity.

M. Provide four copies of a "Balancing Report" to the Santee School District Representative. The Mechanical Engineer shall review this report. This report shall contain a general information sheet listing instruments used, method of balancing, altitude correction calculations, manufacturer's grille, register, and diffuser data. Report shall contain the following additional data.

1. Equipment data sheets listing make, size, serial number, rating, operating data, etc., of all mechanical equipment including fans, motors, starters, and drives. Operating data shall include rotational speed, inlet and outlet pressures, pressure drop across filters, coils and other system components, and measured motor current and voltage.

2. Balancing data sheets listing the required and actual CFM of all supply, return, and exhaust outlets or inlets, and totals summarized by systems.

3. A reduced set of contract drawings with outlets marked thereon for easy identification of the designation used in the data sheets.

4. Listing of any abnormal or notable conditions not covered in the above.

N. Even though it is the responsibility of the balancing firm to check the physical operation of each operating piece of equipment, the control contractor must assure the balancing firm that all controls are accurately calibrated and must cooperate with him during the balancing work period.

O. The agency performing the system balance and performance test, shall personally verify that all system control functions and interlocking do in fact provide the desired results as stated. The agency shall provide a written statement within the air balance report verifying this fact.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before starting work, verify systems are complete and operable.

B. Report defects, deficiencies, or abnormal conditions in mechanical systems preventing system balance.

C. Beginning of work means acceptance of existing conditions.

3.02 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust to within plus or minus 10 percent of design.

3.03 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to deliver design supply, return, and exhaust air quantities within previously stated tolerances.

B. Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Use volume control devices to regulate air quantities only to extent those adjustments do not create objectionable air motion or sound levels. Change volume using dampers mounted in ducts.

E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes to accomplish system air flow. Vary branch air quantities by damper regulation.

F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Allow for pressure drop equivalent to 50 percent loading of filters.

G. Adjust automatic outside air, return air, and exhaust air dampers for design conditions.

H. Measure temperature conditions across outside air, return air, and exhaust air dampers to check leakage.

I. At modulating damper locations, take measurements and balance at extreme conditions.

J. Systems shall be tested for heating and or cooling operation and when is on economizer cycle. TAB report must include tables for both. Refer to drawing M0.1 general note #20.

3.04 FIELD QUALITY CONTROL

A. Verify recorded data represents actually measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.

END OF SECTION

SECTION 23 07 00

HEATING VENTILATING AND AIR CONDITIONING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide labor, equipment and materials, and perform all operations necessary for the installation of insulation as indicated. This section includes thermal insulation for piping and equipment, and thermal and acoustic insulation applied to ductwork and air handling devices.

B. Provide complete Insulation Submittals and Shop drawings. Refer to Section Heating Ventilating and Air Conditioning 23 01 00 paragraph 1.4 Submittals - Shop Drawings/Product Data/Material Certifications.

1.02 RELATED SECTIONS

A. Section 23 01 00 General Provisions for Heating, Ventilating and Air Conditioning
B. Section 23 20 00 Heating, Ventilating and Air Conditioning Systems
C. Section 23 09 00 Heating, Ventilating and Air Conditioning Instrumentation and Control

1.03 FIRE HAZARD CLASSIFICATION

A. Insulation shall have a composite (insulation, jacket or facing, and adhesive to secure jacket or facing) fire hazard rating as tested by ASTM E84, NFPA 255, or UL 723 not to exceed 25 flame spread and 50 smoke developed. Materials labeled accordingly.

B. Insulation shall conform to current California Mechanical Code.

1.04 QUALITY ASSURANCE

A. Furnish insulation systems to the project site bearing the manufacturer's label.

B. Appearance shall be of equal importance with its mechanical correctness and efficiency.

1.05 PROTECTION

A. Protect insulation against dirt, water, chemical, or mechanical damage before, during and after installation. Any such insulation or covering damaged prior to final acceptance of the work shall be satisfactorily repaired or replaced.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

1.07 SUBMITTALS

A. Comply with specification Section 23 01 00 General Provisions for Heating, Ventilating and Air Conditioning.

B. Required Submittals

1. Piping insulation, jackets and accessories.

2. Ductwork insulation, jackets, and lining.

3. Equipment insulation and covering.

4. For each product being submitted, provide product description, list of materials, thickness, location of use and manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable manufacturers for insulation are Johns Manville Corporation, Owens-Corning and Knauf.

B. Acceptable manufacturers in addition to insulation manufacturers for adhesives, sealants and coatings are Foster Products.

C. Duct tape is not an approved sealer tape and shall not be used on this project.

2.02 PIPING SYSTEM INSULATION

A. Pipe insulation R value shall comply with 2016 California Building Energy Efficiency Standards Table 120.3-A or below, whichever is more stringent.

B. Insulation Type

C. Glass Fiber: Johns Manville Micro-Lok meeting ASTM C547 or equal; rigid molded, noncombustible, Class 1 not to exceed 25 flame spread and 50 smoke developed.

1. 'K' ('KSI') Value: 0.23 at 75 degrees F (0.033 at 24 degrees C).

2. Maximum Service Temperature: 850 degrees F (454 degrees C).

3. Vapor Retarder Jacket: AP-T PLUS White kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed. All insulation and jacket material shall be plenum rated.

4. Provide 18 gauge galvanized metal insulation shields at pipe hangers. Insulation shields shall provide an expanded surface area to carrier the weight of the piping without distorting or damage to insulation.

D. Elastomeric Foam: K-Flek Insul-Tube meeting ASTM C534 or equal; flexible, cellular elastomeric, molded or sheet, Class 1 not to exceed 25 flame spread and 50 smoke developed:

1. 'K' ('KSI') Value: 0.28 at 75 degrees F (0.04 at 24 degrees C).

2. Maximum Service Temperature of 220 degrees F (104 degrees C).

3. Maximum Flame Spread: 25.

4. Maximum Smoke Developed: 50.

5. Connection: Waterproof vapor retarder adhesive, as needed; K-Flex 373 Contact Adhesive.

6. UV-Protection: Outdoor protective coating; K-Flex 374 Protective Coating.

7. Provide 18 gauge galvanized metal insulation shields at pipe hangers. Insulation shields shall provide an expanded surface area to carrier the weight of the piping without distorting or damage to insulation.

E. Cellular Glass: ASTM C522; 'k' value of 0.35 at 75 degrees F ('KSI' value of 0.047 at 24 degrees C); 8.0 LB/CU FT (128 Kg/cu m) density, Class 1 not to exceed 25 flame spread and 50 smoke developed.

F. Field Applied Jackets

1. Aluminum Jacket: 0.016 inch (0.045 mm) thick sheet, (smooth / embossed) finish, with longitudinal slip joints and 2 inch (50 mm) laps, die shaped fitting covers with factory attached protective liner.

2.03 DUCT WORK INSULATION

A. Ductwork insulation R value must comply with 2016 California Building Energy Efficiency Standards Table 150.1.A or below whichever is more stringent.

B. Flexible Fiberglass Insulation Wrap Blanket: Johns Manville Microlite Type 100 meeting ASTM C1290 - 11 or equal, Type II, Class B-2; flexible blanket, Class 1 not to exceed 25 flame spread and 50 smoke developed. All flexible fiberglass insulation wrap blanket insulation shall have foil back jacket.

1. 'K' ('KSI') Value: 0.25 at 75 degrees F (0.040 at 24 degrees C) installed.

2. Vapor Barrier Jacket: FSK, Aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft, secured with UL listed pressure sensitive tape and/or outward clinched expanded staples and vapor barrier mastic as needed. All insulation and jacket material shall be plenum rated.

C. Rectangular Duct Liner: Johns Manville Linacoustic Mat Faced or Permacote meeting ASTM C1071 or equal; flexible blanket.

1. 'K' ('KSI') Value: ASTM C518, 0.25 at 75 degrees F (0.036 at 24 degrees C).

2. Noise Reduction Coefficient: .65 or higher based on "Type A mounting". Comply with ASTM C423A Absorption Coefficients, ASTM E84, UL 723 and NFPA 255.
3. Maximum Velocity on Mat or Coated Air Side: 4,000 ft/min.
4. Adhesive: UL listed waterproof type.
5. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.
6. Absolute roughness of exposed surface not to exceed 0.0013 coated.

D. Round Duct Liner: John Manville Spiracoustic Plus, meeting ASTM C1071 or equal; rigid.

1. 'K' ('KSI') Value: ASTM C518, 0.23 at 75 degrees F (.033 at 24 degrees C).
2. Noise Reduction Coefficient of .70 as per ASTM C1071.
3. Maximum Velocity: 4000 ft/min (20.3 mm/sec)

E. Rectangular and round duct liner shall comply with the requirements of NFPA 90A and the "Application Standards for Duct Liners" of SMACNA. Duct liner shall be glass fiber insulation with exposed surface coated to prevent fiber erosion at air velocities up to 4000 fpm. Duct sizes for lined duct show the clear dimension inside the lining.

2.04 FIRE STOPPING INSULATION

A. Fire stop insulation shall be ceramic fiber blanket equal to Morgan Thermal Ceramics "Cerablanket" or USG Therma-fiber 6 lb. density, Class 1 not to exceed 25 flame spread and 50 smoke developed.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that ductwork has been pressure tested for leakage in accordance with SMACNA standards before applying insulation materials.

B. Verify that all surfaces are clean, dry and free of foreign material. Apply insulation on clean, dry surfaces free of any foreign matter and only after tests and approvals required by the specifications have been completed.

3.02 GENERAL INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations except where prohibited by code.

C. Insulation shall be installed by workmen regularly engaged in this kind of work in accordance with the manufacturer's recommendations.

D. All exposed raw edges shall be finished with finishing cement.

E. If staples are used, all must be coated with adhesive to maintain vapor barrier integrity. Thickness per ASHRAE Standards Table.

3.03 PIPING SYSTEM INSULATION INSTALLATION AND SCHEDULE

A. Pipe insulation shall be continuous through walls and floor openings except where walls and floors are required to be fire stopped or required to have a fire resistance rating. Where this occurs, the open space remaining between the sleeve and pipe shall be filled with fire stop insulation.

B. Insulation on piping indicated must be applied with a continuous, unbroken vapor seal. Supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

C. Insulated pipes shall be insulated continuously through hangers. Rigid insulation inserts and metal shields are to be provided at all pipe hangers and supports. Pipe insulation shall abut the rigid insulation insert. Apply a wet coat of vapor barrier lap cement on all butt joints and seal the joints with 3" wide vapor barrier tape or band.

D. Butt all joints firmly together and smoothly, secure all jacket laps and joint strips with lap adhesive.

E. Locate insulation and cover seams in least visible locations.

F. Neatly finish insulation at supports, protrusions, and interruptions.

G. Provide insulated pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.

H. For insulated pipes conveying fluids above ambient temperature, secure jackets with self sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions.

I. Provide shield between isolation inserts and hanger supports. Shields shall be minimum of 20 gauge galvanized metal. Fabricate of Manville Thermo-12 or other heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths;

1 1/2" to 2 1/2" pipe size	10" long
3" to 6" pipe size	12" long
8" to 10" pipe size	16" long
12" and over	22" long

J. For pipe exposed in equipment rooms or unfinished spaces provide field applied aluminum jacket.

K. For exterior piping applications refrigeration suction piping, provide field applied protection jacket or coating. Insulated pipe, fittings, joints, and valves shall be covered with field applied aluminum jacket. Jacket seams shall be located on bottom side of horizontal piping.

L. For return air plenum areas provide a non-combustible jacket .

M. Fittings and valves shall be covered with premolded one-piece insulated covers.

N. Piping Insulation Schedule

1. Fiber Glass Insulation

a. Domestic Hot Water (supply and return piping):

pipe: up to 2"	1 inch thick
pipe: 2 1/2" to 4"	1 1/2 inch thick

b. Condensate piping system

pipe: up to 2"	3/4 inch thick

2. Elastomeric Foam

a. Refrigerant Suction

all sizes	1 inch thick

b. Refrigerant Hot Gas

all sizes	3/4 inch thick

3.04 FLEXIBLE FIBERGLASS INSULATION WRAP BLANKET INSTALLATION AND SCHEDULE

A. All insulation shall be applied with edges tightly butted with facing overlapping all joints at least 2". All external insulation shall have foil backed vapor seal. Joints shall be sealed with fire retardant adhesive. The insulation shall be secure to the duct with approximately 4" wide strips at 8" O.C. of fire retardant adhesive. Where the duct width exceeds 30", the underside insulation shall be additionally held in place with mechanical fasteners on about 18" maximum centers.

B. All breaks and punctures shall be sealed with vapor barrier tape and fire retardant adhesive.

C. Provide all insulated ductwork conveying air with foil backed jacket. Seal all jacket seams and penetrations with UL listed tapes or vapor retardant adhesive. Where service access is required, bevel and seal ends of insulation.

D. Continue insulation through walls, sleeves, hangers, and other duct penetrations except where prohibited by code.

E. The underside of duct work 24" or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18" on center. The protruding ends of the fasteners should be cut off flush after the speed clips are installed, and then, when required, sealed with the same tape as specified above.

F. For ductwork exposed to physical abuse in mechanical equipment rooms or in finished spaces, finish with Johns Manville Zeston® 2000 PVC jacket or aluminum jacket.

G. Flexible Fiberglass Insulation Wrap Blanket Schedule

1. Flexible Fiber Glass

a. Supply and Return Ducts @ HVAC units:

1 1/2 inch thick Foil Back Min R-8

b. Supply and Return Plenums @ HVAC units:

1 1/2 inch thick Foil Back Min R-8

2. Rigid Fiber Glass

a. Supply and Return Ducts @ HVAC units

1 1/2 inch thick Foil Back Min R-8

b. Supply and Return Plenums @ HVAC units

1 1/2 inch thick Foil Back Min R-8

3.05 DUCT LINER INSULATION INSTALLATION AND SCHEDULE

A. Duct liner shall be used in all weather-exposed locations or outside of building. Duct liner shall be installed in all supply and return plenums for sound reduction and thermal insulation. Supply and return plenums occur at each air-moving piece of equipment. Duct liner shall also be installed where indicated on the drawings.

B. Duct linings shall be interrupted at fire dampers and fire doors so as not to interfere with their operation. Duct coverings and linings shall also be interrupted at the immediate area of operation of heat sources in a duct system involving electric resistance or fuel burning heaters.

C. All portions of duct designed to receive duct liner shall be completely lined on the interior with acoustical lining as specified herein. Transverse joints shall be neatly butted and there shall be no interruptions or gaps.

D. The coated surface of the lining shall face the airstream.

E. The lining shall be adhered to the sheet metal with 100% coverage of adhesive, and all exposed leading edges and all transverse joints coated with adhesive.

F. The lining shall be additionally secured with mechanical fasteners that shall compress the duct liner sufficiently to hold it firmly in place.

G. The lining shall be cut to assure overlapped and compressed longitudinal corner joints.

H. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

I. Sizes noted on drawings are clear cross-section area (inside the lining).

J. For velocities up to 2,000 fpm, duct liner shall be applied with 100% coverage of fire retardant adhesive. Duct liner shall be cut to assure snug corner joints. The coated or most dense surface of the liner shall face the air stream. The liner shall be additionally secured with mechanical fasteners that shall compress the duct liner sufficiently to hold it firmly in place. They shall start within 3" of the leading edge of each duct section (and any line transverse joints within the duct section) and shall be spaced no more than 12" O.C. around the perimeter of the duct, except that they need to be no closer than 9" to a corner break. Elsewhere, they shall be a maximum of 18" O.C., except that they shall be placed not more than 6" from a cut edge nor 12" from a corner break. All exposed edges and the leading edge of all cross-joints of the liner shall be coated with the same adhesive used to secure the duct liner to the metal surface. For velocities between 2,000 and 4,000 fpm, installation shall be same except that mechanical fasteners shall be spaced no more than 6" O.C. around the perimeter of the duct, except that they need be no closer than 6" to a corner break. Elsewhere, they shall be a maximum of 10" O.C., except that they shall be placed not more than 6" from a cut edge nor 12" from a corner break.

K. Adhesive shall conform to ASTM C916-85

L. Mechanical fasteners shall conform to Mechanical Fastener Standard MF-1-1975, available from SMACNA.

M. Adhere insulation to sheet metal with full coverage of a UL listed adhesive.

N. Secure insulation with mechanical liner fasteners as indicated by SMACNA or manufacturer. Pin length should be as recommended by the liner manufacturer.

O. All exposed edges of the liner must be factory or field coated. For systems operating at 4000 fpm or higher a metal nosing must be installed in all liner leading edges.

P. Repair liner surface penetrations with UL listed adhesive.

Q. Duct Liner Insulation Schedule - Rigid Fiber Glass

1. Supply and Return Ducts as noted on drawings

   1 inch thick (R-6.3) LINACOUSTIC, PERMACOTE or equal

2. Supply and Return Plenums for down discharge HVAC units:

   1 1/2 inch thick (min R-8) LINACOUSTIC, PERMACOTE or equal

3. Roof Mounted or Exterior Supply and Return Duct Work from HVAC units:

   2 inch thick (min R-8) LINACOUSTIC, PERMACOTE or equal

END OF SECTION

SECTION 23 08 00

COMMISSIONING OF HVAC.

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. HVAC commissioning description.
2. HVAC commissioning responsibilities.

1.02 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:

1. Testing and startup of HVAC equipment and systems.

2. Equipment and system verification checks.

3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.

4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.

5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.

6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.

7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.

8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.

9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. HVAC Units
2. Piping systems.
3. Ductwork.
4. Packaged roof top air conditioning units.
5. Split system air conditioning units.
6. Exhaust Fans.
7. Equipment vibration control.
8. Automatic temperature control system.
9. Testing, Adjusting and Balancing work.

1.03 COMMISSIONING SUBMITTALS

A. Draft Forms: Submit draft of system verification form and functional performance test checklist.

B. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use AABC forms as guidelines.

C. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.

B. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with AABC and ASHRAE Guideline.

B. Maintain one copy of document on site.

1.06 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.

3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.

4. Provide instructions and demonstrations for Owner's personnel.

5. Ensure subcontractors perform assigned commissioning responsibilities.

6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.

7. Develop startup and initial checkout plan using manufacturer’s startup procedures and functional performance checklists for equipment and systems to be commissioned.

8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.

9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.

10. Provide manufacturer’s representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.

11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.

12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.

13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.

14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.

15. Provide factory supervised startup services for equipment and systems specified in Section 23 20 00. Coordinate work with manufacturer and Commissioning Authority.

16. Perform verification checks and startup on equipment and systems as specified.

17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.

18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.

19. Conduct HVAC system orientation and inspection.

B. Temperature Controls Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Review design for ability of systems to be controlled including the following:

a. Confirm proper hardware requirements exist to perform functional performance testing.

b. Confirm proper safeties and interlocks are included in design.

c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.

d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.

e. Confirm sensors selected are within device ranges.

f. Review sequences of operation and obtain clarification from Architect/Engineer.

g. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.

h. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.

3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.

4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.

5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.

6. Perform training sessions to instruct Santee School District Facility personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements of Section 23 09 00.

7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.

8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.

9. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.

10. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes. Repeat sample of 20 percent of measurements contained in testing, adjusting, and balancing report as selected by Commissioning Authority.

3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.07 COMMISSIONING MEETINGS

A. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.08 SCHEDULING

A. Prepare schedule indicating anticipated start dates for the following:

1. Piping system pressure testing.
2. Piping system flushing and cleaning.
3. Ductwork cleaning.
4. Ductwork pressure testing.
5. Equipment and system startups.

6. Automatic temperature control system checkout.
7. Testing, adjusting, and balancing.
8. HVAC system orientation and inspections.
9. Operation and maintenance manual submittals.
10. Training sessions.

B. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.

C. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy or use.

1.09 COORDINATION

A. Notify Commissioning Authority minimum of four weeks in advance of the following:

1. Scheduled equipment and system startups.
2. Scheduled automatic temperature control system checkout.
3. Scheduled start of testing, adjusting, and balancing work.

B. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

PART 2 – PRODUCTS (NOT APPLICALBE)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required by Commissioning Authority.

B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.

C. Install replacement sheaves and belts to obtain system performance, as requested by Commissioning Authority.

D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements. Refer to Section 23 05 00.

E. Prior to start of functional performance test, install replacement filters in equipment as specified in individual section.

3.02 COMMISSIONING

A. Seasonal Sensitive Functional Performance Tests:

1. Test heating equipment at winter design temperatures.

2. Test cooling equipment at summer design temperatures with fully occupied building].

B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

C. Occupancy Sensitive Functional Performance Tests:

1. Test equipment and systems affected by occupancy variations at minimum and peak loads to observe system performance.

END OF SECTION

SECTION 23 09 00

INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. The Direct-Digital Control (DDC) System specified herein shall include materials, operator workstation, building controllers, sensors, control valves, wiring, installation, start-up, testing, documentation and training for a complete operable system as required for this project.

B. Controls Engineering shall be provided by the local controls manufacturer representative.

C. Work specified under this section shall be performed by, or under the direct supervision of the local controls manufacturer representative, or by a contractor that is certified by the controls manufacture to perform all work within Section 23 09 00 Instrumentation and Control for HVAC and those sections of 23 09 00 that have been specified herein.

D. Alternate techniques, modifications or changes to any aspect of these specifications may be submitted as a voluntary alternate no later than (15) days prior to the bid date and with sufficient information for a complete evaluation. This information shall include product data sheets, a UL508A Standard for Industrial Control Panels statement of compliance for any locally manufactured control panels, a detailed sequence of operation and engineered shop drawing. Shop drawings shall include the following as a minimum. Point to point wiring diagrams for each piece of equipment to be controlled, a network riser diagram that will depict quantity and location of the operator workstation, controllers, routers and repeaters required for this project.

1.02 RELATED SECTIONS

A. 23 01 00: HVAC Systems General

B. 03 05 00 Test Adjusting and Balance

C. 23 08 00: Commissioning of HVAC

D. 26 00 00: Electrical

1.03 SUBMITTALS

A. Submit engineered shop drawings, sequences of operation, third party equipment and controls integration points and product data sheets covering all items of equipment for the proposed system prior to installation for approval. Any deviation from the contract documents shall be noted and the drawings signed and dated by the Contractor. Additionally, submit a UL508A Standard for Industrial Control Panels statement of compliance for any locally manufactured control panels.

B. After completion of the installation and commissioning, a full set of as-built documentation shall be turned over to the Owner. The as-built shall include operation and maintenance manuals, sequence of operation, shop drawings and digital copies of the following.

1. Complete DDC System database backup

2. Source files for all custom written controller applications

3. Source files for graphics if required for this project

1.04 WARRANTY

A. Components, system software, and parts shall be guaranteed against defects in materials, fabrication, and execution for (2) years from date of system acceptance. Provide labor and materials to repair, reprogram, or replace components at no charge to the Owner during the warranty period.

B. Provide a list of applicable warranties for components, this list shall include warranty information, names, addresses, telephone numbers, and procedures for filing a claim and obtaining warranty services.

C. Respond to the Owner's request for warranty service within (24) hours during normal business hours. Submit records of the nature of the call, the work performed, and the parts replaced or service rendered.

D. Contractor shall request VPN access from owner and provide remote maintenance, software updates and repair service for the duration of the warranty period.

1.05 TRAINING

A. Provide a competent instructor who is factory trained and has comprehensive knowledge of system components and operations to provide full instructions to designated personnel in the system operation, maintenance, and programming. Training shall be specifically oriented to installed equipment and systems.

B. Provide (4) hours of onsite owner familiarization and training for the installed system. Training shall include system overview, time schedules, emergency operation, and programming and report generation.

C. Owner employees attending this training session shall be provided with the following documentation:

1. System layout point to point connection diagram.
2. System components cut sheets.
3. Operations and maintenance data.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Do not store or install electronic hardware on the project until non-condensing environmental conditions have been established.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

DDC Equipment: Carrier OPEN BACnet Controls, Honeywell, Trane, or approved equal.

A. The local manufacture representative will operate a free 40 hour a week, toll free customer support hotline for additional user support services that are required.

2.02 SYSTEM LISTING COMPLIANCE

A. Locally manufactured control panels shall meet all requirements as outlined by UL 508A standard and shall be both approved and listed by Underwriters Laboratories, Inc.

2.03 COMMUNICATION

A. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.

B. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.

C. Use owner provided Ethernet backbone for network segments.

2.04 OPERATOR INTERFACE

A. Description. The control system shall be as shown and consist of a high-speed, peer-to-peer network of DDC controllers and a stand-alone web server operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators with sufficient access level shall have an ability to make changes to all system and equipment graphics in the web server in addition to having full DDC system access to make configuration changes to the control system. Any tools required for making graphic changes shall be provided with web server.

B. Operator Interface. Furnish (1) Web server interface as shown on the system drawings.

1. With the use of an owner provided remote SMTP email server the operators interface web server shall notify personnel of an alarm and record information about an alarm in the DDC system.

2. Any required installation or commissioning software shall be provided to the owner.

C. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:

1. Log In and Log Out
2. Point-and-click Navigation
3. View and Adjust Equipment Properties
4. View and Adjust Operating Schedules
5. View and Respond to Alarms
6. View and Configure Trends
7. Manage Control System Hardware
8. Manage Operator Access

D. System Graphics. Operator interface shall be graphical and shall include at least one graphic per piece of equipment and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.

E. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs.

F. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Furnish the following standard system reports.

1. Alarm Reports
2. Schedule Reports
3. Security Reports
4. Commissioning Reports
5. Equipment Reports

G. Energy Conservation

1. Outside Air Lockout. Lock out heating or cooling modes based on configurable outside air temperature limits.

2. Demand Limiting

a. System shall monitor building power consumption from building power meter pulse generator signals or from building feeder line watt transducer or current transformer.

b. The system shall include all required hardware and software necessary to receive an Automated Demand Response (ADR) signal from the utilities Demand Response Automation Server (DRAS).

c. When power consumption exceeds adjustable levels, or the system receives an ADR signal from the utility, the system shall automatically adjust set points, and take other programmatic actions to reduce demand.

3. Optimal Start. The system shall bring the conditioned space to within occupied set points prior to the occupied time period to ensure occupant comfort.

4. Demand Controlled Ventilation (DCV).Each controlled space shall have a Carbon Dioxide (CO2) sensor and shall maintain a ventilation setpoint through a DCV algorithm to fulfill the requirements of ASHRAE standard, 62-1989 “Ventilation for Acceptable Indoor Air Quality” (including Addendum 62a-1990).

2.05 CONTROLLERS

A. General. The control system shall be available as a complete package with the required input sensors and devices readily available. Provide BACnet Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), and Sensors (SEN) as required.

B. Stand-Alone Operation. Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure.

C. Serviceability. Controllers shall have diagnostic LEDs for power, communication, and processor.

D. Rooftop Unit Controller (RTC). Defined as Application Specific Controllers (ASC), shall be factory installed by the HVAC manufacturer and shall control all associated HVAC rooftop equipment functions in a single zone application or as part of a zoning system application.

1. Capacity control shall be based by the RTC internal time clock and setpoints (cooling and heating) coupled with a communicating room sensor. The controls shall provide separate occupied and unoccupied cooling and heating setpoints.

2. RTC shall utilize up to 2 speed of fan control, up to 3 stages of cooling, and up to 4 stages of heating.

3. RTC shall provide economizer control that has been certified for Fault Detection and Diagnostics (FDD) by California Energy Commission (CEC). The FDD system shall detect the following faults:
   a. Air temperature sensor failure/fault
   b. Not economizing when it should
   c. Economizing when it should not
   d. Damper not modulating
   e. Excess outdoor air

E. Zone Controller (ZC). Defined as Application Specific Controllers (ASC) shall be capable of independent zone control or function as part of the zoning system.

1. ZC shall have an integrated brushless actuator, onboard pressure sensor and shall perform pressure independent zone control by measuring and controlling CFM being delivered to the zone.

2. The ZC shall utilize the Dual Maximum Control Setpoints VAV Box Logic as defined by Title 24.

F. Bypass Controller (BC). Defined as Application Specific Controllers (ASC) shall be capable of reading supply static pressure and controlling the bypass damper (or a VFD speed control output) to maintain the supply static set point in the supply duct. This operation shall be provided when operating within a zoning system application, or in a stand-alone mode.

1. BC shall have an integrated brushless actuator and onboard pressure sensor to measure and control duct static pressure.

G. General Purpose Controller. Defined as Advanced Application Controller (AAC) shall be a solid state micro-controller with pre-tested and factory configured software designed for controlling building equipment using DDC algorithms and facility management routines. The controller shall be capable of operating in either a stand-alone mode or as part of a network.

2.06 FIELD INSTALLED SENSORS

A. Space Temperature Sensors shall communicate to the controller over a 4-wire communication network and have setpoint adjustment, after hours override, LCD display and a communication service port.

B. Carbon dioxide sensor (CO2) shall be integrated into the Space Temperature Sensors and have integral programming to perform automatic baseline calibration without user interface. The recommended manual recalibration period shall not be less than five years.

C. Status indication for fans or pumps shall be provided by current sensing switch. The sensor shall be installed at the motor starter or motor to provide load indication. The unit shall consist of a current transformer, a solid state current sensing circuit (with adjustable set point) and a solid state switch. A light emitting diode (LED) shall indicate the on off status of the unit.

2.07 CONTROL PANELS

A. Provide single-door, UL 508A Listed; NEMA Type 1, 3R or 4 to match environmental conditions, wall-mount enclosures for each system under automatic control. Mount relays, switches, and controllers in cabinet and indicators, pilot lights, push buttons and switches flush on enclosure exterior face as required.

B. Fabricate panels from 16 gauge steel with ANSI 61 gray finish and shall include (1) black padlock handle that will accommodate a padlock with up to a 5/16-in. locking bar for secure access to the enclosure contents. All additional latches shall be black non-locking handle type.

C. Provide engraved name plates that identify each control panel and for each component mounted to the exterior of the enclosure.

D. Provide a complete wiring diagram, bill of material for all components and markings with the following information:

1. Manufacturer’s name or trademark

2. Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit

3. Enclosure type number

PART 3 - EXECUTION

3.01 ELECTRICAL WIRING

A. This contractor is responsible for all low voltage electrical installation and wiring for a fully operational DDC System as shown on the drawings and shall perform electrical installation in accordance with local and national electrical codes and in accordance with Division 26.

B. Install all HVAC control wiring, 24vdc or less, in electrical metallic tubing (EMT) when wire is concealed in walls and in exposed areas. Rigid metal conduit (RMC) will be used when conduit will be installed on roofs. Plenum wire may be used in ceilings where anchored support is provided every 10 feet.

C. Electrical Contractor is responsible for providing power from local electrical panels to the DDC System control panels.

D. When transitioning between buildings above or below ground level, provide a pull box with necessary surge suppression hardware to transition exterior rated wiring to interior applications.

3.02 ACCEPTANCE PROCEDURE

A. Upon completion of the installation, the contractor shall start-up the system and perform all necessary calibration and testing to ensure the proper operation of the DDC System.

B. After all calibration and testing have been completed, the contractor shall schedule a hardware demonstration and system acceptance test to be performed in the presence of the designated owner's representatives.

C. The contractor shall be a member of the designated Commissioning Team and shall be responsible for performing procedures presented in specification and contract drawings as detailed in the Functional Performance Tests (FPT).

END OF SECTION

SECTION 23 20 00

HEATING VENTILATING AND AIR CONDITIONING SYSTEMS

PART 1- GENERAL

1.01 SUMMARY

A. Work under this section provides materials and equipment related to Heating, Air Conditioning and Refrigeration systems.

B. Provide complete Mechanical Submittals and Shop drawings. Refer to Section Heating Ventilating and Air Conditioning System General Provisions 23 01 00 paragraph 1.4 Submittals - Shop Drawings/Product Data/Material Certifications.

1.02 RELATED SECTIONS

A. Section 23 01 00 - Heating Ventilating and Air Conditioning Systems General Provisions.

B. Section 23 07 00 - Heating Ventilating and Air Conditioning Insulation.

C. Section 23 09 00 - Instrumentation and Control for Heating Ventilating and Air Conditioning.

1.03 DEFINITIONS

A. Ductwork Sizes: Inside clear dimensions. For acoustically lined and internally insulated ductwork, maintain ductwork sizes inside lining or insulation.

B. Low Pressure: Static pressure in duct 2" water gauge or less, velocity 2000 fpm or less.

1.04 EQUIPMENT AND COMPONENTS REVIEW

A. Only equipment and components from those manufacturers indicated in this specification are acceptable.

B. Products from manufacturers which have not previously been thoroughly reviewed and accepted by the Santee School District Representative before the bidding period will not be considered.

1.05 SUBMITTALS

A. Comply with specification Section 23 01 00 General Provisions for Heating Ventilating and Air Conditioning Systems.

B. Require Completed Submittals

1. Duct work fittings and accessories.
2. Sealant.

3. Access panel and doors.
4. Grilles, registers, and diffusers.
5. Filters.
6. HVAC units.
7. Exhaust fans.
8. Vibration Isolation products.
9. Refrigeration piping and piping supports.

C. Required Shop Drawings

1. Routing of all duct and piping systems.
2. Equipment layout with vibration isolation.

PART 2 - PRODUCTS

2.01 SHEET METAL

A. Unless otherwise specified, sheet metal used for duct and plenum construction shall be G90 coated galvanized steel of lock forming grade conforming to ASTM standards A653-11. All duct work and supports shall be galvanized. All sheet metal round ducts shall be round spiral lock-seam construction. "Knock down" (KD) duct is not acceptable.

B. The gauge of the duct and its construction shall be based on low pressure or medium pressure or low or medium velocity. The velocities can be obtained by the duct size and CFM values listed on the drawings. The static pressure for various systems is listed on the mechanical equipment schedule. Refer to the SMACNA standards for the correct duct construction based on the velocities and static pressures involved.

C. Sealing of Duct Work: All supply and return duct work from mechanical units, all exhaust duct work and all outside air duct work shall have a high pressure Class A seal per SMACNA.

D. Alumiflex type duct will not be permitted on this project. All ducts are to be rigid galvanized sheet metal.

E. Exposed round ductwork shall be equal to McGill Round Uni-Light spiral duct, manufactured from G90 galvanized sheet steel meeting ASTM A653-11 (lock forming quality) or equal. The duct and fittings shall be assembled with United Uni-Ramp joints or equal, using sheet metal screws.

F. All ductwork, fittings, transitions, and hangers exposed to view shall be painted. Provide primer and final coat on all exposed ductwork. The color of the final coat of paint shall be selected by the Santee School District Representative.

G. All fittings shall be standard design fittings from the same manufacturer as the duct. Branch takeoffs shall be set at 45^{o} to the trunk duct in the direction of the air flow with factory made fittings. All reductions in duct size shall be made in factory fabricated reducing fittings. Elbows with heel taps are not acceptable.

H. All factory fabricated fittings and joints must be joined using sheet metal screws and duct sealing compound. Ducts made up with sealer shall have a minimum of 2" overlap

and sealed with duct sealing compound applied to both parts for the full length of the overlap.

2.02 FLEXIBLE DUCT

A. Flexible duct shall only be permitted in concealed tee bar ceilings and at the end of duct run-outs to diffusers or grills. No flex duct shall be exposed to view. The maximum flex length shall be 7 feet.

B. Flexible ducts shall be installed in as straight a manner as possible. Avoid bends with inside radius of less than one duct diameter. Cut ducts to length required, rather than using bends to take up slack.

C. Flexible duct shall comply with the UL 181 Class I requirements of the current edition of the California Mechanical Code with a flame spread rating 25 or less and smoke developed rating not higher than 50.

D. All flexible ducts shall be insulated. Insulation shall be fiberglass with an "R" value of 8.

E. Flexible Ductwork – Manufactured with a fiberglass scrim reinforced, metallized polyester jacket and polymer water proof liner. Duct shall be factory made and consist of an interior liner that is moisture proof. Interior liner material shall be polymer type. Interior liner shall be air and water tight.

F. Flexible Ductwork shall be ATCO UPC #031 (R-8) UL 181, Class 1 Air Ducts or equal. Flex duct shall have R-8 double-layer core of each product and is to be wrapped in multiple thicknesses of fiberglass insulation. Jacket shall have rugged and durable fiberglass scrim reinforced, metallized polyester jacket.

G. Flexible Duct work - All thermal performance (R-Values) are classified by Underwriters Laboratories in accordance with ADC Flexible Duct Performance and Installation Standard using ASTM C518-10, at installed wall thickness, on flat insulation only. Rated Positive Pressure: 10” w.g. per UL 181 (UL Listed pressure ratings are determined in straight lengths @ ambient temperatures.) Recommended Operating Pressures: (Determined in a 90° bend at elevated temperatures in accordance with ADC FD 72-R1 Test Code.) Maximum Positive: 6” w.g. - 4” thru 12” Dia. 4” w.g. - 14” thru 20” Dia. (With factory installed metal collars, 2” w.g. - all diameters). Maximum Negative: 3/4” w.g. - all diameters. Maximum Velocity: 5,000 FPM.

2.03 ROUND DUCT TAKE-OFF FITTINGS

A. Take-off fittings for all rigid round ducts shall be at 45 degree angles to the main duct or use a bellmouth fitting. Provide quadrant damper at duct take-off fitting unless otherwise specified.

2.04 DUCT SEALANT

A. Acceptable manufacturers are Ductmate® Industries – PROseal® and FIBERseal®; and Hardcast, Inc – Sealing System.

B. Metal to Metal - Duct sealer shall be flexible and self-curing and comply with UL 723 and UL 181B.

C. Flex Duct - Duct sealer shall be flexible and self-curing and comply with UL 723 and UL 181B-M.

D. Sealant shall have a flame spread less than 25 and the smoke developed less than 50 when dry.

2.05 ACCESS PANELS AND DOORS

A. Acceptable manufacturers are Ventfabrics, Inc., C. E. Sparrow Co. and Elmdor / Stoneman MFG.

B. Access panels in sheet metal work shall consist of three one-piece stampings: the door frame, the door itself and the pan. Space between door and pan shall be filled with 1" thick insulation. The door shall be hung with loose pin hinges.

C. Access panel sizes shall be as follows unless otherwise specified on drawings:

Size of Duct to be Accessed	Panel Size	Metal Gauges of Frame	Door	Pan
6" - 8"	6" x 8"	24	26	28
10" - 12"	10" x 12"	22	24	28
12" - 16"	12 x 16"	20	24	28
18" and over	16" x 24"	20	22	28

D. Access doors shall be fabricated in accordance with the details in the SMACNA Duct Construction Standards. Latches and hinges shall be equal to Ventlok of appropriate type and size.

2.06 TURNING VANES

A. Acceptable manufacturers are Tuttle & Bailey, Invensys Eurotherm (Barber-Colman) and AeroDyne Research.

B. Turning vanes shall be double-walled and formed to assure that any point on one blade is equidistant from the same point on an adjacent blade.

2.07 BACKDRAFT DAMPERS

A. Gravity backdraft dampers shall be fabricated multi-blade, parallel action, gravity balanced backdraft dampers of galvanized steel or extruded aluminum, with center pivoted blades linked together; with sealed edges, steel ball bearings, and a plated steel pivot pin.

2.08 GRILLES, REGISTERS AND DIFFUSERS

A. Acceptable manufacturers are Price, Krueger or Titus.

B. All units must be factory finished. Provide white color finish. Unit ratings shall be approved by ADC.

C. Air flow tests and sound level measurement shall be made in accordance with applicable ADC equipment test codes and ASHRAE standards. Manufacturer shall certify catalogued performances and ensure correct application of air outlet types.

D. Positions indicated are approximate only. Check location of supply, return and exhaust grilles and make necessary adjustments in position to conform architectural features, symmetry and lighting arrangement. See architectural reflected ceiling plans and interior elevations for additional information.

E. Provide splay wires from air distribution to structural building members. Splay wires are used for seismic restraint and shall be attached at each corner with a minimum of 4 splays for each grill.

F. For dry wall ceilings use "Rapid Mount" frames for access to volume dampers and other items.

G. Supply Air Distribution - Provide the sizes listed below unless otherwise noted on the drawings. Sizes specified on the drawings supersedes the tables below.

1. Supply Diffuser - 24" X 24" Lay in Tee-Bar and Modular Core Type. Do not provide perforated plate type due to sound and air distribution issues. Exposed blades with 4 modular cores that can be removed and repositioned to provide one-way to four-way blow pattern. Square neck type. Cores shall be put in four-way blow pattern unless other wise noted. Include square to round transition for duct connection. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 100	24" X 24"	6” x 6"
101 - 175	24" X 24"	8" X 8"
176 - 250	24" X 24"	10" X 10"
251 - 400	24" X 24"	14" X 14"
401 - 500	24" X 24"	14" X 14"
501 - 700	24" X 24"	16" X 16"
701 - 850	24" X 24"	18" X 18"

2. Supply Diffuser - Surface Mounted and Modular Core Type. Exposed blades with 4 modular cores that can be removed and repositioned to provide one-way to four way blow pattern. Do not provide perforated plate type due to sound and air distribution issues. Square neck type. Cores shall be put in four-way blow pattern unless other wise noted. Include square to round transition for duct connection. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 100	11" X 11"	6” x 6"
101 - 175	13" X 13"	8" X 8"
176 - 250	15" X 15"	10" X 10"

251 - 400	17" X 17"	12" X 12"
401 - 500	19" X 19"	14" X 14"
501 - 700	21" X 21"	16" X 16"
701 - 850	23" X 23"	18" X 18"

3. Supply Grill - Surface Mounted Sidewall Type Diffuser. Extruded aluminum with double deflection. Include transition from duct size to diffuser size. Two way blow. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 75	11 3/4" X 5 3/4"	10" X 4"
76 - 150	11 3/4" X 7 3/4"	10" X 6"
151 - 175	13 3/4" X 7 3/4"	12" X 6"
176 - 225	15 3/4" X 7 3/4"	14" X 6"
226 - 350	19 3/4" X 9 3/4"	18" X 8"
351 - 600	21 3/4" x 11 3/4"	20" X 10"

H. Return Air Distribution - Provide the sizes listed below unless otherwise noted on the drawings.

1. Return Grill - 24" X 24" Perforated lay in Tee-Bar type. Concealed hinges. Include square to round transition for duct connection. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 100	24" X 24"	6” x 6"
101 - 175	24" X 24"	8" X 8"
176 - 250	24" X 24"	12" X 12"
401 - 500	24" X 24"	14" X 14"
501 - 700	24" X 24"	16" X 16"
701 - 850	24" X 24"	18" X 18"

2. Return Grill - Perforated surface mounted type. Concealed hinges. Include square to round transition for duct connection. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 100	13" X 13"	6 x 6"
101 - 180	15" X 15"	8" X 8"
181 - 225	16" X 16"	9" X 9"
226 - 280	17" X 17"	10" X 10"
281 - 400	19" X 19"	12" X 12"
401 - 600	22" X 22"	15" X 15"
601 - 800	25" X 25"	18" X 18"

3. Return Grill - Surface Mounted Sidewall Type Return Grill. Extruded aluminum with 3/4" centers. Include transition from duct size to grill size. 35 degree angle blades. Standard white color.

CFM	FACE SIZE	NECK SIZE
0 - 100	11 3/4" X 7 3/4"	10" X 6"

101 - 150	13 3/4" X 7 3/4"	12" X 6"
151 - 200	19 3/4" X 7 3/4"	18" X 6"
201 - 350	19 3/4" X 11 3/4"	18" X 10"
351 - 450	19 3/4" X 13 3/4"	18" X 12"
451 - 600	25 3/4" x 13 3/4"	24" X 12"

I. Exhaust Grills shall be the same model and size as return grills.

2.09 FLEXIBLE CONNECTIONS

A. Provide flexible connections at inlet and discharge connections of fans and air handling equipment to prevent mechanical noises from being transmitted to connecting ductwork.

B. Acceptable manufacturers are Ventfabrics, Inc., and Duro Dyne Corp. UL listed, fire-retardant, neoprene-coated woven glass fiber fabric to NFPA 90A and crimped into metal edging strip.

C. Ventglas® shall be used for flexible duct connections when not exposed to the weather.

D. Ventlon® shall be used for flexible duct connections exposed to the weather.

2.10 VOLUME CONTROL DAMPERS

A. Acceptable manufacturer are Penn Barry, Metal Form Manufacturing Co. and Duro Dyne Corp.

B. Provide tight close-off dampers at locations indicated on drawings or as needed for control of the air distribution system.

C. Dampers shall have air loss (leakage), when closed, less than 1% of the full flow rate (based on approach velocity of 2,000 fpm) with a pressure differential across damper 4" static pressure or less.

D. Construction shall be of No. 22 gauge galvanized blades.

E. All control rods for volume dampers shall be continuous through-out blade and duct work. Provide locking quadrants and bronze end bushings.

F. Provide locator flags at each damper adjusting arm consisting of a 12" length of yellow or orange engineering tape.

2.11 SMOKE DETECTORS

A. HVAC combined systems with over 2,000 CFM serving a single space.

1. Fire alarm system shall provide automatic shut-off per CMC section 608. Refer to drawing M0.2, package unit schedule remark #22 and detail 9/M5.

2.12 FILTERS

A. Acceptable manufacturers are Camfil Farr or American Air Filter.

B. Provide two sets of air filters for each HVAC, HV and fan coil unit.

1. The first set of air filters shall be installed during construction and used during the air balance portion of the project.

2. The second set of air filters shall be installed after the air balance portion of the project is finished and prior to the mechanical final punch list site visit.

C. Air filters for rooftop HVAC units filers MERV rating shall be 13.

D. Air rooftop HVAC units filters shall be 2" pleated, disposable type.

E. Each filter shall consist of a non-woven cotton fabric media support grid and enclosing frame. Provide Farr Holding Frames factory fabricated of 16 gauge galvanized steel and be equipped with gaskets and four heavy-duty positive sealing fasteners. Each fastener shall be capable of withstanding 25 lbs. of pressure without deflection. They shall be capable of being attached or removed without the use of tools. Filters shall be capable of being installed or removed without any movement of equipment or duct work.

F. Filters shall have a composite fire hazard rating as tested by ASTM E84, NFPA 255, or UL 723 not to exceed 25 flame spread and 50 smoke developed. Materials labeled accordingly.

G. Air Filters shall be a California State Fire Marshal approved and listed type. Preformed filters having combustible framing shall be tested as a complete assembly. Air filters in all occupancies shall be Class 2 or better (as shown in the State Fire Marshal Listing). Air filters shall be accessible for cleaning or replacement.

H. Filters shall conform to ASHRAE 90A-1980 and NFPA 90.

2.13 ROOFTOP PACKAGED HEATING, VENTILATING AND AIR CONDITIONING (HVAC) UNITS, AND ACCESSORIES

A. Acceptable manufacturers of rooftop package HVAC units are Carrier, Trane or Equal.

B. Curbs for HVAC and HV units - Provide a minimum of 16 gauge custom pitched roof curb for each HVAC and HV rooftop unit. The roof curb shall be a single type pitched curb with the slope of the roof curb field measured. The roof curb shall be supported by roof structural support members. Align the roof curb with these support members. The roof curb shall provide a level surface for the installation of the rooftop unit. All curbs shall be rated for seismic zone 4. Provide structural seismic overturning calculations for curbs in submittal. All structural calculations in submittals shall be stamped and signed by a State Certified Structural Professional Engineer.

C. HVAC Packaged Rooftop Units

1. Include the following components and accessories

a. R410A Direct-expansion cooling.

b. Stainless steel gas furnace.

c. Economizer outdoor- and return-air damper section.

d. Roof curbs and vibrations isolation rails.

e. Modulating power exhaust fan with room pressure sensor.

2. The casing shall be constructed of coated steel meeting SMACNA or ASHRAE Standards. Internal insulation shall meet the requirements of NFPA Bulletin 90-A and UL 181.

3. ARI Compliance: Comply with ARI 210/240 and ANSI/ARI 340/360 for testing and rating energy efficiencies. Comply with ANSI/ARI 270 for testing and rating sound performance.

4. ASHRAE Compliance: Comply with ANSI/ASHRAE 15 for refrigeration system safety.

5. Minimum Energy Compliance: Comply with the current edition of California Energy Code, Title 24, Part 6.

6. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

7. UL Compliance: Comply with UL 1995. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

8. The unit manufacturer shall furnish, when requested, certified sound power levels for both discharge sound and casing radiated sound, tested in accordance with ASHRAE Standard 36-72.

9. Controls: The units shall be equipped for and shall interface with DDC (Direct Digital Controls) systems. Coordinate with controls manufacturer.

10. Arrangement and configuration as indicated on drawings and as described on the equipment schedule. Condensing section shall be designed for outdoor duty. Performance shall be certified in accordance with Air Conditioning and Refrigeration institute (ARI) Standard for rooftop HVAC units. Fans to be rated by AMCA.

11. Provide and flex connections on supply and return duct plenums for the isolation of mechanical equipment. These flex connections are for the avoidance of excessive noise or vibration in the building due to the operation of equipment.

12. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.

13. Seismic-Restraint Details: Detail fabrication and attachment of wind and seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

2.14 SPLIT SYSTEM

A. Acceptable manufacturers are Liebert, Cool Air, ATS.

B. Provide factory assembled ductless cooling only split system as specified on drawing M0.2.

C. Single refrigeration circuit

D. Blower shall be direct drive with two speeds.

E. Direct drive with centrifugal type, double inlet blower, with permanently lubricated bearing.

F. Micro Processor based design including 8 key for set points.

G. The units shall be equipped and designed for DDC (Direct Digital Controls) systems.

H. Units shall be suspended and provided with neoprene rubber-in-shear vibration isolators and hanger units. Provide seismic motion restraints as required by California Mechanical and Building Codes. This isolation equipment is for the avoidance of excessive noise or vibration in the building due to the operation of equipment, and due to interconnected piping, ductwork and conduit.

2.15 CONDENSING UNITS

A. Acceptable manufacturer is Liebert or Equal.

B. Arrangement and configuration as indicated on drawings and as described on the equipment schedule. Condensing units shall be weatherized for outdoor duty. Condensing unit performance shall be certified in accordance with Air Conditioning and Refrigeration institute (ARI) Standards.

C. Provide 1" thick neoprene pads for the isolation of mechanical equipment. This isolation equipment is for the avoidance of excessive noise or vibration in the building due to the operation of equipment.

D. The units shall be equipped and designed for DDC (Direct Digital Controls) systems.

2.16 EXHAUST FANS AND ACCESSORIES

A. Acceptable manufacturers are Greenheck, Loren Cook Co., or Penn Barry. Exhaust fans shall meet AMCA standards.

B. Provide a custom pitched roof curb for all roof mounted exhaust fans. The roof curb shall be a single type pitched curb with the slope of the roof curb field measured. The roof curb shall be supported by roof structural support members. Align the roof curb

with these support members. The roof curb shall provide a level surface for the installation of the roof mounted exhaust fans. Roof mounted exhaust fans and motors shall be designed for outdoor duty.

C. Provide neoprene rubber-in-shear vibration isolators for all ceiling hung and attic suspended units. Provide seismic motion restraints as required by California Mechanical and Building Codes. This isolation equipment is for the avoidance of excessive noise or vibration in the building due to the operation of equipment, and due to interconnected ductwork and conduit.

D. The casing shall be constructed of coated steel meeting SMACNA and ASHRAE Standards.

E. The exhaust fan's manufacturer shall furnish, when requested, certified sound power levels for both discharge sound and casing radiated sound, tested in accordance with ASHRAE Standard 36-72.

F. Arrangement and configuration as indicated on drawings and as described on the equipment schedule. Performance shall be certified in accordance with Air Conditioning and Refrigeration Institute (ARI) Standard for rooftop HVAC units. Fans to be rated by AMCA.

G. Provide and flex connections on exhaust inlet and outlet for the isolation of exhaust fans. These flex connections are for the avoidance of excessive noise or vibration in the building due to the operation of equipment.

H. Exhaust fan motors that are 208/230 volt, 1 or 3 phase and 460 volt, 3 phase shall be provided with motor starters. Provide correct size and voltage characteristics per electrical requirements. Motor starters shall be coordinated with Section 23 09 00 HVAC Instrumentation and Control.

I. Controls: The units shall be equipped and designed for DDC (Direct Digital Controls), as specified in the mechanical schedule.

2.17 PIPING AND FITTINGS

A. Refrigeration System

1. Piping: Type ACR L Hard Copper. Joints: Solder for copper using 95% tin - 5% antimony. Provide wrought copper fittings.

2. Fittings: Provide wrought copper fittings.

3. Refrigeration Specialties: Provide in line filter dyers at all condensing units in suction piping. Provide shut off valves at each condensing unit. Provide suction line accumulators.

B. Piping Supports:

1. Supports shall secure pipes in place, shall prevent pipe vibration and maintain required grading of proper adjustment, and shall provide for expansion and contraction.

2. Hangers and roof supports shall be located near or at changes in piping direction and shall provide vertical adjustment to maintain pitch required. All piping mechanically attached to metal studs or bracing shall be attached with approved isolator devices. These isolation devices are for the avoidance of excessive noise or vibration in the building due to the operation of equipment, and/or due to interconnected piping, ductwork or conduit.

3. Hangers and roof supports shall be of strength and rigidity to suit loading and service and in a manner which will not unduly stress the building construction.

4. Hangers and roof supports shall be of adequate size to fit outside the insulation.

5. Provide seismic motion restraints as required by current California Mechanical Code and current California Building Code.

6. Hangers:

   a. Copper pipe: horizontal - insulated and uninsulated: Adjustable steel clevis of sufficient size to fit outside of insulation.

   b. Copper pipe: vertical - insulated and uninsulated: Tubing riser clamp carbon steel with copper finish; or figure with plastic coating on formed portion.

7. Hanger Spacing:

   a. Copper pipe: 1/2" to 2" pipe every 6'- 0" or less.
   b. Copper pipe: 2" and larger pipe every 8'- 0" or less.

8. Pipe Supports on Roof:

   a. Roof pipe supports shall be Pipe Pier, flexible resilient closed-cell polyethylene foam (ETHAFOAM brand - trade mark of the Dow Chemical Company), with strut system built into foam block.

   b. Foam block size:
      4" high X 4" wide for 1/2" to 2" pipe diameter pipe
      4"high X 6" wide for 2" and larger pipe diameter

9. Pipe Support Spacing on Roof

   a. Copper pipe: 1/2" to 2" pipe every 6'- 0" or less.
   b. Copper pipe: 2" and larger pipe every 8'- 0" or less.

PART 3 – EXECUTION

3.01 DUCT CONSTRUCTION AND INSTALLATION

A. Ductwork construction and installation including sheet metal gauges, reinforcement, joint sealing, air leakage and details not specifically shown on the drawings shall be in

accordance with SMACNA Publication HVAC Duct Construction Standards - Meal and Flexible current edition and SMACNA Publication Seismic Restraint Manual: Guidelines for Mechanical Systems current edition.

B. Use Ductmate Duct Connection System for all transverse joints in ducts.

C. Seal seams, joints, duct connections, elbow gores with Hardcast high pressure Class A SMACNA sealant.

D. Radius elbows shall have a center line radius equal to 1-1/2 times the duct width. Square throats will not be permitted on radius elbows. Square elbows shall have double thick turning vanes. Job fabricated turning vanes will not be accepted without prior approval.

E. Provide all necessary dampers as required for proper adjustment and control of air distribution. All dampers shall have rigid bearings and locking quadrants which allow no rattling. All damper rods shall be marked to indicate the relative position of the damper blade with respect to the rod.

F. All grilles, registers, and diffusers shall be set flush and true to the wall or ceilings to prevent air leakage around the edges. Provide plaster frames for all outlets in plaster or gypsum board.

G. Provide 1" angle collars for all exposed ducts passing through roofs, ceilings, floors and walls. Anchor collars in position after installation is complete.

H. At all places where inside of duct will be visible through return air grilles, louvers, etc., paint normally visible inside portion of duct with flat black paint.

I. Install hinged doors on ductwork and housing to provide access to all parts of every automatic damper, and all other items requiring maintenance or inspection.

J. Transitions in ductwork, in changing shapes and sizes, shall be made with angles not exceeding 15^{o} wherever possible. Maximum divergence upstream of equipment shall be 30^{o} and maximum convergence downstream shall be 45^{o}.

K. Where horizontal ducts pass through walls and vertical ducts pass through roof or floors, supporting angles shall be rigidly attached to ducts and to the wall, roof or floor. Angles shall be galvanized and of approved sizes to properly support the ductwork. The supporting angles shall be placed on at least two sides of the duct.

L. Where horizontal ducts pass through walls and vertical ducts pass through roof or floors, the openings shall be tightly sealed off so as to provide a air and sound tight seal between duct and opening.

M. Contractor shall not provide holes in the duct systems for the installation of hangers, conduits, etc. Coordinate work of all other trades so this will not be necessary.

N. Ensure that interior of ducting is kept clean during building construction. Install plastic film over exposed duct openings as soon as ducts are installed.

O. Locate duct with sufficient space around equipment to allow normal operating and maintenance activities.

P. All supply air, return air, outside air and exhaust air ductwork joints and seams to be sealed through their entirety with high pressure Class A SMACNA duct sealant.

Q. Complete metal ducts within themselves with no single partition between ducts. Where width of duct exceeds 18 inches, cross break for rigidity. Open corners are not acceptable.

R. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

S. Construct tees, bends and elbows with radius of not less than 1-1/2 times width of duct on center line. Where not possible and where rectangular elbows are used, provide approved type airfoil turning vanes.

T. Clothes dryer exhaust ducts shall be fabricated with no screws or other penetrations into the air stream.

3.02 FLEXIBLE DUCTWORK

A. Connect flexible ducts to metal ducts with metal draw bands plus sheet metal screws. Use crimp joints with bead for joining round duct sizes with crimp in direction of airflow.

3.03 FLEXIBLE CONNECTIONS

A. Provide flexible connections at inlet and discharge connections of fans and air handling equipment to prevent mechanical noises from being transmitted to connecting ductwork. Align sheet metal duct with fan or fan casing opening in all three dimensions prior to installation of flexible connection, so that duct opening nearly coincides and are almost equally spaced from one another all around. Do not install flexible connection until above requirements are met. Fans or fan casings and ducts shall be able to move 1" in any direction relative to each other without short-circuiting metal to metal or stretching taut the flexible connection.

3.04 ROOFTOP HVAC UNITS, SPLIT SYSTEMS AND EXHAUST FANS

A. Install equipment in accordance with manufacturer's recommendations, good industry standards and SMACNA Installation Standards for Heating, Air Conditioning and Solar systems.

B. Provide high pressure air seal around ducts and units.

C. Coordinate with other work, including ductwork, floor construction, and electrical work as necessary to interface installation of air handling equipment with other work.

D. Ensure equipment is wired properly, with rotation in direction indicated and intended for proper performance. If there is no rotation arrow supplied by the manufacturer, install a correct rotation arrow.

E. Inlet and outlet connections to all equipment shall be made with neoprene coated glass fabric flexible connection not less than four inches full length with one inch slack.

Weather exposed connections shall be same as above except to be hypalon coated in lieu of neoprene.

F. Connect motor starters at equipment to DDC control system, on/off light switches or "on temperature rise thermostats"

3.05 ACCESS DOORS

A. Provide access doors as specified for inspection and cleaning before and after coils, at volume dampers, and elsewhere as indicated or as required. Review locations prior to fabrication.

B. Locate access doors for easy access. Doors should be located above accessible ceilings, whenever possible. Where access is required above gypsum board ceilings, coordinate location of access panel with Contractor. Coordinate location of access doors with other trades such that conduit and pipe does not prevent or interfere with access to ductwork.

3.06 REFRIGERATION PIPING INSTALLATION

A. All piping shall be concealed in walls, furred spaces, pipe spaces, or above suspended ceilings. Piping shall be grouped wherever practical and shall be installed uniformly in straight parallel lines in either vertical or horizontal positions and at right angles with beams, walls, ceilings or other building lines. Install all exposed piping as close as practical to walls, columns or overhead construction to provide maximum head room and minimum interference with usable building space. Where interference develops in the field, piping shall be offset or routed as required.

B. Pipe shall be installed to eliminate sagging.

C. All pipe, fittings and valves shall bear manufacturer's name and trademark, and valves shall have service and pressure rating cast in bodies.

D. Copper piping passing through poured concrete floors shall be sleeved and wrapped with plastic foam or fire stop material as appropriate with 50% overlap.

3.07 PIPE SUPPORT SPACING AND LOCATIONS

A. Hangers shall adequately support the piping system and shall be located near or at changes in piping direction and concentrated loads.

3.08 PIPE TESTING

A. All piping system shall be tested and proven tight prior to concealment.

B. Insure that the test pressure which might damage equipment does not reach such units, valve them off or otherwise isolating them during the test.

C. All air tests shall be held for a minimum of four hours without loss of pressure.

3.09 DUCTWORK TESTING

A. Leak test supply air ductwork during construction and prior to installation of duct wrap. Leakage shall not exceed of 1% of the total design CFM when tested at 1-1/2 times the design air pressure or the minimum requirement as set forth by SMACNA HVAC Duct Construction Standards. Notify Santee School District Representative 24 hours in advance of test. Keep field records of tests and submit to Architect Mechanical Engineer Owner's Representative three copies of results.

B. Retesting: Retest ductwork failing initial tests following correction of defective work. Requirements of initial tests shall apply.

END OF SECTION

26 00 00

ELECTRICAL

SANTEE SCHOOL DISTRICT

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 Division 26, 27 and 28.

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 (NESC).
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 their understanding by indicating

which equipment and material they intend 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 CLOSING-IN OF UNINSPECTED WORK

12.1 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 13 EXCAVATION AND BACKFILL

13.1 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.

13.2 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.

13.3 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.

13.4 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.

13.5 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.

13.6 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.

13.7 Perform all backfilling in accordance with the requirements of and under the direction of the Geotechnical Engineer.

13.8 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 14 CONCRETE

14.1 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.

14.2 See other sections for additional requirements for underground vaults, cable ducts, etc.

ARTICLE 15 ACCESSIBILITY

15.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.

15.2 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.

15.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.

15.4 Refer to 'finish schedule' for types of walls and ceilings in each area and the architectural drawings for rated wall construction.

15.5 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

ARTICLE 16 FLASHING

16.1 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 17 IDENTIFICATION OF EQUIPMENT

17.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:

17.1.1 General:

17.1.1.1 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.

17.1.1.2 All auxiliary systems, including communications, shall be labeled to indicate function.

17.1.2 Lighting and Local Panelboards:

17.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.

17.1.2.2 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.

17.1.3 Distribution Switchboards and Feeders Sections:

17.1.3.1 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.

17.1.3.2 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.

17.1.4 Disconnect Switches, Motor Starters and Transformers:

17.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

17.1.5 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 18 CONSTRUCTION FACILITIES

18.1 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.

18.2 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 19 GUARANTEE

19.1 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 20 PATENTS

20.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

ARTICLE 21 PLUMBING (DIVISION 22) / HEATING, VENTILATING, AND AIR CONDTIONING (DIVISION 23) / ELECTRICAL – COORDINATION REQUIREMENTS

21.1 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.

21.2 The work under Division 22 and/or Division 23 shall include the following:

21.2.1 All motors required by mechanical equipment.

21.2.2 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.

21.2.3 All wiring interior to packaged equipment furnished as an integral part of the equipment.

21.2.4 All control **wiring and conduit** for mechanical control systems.

21.2.5 All control systems required by mechanical equipment.

21.3 The work under Division 26 shall include the following:

21.3.1 All power wiring and conduit; and conduit only for EMS control conductors between each building and the main control panel.

21.3.2 Electrical disconnects as shown on the electrical drawings.

21.3.3 Starters forming part of a motor control center.

21.4 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.

21.5 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.

21.6 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.

21.7 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.

21.8 Division 26 Contractor shall make all final connections of power wiring to equipment furnished under this Division.

21.9 Wiring diagrams complete with all connection details shall be furnished under each respective Section.

21.10 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 22 EQUIPMENT ROUGH-IN

22.1 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 23 OWNER FURNISHED AND OTHER EQUIPMENT

23.1 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 24 EQUIPMENT FINAL CONNECTIONS

24.1 Provide all final connections for the following:

24.1.1 All equipment furnished under this Division.

24.1.2 Electrical equipment furnished under other sections of the specification.

24.1.3 Owner furnished equipment as specified under this Division.

ARTICLE 25 INSERTS, ANCHORS, AND MOUNTING SLEEVES

25.1 Inserts and anchors must be:

25.1.1 Furnished and installed for support of work under this Division.

25.1.2 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.

25.1.3 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 26 SEISMIC ANCHORING

26.1 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. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

26.2 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. The Contractor shall submit drawings signed by the Contractors registered Structural Engineer indicating method of compliance prior to installation.

ARTICLE 27 RUST PROOFING

27.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

27.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

27.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

ARTICLE 28 GENERAL WIRING

28.1 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.

28.2 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.

28.3 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 29 SEPARATE CONDUIT SYSTEMS

29.1 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.

29.2 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 30 CLEANUP

30.1 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.

30.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.

30.3 During the progress of the work, keep the premises clean and free of debris.

ARTICLE 31 PAINTING

31.1 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 32 GENERAL DEMOLITION REQUIREMENTS

32.1 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace existing work schedule.

32.2 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.

32.3 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.

32.4 Perform the removal, cutting, drilling of existing work with extreme care and use small tools in order not to jeopardize the structural integrity of the building.

32.5 Rebuild to existing condition or better, existing work which has to be removed to allow the installation of new work as required.

32.6 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material, and installation.

32.7 Do not reuse in this project materials and items removed from existing site or building, except with specific written approval by the Architect in each case, unless such removed material or item is specifically indicated or specified to be reused.

32.8 Remove materials and equipment indicated to be salvaged for reinstallation and store to prevent damage and reinstall as the work progresses. Do not reuse in this project, other materials and equipment removed from existing site or building, except with specific written approval by the Architect in each case.

32.9 Patch areas requiring patching, including damage caused by removing, relocating or adding fixtures and equipment, damages caused by demolition at adjacent materials.

32.10 Do not stockpile debris in the existing building, without the approval of the Architect. Remove debris as it accumulates from removal operations to a legal disposal area.

32.11 Contractor to assume existing oil filled and dry transformers, oil switches, ballasts, lamps, wooden poles, cross arms, computers, computer monitors, and conductor insulation containing materials considered hazardous. Comply with local, state and federal regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution. Contractor shall be responsible for removal of the above hazardous materials where encountered. Include all costs for such removal as part of this contract.

32.12 All fluorescent, compact fluorescent, high intensity discharge, metal halide, mercury vapor, high and low-pressure sodium, and neon lamps are to be disposed of as required by the California Waste Rule Regulations as described in the California Code of Regulations, Title 22, Division 4.5 and Chapter 23.

32.13 **Communication System:** Where new communication systems, (including telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) are installed to replace existing systems, unless where otherwise directed the existing systems shall remain fully operational until the new system has been installed and tested. Demolition of the existing systems shall include removal of all equipment and associated wiring and exposed conduits and providing new blank covers for all abandoned device locations.

32.14 **Salvage Power Equipment:** The Contractor shall carefully remove all existing switchboards, panelboards, transformers, and confirm in writing which items the Owner

wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.

32.15 **Salvage Lighting Equipment:** The Contractor shall confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.

32.16 **Salvage Communication Equipment:** The Contractor shall carefully remove all communication devices (telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) and box each type of devices separately. The Contractor shall deliver all items to the Owner's maintenance facility.

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.

36.5 CAD files will be made available via e-mail or on disk, depending on the quantity of files requested. The Contractor requesting the files will be required to pay $50.00 per drawing plan, or $300.00 maximum, whichever is ***less***.

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 <u>Common submittal mistakes which will result in the submittals being rejected:</u>

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 below120 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 hardwired 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:

	480 volt system	208 or 240 volt system
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 250-122.

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 exothermic 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

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 90ºC, 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 Alflex.

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 90ºC, 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 Alflex.

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 ASTME 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	WALLTRAK 1 series
		Wiremold	ECLIPSE PN05series
		Panduit	LD5 series
		Hellerman-Tyton	TSR2 series
2.10.2	System 'SR2'	Hubbell	WALTRAK 22
		Wiremold	2300D Series
		Panduit	D2P10
		Hellerman-Tyton	TSR3 series
2.10.3	System 'SR3'	Hubbell	BASETRAK series
		Wiremold	5400 - series
		Panduit	70 series
		Hellerman-Tyton	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 0.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 <u>Common submittal mistakes which will result in the submittals being rejected:</u>

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 feraloy 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 ¾" past boxes all around. Covers for 4" square boxes shall extend ¼" 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 ¾" 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 1-¼" or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1-¼" for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1-¼" 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 05 43

UNDERGROUND PULL BOXES AND MANHOLES

PART 1 – GENERAL

1.1 Furnish and install electrical underground pull boxes and manholes 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 The concrete for pull boxes and manholes shall be class 5500 psi or as noted on the drawings. All pull boxes and manholes and covers located in parking lots, driveways, roads, or any other driveable areas shall be traffic rated.

2.2 Each manhole shall be provided with a fiberglass ladder and ground rod. Ground rods shall be copper or a copper-clad steel 3/4" diameter by 10-feet long. All non-current carrying metallic components shall be grounded to the ground rods with minimum #6 copper wire.

2.3 All underground pull boxes shall be provided with steel bolt down type covers. Bolts shall be bronze or brass. All communication or signal system pull boxes shall be sized to comply with CEC Article 314 unless where other sizes are specifically noted on the drawings.

2.4 All underground pull box and manhole covers shall be provided with either "electrical" or "telephone" or "fire alarm" markings. The telephone marking shall be used to identify telephone, T.V., clock or any other types of communication systems.

2.5 All power and communication systems shall be provided with separate pull boxes or manholes. Fire alarm circuits shall also be provided with separate pull boxes from any other type of communication systems.

PART 3 – INSTALLATION

3.1 Shoring of the excavation shall be in accordance with all federal, state and local regulations.

3.2 Provide sealing material for the joints between sections per manufacturer's instructions.

3.3 The contractor shall make the top and access assembly or lid flush with surrounding areas where installed in driveable or normal walking areas.

END OF SECTION

SECTION 26 09 23

DIGITAL LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

1.1 Furnish and install automatic lighting controls as shown on the drawings and as specified herein Submit manufacturers' data on all items.

1.2 Equipment shall be UL listed, comply with those portions of CEC as applicable to electrical wiring work and comply with those portions of NEMA or UL pertaining to types of electrical equipment and enclosures. The equipment shall also be certified by the California Energy Commission.

1.3 The manufacturer of the lighting control equipment shall have been actively engaged in the manufacture of the types and capacities required for the application for at least three years. It is the sole responsibility of the Division 26 contractor to ensure that submittals of material meets the performance specifications contained herein.

1.4 All components and assemblies shall be factory pre-tested and burned-in as a system for 48 hours prior to shipping.

1.5 Control Intent – Control Intent includes, but is not limited to:

1.5.1 Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.

1.5.2 Initial sensor and switching zones

1.5.3 Initial time switch settings

1.5.4 Task lighting and receptacle controls

1.5.5 Emergency Lighting control (if applicable)

1.5.6 Manufacturer shall submit a point-to-point line diagram of the system configuration including all devices and accessories required to complete the system.

1.5.7 Manufacturer shall submit data sheets on the components and system submitted, with descriptions of hardware and software components.

SYSTEM DESCRIPTION & OPERATION

1.6 The Lighting Control and Automation system as defined under this section covers the following equipment:

1.6.1 Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications

1.6.2 Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications

1.6.3 Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools

1.6.4 Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting

1.6.5 Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities

1.6.6 Digital Plug-Load Controllers – Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities

1.6.7 Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings

1.6.8 Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices

1.6.9 Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control

1.6.10 Network Bridge – provides BACnet MSTP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.

1.6.11 Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting

1.6.12 Programming and Configuration software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication

1.6.13 LMCP Digital Lighting Management Relay Panel – provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS)

1.6.14 Emergency Lighting Control Unit (ELCU) – allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

LIGHTING CONTROL APPLICATIONS

1.7 Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1.7.1 Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.

1.7.2 Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used

1.7.3 Task Lighting / Plug Loads – Provide automatic shut off of non-essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area

1.7.4 Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:

1.7.4.1 All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones

1.7.4.2 Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes

1.7.4.3 Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings

1.7.4.4 Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

1.7.5 Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.

1.8 Submit shop drawings and manufacturers' data for all components including:

1.8.1 Manufacturer shall submit in bill-of-material form an itemized list of all materials supplied to meet the specification.

1.8.2 Manufacturer shall submit dimensional drawings of lighting control panel(s).

1.8.3 Manufacturer shall submit a point-to-point line diagram of the system configuration including all devices and accessories required to complete the system.

1.8.4 Manufacturer shall submit data sheets on the components and system submitted, with descriptions of hardware and software components

1.8.5 Composite wiring and/or schematic diagram of each control circuit as proposed to be installed

1.8.6 Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans)

1.8.7 Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies

1.8.8 Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades

QUALITY ASSURANCE

1.9 Manufacturer: Minimum 10 years' experience in manufacture of lighting controls

PROJECT CONDITIONS

1.10 Do not install equipment until following conditions can be maintained in spaces to receive equipment:

1.10.1 Ambient temperature: 0° to 40° C (32° to 104° F)

1.10.2 Relative humidity: Maximum 90 percent, non-condensing.

WARRANTY

1.11 Provide a five-year limited manufacturer's warranty on all room control devices and panels

MAINTENANCE

1.12 Spare Parts:

1.12.1 The contactor shall provide as a part of this contract additional Control modules of each type used, Switches of each type used, Daylight sensors, Ceiling mounted occupancy sensors, Wall mounted occupancy sensors, Room controller, etc, three (3) for each type. 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 1 submittals**.

PART 2 – PRODUCTS

2.1 Acceptable Manufacturers: **WattStopper, Digital Lighting Management (DLM) and nLight by Acuity.**

Substitutions:

2.2 Bidder's wishing to obtain approval on manufacturers other than those specified in these specifications or on the drawings shall comply with the following procedures:

2.2.1 All substitution requests shall be submitted to the Architect / Engineer no less than 10 business days prior to the project bid opening date. Approvals when accepted will be issued in the form of an addendum to the contract. No consideration for substitutions will be provided after the award of the contract.

2.2.2 The substitution request must include a statement indicating how the substituted product may impact the completion of the project.

2.2.3 The substitution request must include a statement indicating the difference in price (both list price and Contractor price) between the specified product and the substitution.

2.2.4 The substitution request must include a detailed analysis indicating <u>any</u> differences between the specified product and the substitution.

2.2.5 Catalog literature for both the specified and the substitution shall be provided along with contact information of the manufacturer for the substituted product.

2.3 The contractor shall pay the Engineer (at their current standard hourly rates) for the time spent reviewing substitutions. These costs will be included as an addendum to be issued to all bidders to include in their proposals, and must be paid to the Engineer within 60 days of award of the project.

DIGITAL LIGHTING CONTROLS

2.4 Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

DIGITAL WALL SWITCH OCCUPANCY SENSORS

2.5 Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons

2.6 Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

2.6.1 Digital calibration and pushbutton configuration for the following variables:

2.6.1.1 Sensitivity – 0-100% in 10% increments

2.6.1.2 Time delay – 1-30 minutes in 1 minute increments xx

2.6.1.3 Test mode – Five second time delay

2.6.1.4 Detection technology – PIR, Dual Technology activation and/or re-activation.

2.6.1.5 Walk-through mode

2.6.1.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network

2.6.2 Programmable control functionality including:

2.6.2.1 Each sensor may be programmed to control specific loads within a local network

2.6.2.2 Sensor shall be capable of activating one of 16 user-definable lighting scenes.

2.6.2.3 Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.

2.6.2.4 On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:

2.6.2.4.1 Ultrasonic and Passive Infrared

2.6.2.4.2 Ultrasonic only

2.6.2.4.3 Passive Infrared only

2.6.3 Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods

2.6.4 Two RJ-45 ports for connection to DLM local network

2.6.5 Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote person controls.

2.6.6 Device Status LEDs including:

2.6.6.1.1 PIR detection

2.6.6.1.2 Ultrasonic detection

2.6.6.1.3 Configuration mode

2.6.6.1.4 Load binding

2.6.7 Assignment of occupancy sensor to a specific load within the room without wiring or special tools

2.6.8 Assignment of local buttons to specific loads within the room without wiring or special tools

2.6.9 Manual override of controlled loads

2.6.10 All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.

2.7 BACnet object information shall be available for the following objects:

2.7.1 Detection state

2.7.2 Occupancy sensor time delay

2.7.3 Occupancy sensor sensitivity, PIR and Ultrasonic

2.7.4 Button state

2.7.5 Switch lock control

2.7.6 Switch lock status

2.8 Units shall not have any dip switches or potentiometers for field settings

2.9 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required

2.10 Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:

2.10.1 Left button

2.10.1.1 Press and release – Turn load on

2.10.1.2 Press and hold – Raise dimming load

2.10.2 Right button

2.10.2.1 Press and release – Turn off

2.10.2.2 Press and hold – Lower diming load

2.11 Low voltage momentary pushbuttons shall include the following features:

2.11.1 Load/Scene Status LED on each switch button with the following characteristics:

2.11.1.1 Bi-level LED

2.11.1.2 Dim locator level indicates power to switch

2.11.1.3 Bright status level indicates that load or scene is active

2.11.2 The following button attributes may be changed or selected using a wireless configuration tool:

2.11.2.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

2.11.2.2 Individual button function may be configured to Toggle, On only or Off only.

2.11.2.3 Individual scenes may be locked to prevent unauthorized change.

2.11.2.4 Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.

2.11.2.5 Ramp rate may be adjusted for each dimmer switch.

2.11.2.6 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple load

2.12 WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening

DIGITAL WALL OR CELING MOUNTED OCCUPANCY SENSOR

2.13 Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor

2.14 Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

2.14.1 Digital calibration and pushbutton configuration for the following variables:

2.14.1.1 Sensitivity – 0-100% in 10% increments

2.14.1.2 Time delay – 1-30 minutes in 1 minute increments

2.14.1.3 Test mode – Five second time delay

2.14.1.4 Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.

2.14.1.5 Walk-through mode

2.14.1.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2.14.2 Programmable control functionality including:

2.14.2.1 Each sensor may be programmed to control specific loads within a local network.

2.14.2.2 Sensor shall be capable of activating one of 16 user-definable lighting scenes.

2.14.2.3 Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off

2.14.2.4 On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:

2.14.2.4.1 Ultrasonic and Passive Infrared

2.14.2.4.2 Ultrasonic or Passive Infrared

2.14.2.4.3 Ultrasonic only

2.14.2.4.4 Passive Infrared only

2.14.3 Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

2.14.4 One or two RJ-45 port(s) for connection to DLM local network

2.14.5 Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls

2.14.6 Device Status LEDs, which may be disabled for selected applications, including:

2.14.6.1 PIR detection

2.14.6.2 Ultrasonic detection

2.14.6.3 Configuration mode

2.14.6.4 Load binding

2.14.7 Assignment of occupancy sensor to a specific load within the room without wiring or special tools

2.14.8 Manual override of controlled loads

2.14.9 All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years

2.15 BACnet object information shall be available for the following objects:

2.15.1 Detection state

2.15.2 Occupancy sensor time delay

2.15.3 Occupancy sensor sensitivity, PIR and Ultrasonic

2.16 Units shall not have any dip switches or potentiometers for field settings

2.17 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

2.18 WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

DIGITAL WALL SWITCHES

2.19 Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configurations. Wall switches shall include the following features:

2.19.1 Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

2.19.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

2.19.3 Configuration LED on each switch that blinks to indicate data transmission.

2.19.4 Load/Scene Status LED on each switch button with the following characteristics:

2.19.4.1 Bi-level LED

2.19.4.2 Dim locator level indicates power to switch

2.19.4.3 Bright status level indicates that load or scene is active

2.19.5 Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps

2.19.6 Programmable control functionality including

2.19.6.1 Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority.

2.19.6.2 Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels

2.19.7 All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years

2.20 BACnet object information shall be available for the following objects:

2.20.1 Button state

2.20.2 Switch lock control

2.20.3 Switch lock status

2.21 Two RJ-45 ports for connection to DLM local network

2.22 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching

2.23 The following switch attributes may be changed or selected using a wireless configuration tool:

2.23.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa)

2.23.2 Individual button function may be configured to Toggle, On only or Off only.

2.23.3 Individual scenes may be locked to prevent unauthorized change.

2.23.4 Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours

2.23.5 Ramp rate may be adjusted for each dimmer switch.

2.23.6 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads

2.24 WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening

HANDHELD REMOTE CONTROLS

2.25 Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:

2.25.1 Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet

2.25.2 LED on each button confirms button press

2.25.3 Load buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads

2.25.4 Inactivity timeout to save battery life

2.26 A wall mount holster and mounting hardware shall be included with each remote control

2.27 WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105

DIGITAL PARTITION CONTROLS

2.28 Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors

2.29 Four-button low voltage pushbutton switch for manual control.

2.29.1 Two-way infrared (IR) transceiver for use with configuration remote control.

2.29.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall

2.29.3 Configuration LED on each switch that blinks to indicate data transmission.

2.29.4 Each button represents one wall; Green button LED indicates status.

2.29.5 Two RJ-45 ports for connection to DLM local network.

2.30 WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening

2.31 Contact closure interface for automatic control via input from limit switches on movable walls (by others).

2.31.1 Operates on Class 2 power supplied by DLM local network.

2.31.2 Includes 24VDC output and four input terminals for maintained third party contract closure inputs.

2.31.2.1 Input max. sink/source current: 1-5Ma

2.31.2.2 Logic input signal voltage High: >18VDC

2.31.2.3 Logic input signal voltage Low: <2VDC

2.31.3 Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.

2.31.4 Two RJ-45 ports for connection to DLM local network.

2.32 WattStopper part number: LMIO-102

DIGITAL DAYLIGHTING SENSORS

2.33 Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring

2.33.1 Closed loop sensors measure the ambient light in the space and control a single lighting zone

2.33.2 Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones

2.33.3 Dual loop sensors measure both ambient and incoming daylight in the space to ensure that proper light levels are maintained as changes to reflective materials are made in a single zone

2.34 Digital daylighting sensors shall include the following features:

2.34.1 The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers

2.34.2 Sensor light level range shall be from 1-6,553 footcandles (fc).

2.34.3 The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).

2.34.4 For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.

2.34.5 For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level

2.34.6 Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.

2.34.7 Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off

2.34.8 Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy

2.34.9 Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls

2.34.10 Configuration LED status light on device that blinks to indicate data transmission

2.34.11 Status LED indicates test mode, override mode and load binding.

2.34.12 Recessed switch on device to turn controlled load(s) ON and OFF.

2.34.13 BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:

2.34.13.1 Day and night setpoints

2.34.13.2 Off time delay

2.34.13.3 On and off setpoints

2.34.13.4 Up top three setpoints

2.34.13.5 Operating mode – on/off, bi-level, tri-level or dimming

2.34.14 One RJ-45 port for connection to DLM local network

2.35 A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well

2.36 Any load or group of load in the room can be assigned to a daylighting zone

2.37 Each load within a daylighting zone can be individually enabled or disabled for discrete control) load independence)

2.38 All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years

Closed loop digital photosensors shall include the following additional features:

2.39 An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.

2.40 Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software

2.41 Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads

2.42 WattStopper Product Number: LMLS-400, LMLS-400-L

Open loop digital photosensors shall include the following additional features:

2.43 An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room

2.44 Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone

2.45 Each of the three discrete daylight zones can include any non-overlapping group of loads in the room

2.46 WattStopper Product Number: LMLS-500, LMLS-500-L

Dual loop photosensors shall include the following additional features:

2.47 Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside.

2.48 Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room

2.49 Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load

2.50 Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is require

2.51 Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes

2.52 Device must include extendable mounting arm to properly position sensor within a skylight well

2.53 WattStopper product number LMLS-600

DIGITAL ROOM CONTROLLERS AND PLUG – LOAD CONTROLLERS

2.54 Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:

2.54.1 Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room

2.54.2 Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf

2.54.3 Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest

2.54.4 Device Status LEDs to indicate:

2.54.4.1 Data transmission

2.54.4.2 Device has power

2.54.4.3 Status for each load

2.54.4.4 Configuration status

2.54.5 Quick installation features including:

2.54.5.1 Standard junction box mounting

2.54.5.2 Quick low voltage connections using standard RJ-45 patch cable

2.54.6 Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power

2.54.6.1 Turn on to 100%

2.54.6.2 Remain off

2.54.6.3 Turn on to last level

2.54.7 Each load shall be configurable to operate in the following sequences based on occupancy:

2.54.7.1 Auto-on/Auto-off (Follow on and off)

2.54.7.2 Manual-on/Auto-off (Follow off only)

2.54.8 The priority of each load output shall be reversible, via digital configuration, so that on is off and off is on

2.54.9 BACnet object information shall be available for the following objects:

2.54.9.1 Load status

2.54.9.2 Electrical current

2.54.9.3 Total watts per controller

2.54.9.4 Schedule state – normal or after-hours

2.54.9.5 Demand response control and cap level

2.54.9.6 Room occupancy status

2.54.9.7 Total room lighting and plug loads watts

2.54.9.8 Total room watts/sq ft

2.54.9.9 Force on/off all loads

2.54.10 UL 2043 plenum rated

2.54.11 Manual override and LED indication for each load

2.54.12 Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.

2.54.13 Zero cross circuitry each load

2.54.14 All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

2.55 On/Off Controllers shall include:

2.55.1 One or two relay configuration

2.55.2 Efficient 150 mA switching power supply

2.55.3 Three RJ-45 DLM local network ports with integral strain relief and dust cover

2.55.4 WattStopper product numbers: LMRC-101, LMRC-102

2.56 On/Off/Dimming enhanced Room Controllers shall include:

2.56.1 Real time current monitoring

2.56.2 Multiple relay configurations

2.56.2.1 One, two or three relays (LMRC-21 x series)

2.56.2.2 One or two relays (LMRC-22x series)

2.56.3 Efficient 250 mA switching power supply

2.56.4 Four RJ-45 DLM local network ports with integral strain relief and dust cover

2.56.5 Once dimming output per relay

2.56.5.1 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)

2.56.5.2 Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)

2.56.5.3 Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver

2.56.5.4 The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim

2.56.5.5 Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the

dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim

2.56.5.6 Calibration and trim levels must be set per output channel

2.56.5.7 Devices that set calibration or trim levels per controller are not acceptable

2.56.5.8 All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dipswitches are not acceptable

2.56.6 Each load shall have an independently configurable preset on level for Normal Hours and After-Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After-Hours events

2.56.7 Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value

2.56.8 The following dimming attributes may be changed or selected using a wireless configuration tool:

2.56.8.1 Establish preset level for each load from 0-100%

2.56.8.2 Set high and low trim for each load

2.56.8.3 Set lamp burn in time for each load up to 100 hours

2.56.9 Override button for each load provides the following functions:

2.56.9.1 Press and release for on/off control

2.56.9.2 Press and hold for dimming control

2.57 WattStopper product numbers: LMRC-211, LRMC-212, LMRC-221, LMRC-222

2.58 Plug Load Room Controllers shall include the following:

2.58.1 One relay configuration with additional connection for unswitched load

2.58.2 Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10-minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated)

2.58.3 Factory default operation is Auto-on/Auto-off, based on occupancy

2.58.4 Real time current monitoring of both switched and un-switched load (LMPL-201 only)

2.58.5 Efficient switching power supply

2.58.5.1 150mA (LMPL-101)

2.58.5.2 250mA (LMPL-201)

2.58.6 RJ-45 DLM local network ports

2.58.6.1 Three RJ-45 ports (LMPL-101)

2.58.6.2 Four RJ-45 ports (LMPL-201)

2.59 Wattstopper product numbers: LMPL-101, LMPL-201

DLM LOCAL NETWORK (Room Network)

2.60 The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building

2.61 Features of the DLM local network include:

2.61.1 Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached

2.61.2 Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup

2.61.3 Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network

2.61.4 Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver

2.62 Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable

2.63 If manufacturer's pre-terminated Cat 5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results

2.64 WattStopper Product Number: LMRJ-Series

DLM SEGMENT NETWORK (Room to Room Network)

2.65 The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control

2.65.1 Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network

2.65.2 Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate “in” and “out” terminations, for segment network connections

2.65.3 The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms

2.65.4 Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device

2.65.5 Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer’s specific requirements

2.65.6 Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERs, via BACnet/IP or BACnet/Ethernet. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable

2.66 WattStopper Product Number: LM-MSTP, LM-MSTP-DB

CONFIGURATION TOOLS

2.67 A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface

2.68 Features and functionality of the wireless configuration tool shall include but not be limited to:

2.68.1 Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet

2.68.2 High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation

2.68.3 Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number

2.68.4 Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors

2.68.5 Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings

2.68.6 Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls

2.68.7 Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings

2.68.8 Verify status of building level network devices

2.69 WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

NETWORK BRIDGE

2.70 The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver

2.70.1 The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 por

2.70.2 Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network

2.70.3 The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:

2.70.3.1 Read/write the normal or after-hours schedule state for the room

2.70.3.2 Read the detection state of each occupancy sensor

2.70.3.3 Read the aggregate occupancy state of the room

2.70.3.4 Read/write the On/Off state of loads

2.70.3.5 Read/write the dimmed light level of loads

2.70.3.6 Read the button states of switches

2.70.3.7 Read total current in amps, and total power in watts through the room control

2.70.3.8 Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings

2.70.3.9 Activate a preset scene for the room

2.70.3.10 Read/write daylight sensor fade time and day and night setpoints

2.70.3.11 Read the current light level, in footcandles, from interior and exterior photosensors and photocells

2.70.3.12 Set daylight sensor operating mode

2.70.3.13 Read/write wall switch lock status

2.70.3.14 Read watts per square foot for the entire controlled room

2.70.3.15 Write maximum light level per load for demand response mode

2.70.3.16 Read/write activation of demand response mode for the room

2.70.3.17 Activate/restore demand response mode for the room

2.71 Wattstopper product number: LMBC-300

SEGMENT MANAGER

2.72 For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443)

2.73 Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans

2.74 Operational features of the Segment Manager shall include the following:

2.74.1 Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic

2.74.2 Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC

2.74.3 Log in security capable of restricting some users to view-only or other limited operations

2.74.4 Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels

2.74.5 After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the use

2.74.6 Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On

2.74.7 Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays, and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules

2.74.8 Ability to group rooms and loads for common control by schedules, switches or network commands

2.74.9 Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature

2.74.10 Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control

2.74.11 The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable

2.75 Segment Manager shall support multiple DLM rooms as follows

2.75.1 Support up to 120 network bridges and 900 digital in-room devices (LMSM-3E)

2.75.2 Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E)

2.76 WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16

PROGRAMMING, CONFIGUARION AND DOCUMENTATION SOFTWARE

2.77 PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication. Additional parameters exposed through this method include but are not limited to:

2.77.1 Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.

2.77.2 Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after-hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.

2.77.3 Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.

2.77.4 Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.

2.77.5 Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.

2.77.6 Load control polarity reversal so that on events turn loads off and vice versa.

2.77.7 Per-load DR (demand response) shed level in units of percent.

2.77.8 Load output pulse mode in increments of 1second.

2.77.9 Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer

2.78 Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:

2.78.1 Device list report: All devices in a project listed by type.

2.78.2 Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.

2.78.3 BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.

2.78.4 Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.

2.78.5 Device parameter report: Per-room lists of all configured parameters accessible via handheld IR programmer for use with O&M documentation.

2.78.6 Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).

2.78.7 Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors

2.79 Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations

2.79.1 Set, copy/paste an entire project site of sensor time delays.

2.79.2 Set, copy/paste an entire project site of sensor sensitivity settings.

2.79.3 Search based on room name and text labels.

2.79.4 Filter by product type (i.e. LMRC-212) to allow parameter set by product.

2.79.5 Filter by parameter value to search for product with specific configurations

2.80 Network-wide firmware upgrading remotely via the BACnet/IP network

2.80.1 Mass firmware update of entire rooms

2.80.2 Mass firmware update of specifically selected rooms or areas

2.80.3 Mass firmware upgrade of specific products

2.81 WattStopper Product Number: LMCS-100, LMCI-100

LMCP LIGHTING CONTROL PANELS

2.82 Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:

2.82.1 Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors

2.82.2 Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel

2.82.3 Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features

2.82.3.1 Removable, plug-in terminal blocks with connections for all low voltage terminations

2.82.3.2 Individual terminal block, override pushbutton, and LED status light for each relay

2.82.3.3 Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only

2.82.3.4 Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital

occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices

2.82.3.5 True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet

2.82.3.6 Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously

2.82.3.7 Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99

2.82.3.8 Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state

2.82.3.9 Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:

Electrical

2.82.3.9.1 30 amp ballast at 277V

2.82.3.9.2 20 amp ballast at 347V

2.82.3.9.3 20 amp tungsten at 120V

2.82.3.9.4 30 amp resistive at 347V

2.82.3.9.5 1.5 HP motor at 120V

2.82.3.9.6 14,000 amp short circuit current rating (SCCR) at 347V

2.82.3.9.7 Relays shall be specifically UL 20 listed for control of plug-loads

Mechanical

2.82.3.9.8 Replaceable, ½" KO mounting with removable Class 2 wire harness

2.82.3.9.9 Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel

2.82.3.9.10 Dual line and load terminals each support two #14 - #12 solid or stranded conductors

2.82.3.9.11 Tested to 300,000 mechanical on/off cycles

2.83 Isolated low voltage contacts provide for true relay status feedback and pilot light indication

2.84 Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection

2.85 Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700

2.86 Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control

2.86.1 Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups

2.86.2 The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes

2.86.3 The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed

2.86.4 The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:

2.86.4.1 Scheduled ON / OFF

2.86.4.2 Manual ON / Scheduled OFF

2.86.4.3 Astro ON / OFF (or Photo ON / OFF)

2.86.4.4 Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)

2.86.5 The user interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)

2.86.6 The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years

2.86.7 Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable

2.87 The lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection

2.88 The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet® protocol

2.88.1 The panel shall have provision for an individual BACnet device ID and shall support the full 2^{22} range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network

2.88.2 The panel shall support MS/TP MAC addresses in the range of 0 – 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second

2.88.3 Lighting control relays shall be controllable as binary output objects in the instance range of 1 – 64. The state of each relay shall be readable and writable by the BAS via the object present value property

2.88.4 Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 – 64

2.88.5 The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 – 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode

2.88.6 Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:

2.88.6.1 Binary output objects in the instance range of 1 – 64 (one per relay) for on/off control of relays

2.88.6.2 Binary value objects in the instance range of 1 – 99 (one per channel) for normal hours/after hours schedule control

2.88.6.3 Binary input objects in the instance range of 1 – 64 (one per relay) for reading true on/off state of the relays

2.88.6.4 Analog value objects in the instance range of 101 – 199 (one per channel group) shall assign a blink warn time value to each

channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches

2.88.7 The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel

2.88.8 The BO and BV 1 – 99 objects shall support BACnet priority array with a relinquish default of off and after hours respectively. Prioritized writes to the channel BV objects shall propagate prioritized control to each member relay in a way analogous to the BACnet Channel object described in addendum aa. (http://www.bacnet.org/Addenda/Add-135-2010aa.pdf)

2.88.9 Panel-aggregate control of relay Force Off at priority 2 shall be available via a single BV5 object. Force On at priority 1 shall be available via a single BV4 object

2.88.10 Lockout of all digital switch buttons connected to a given panel shall be command-able via a single BV2 object. The lock status of any connected switch station shall be represented as BV101-196

2.89 WattStopper Product Number: LMCP8, LMCP24 or LMCP48

USER INTERFACE

2.90 Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum:

2.90.1 Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.

2.90.2 Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.

2.90.3 Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.

2.90.4 Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.

2.90.5 Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.

2.90.6 Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.

2.90.7 An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.

2.91 WattStopper Product Number: LMCT-100

EMERGENCY LIGHTING CONTROL DEVICES

2.92 Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

2.92.1 120/277 volts, 50/60 Hz, 20 amp ballast rating

2.92.2 Push to test button

2.92.3 Auxiliary contact for remote test or fire alarm system interface

2.93 WattStopper Product Numbers: ELCU-100, ELCU-200

PART 3 - EXECUTION

PRE-INSTALLATION MEETING

3.1 A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:

3.1.1 Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.

3.1.2 Review the specifications for low voltage control wiring and termination.

3.1.3 Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.

3.1.4 Discuss requirements for integration with other trades

CONTRACTOR INSTALLATOIN AND SERVICES

3.2 Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs

3.3 Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable following installation, and shall supply the lighting controls manufacturers with test results. Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification. Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings

3.4 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication

3.5 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings

3.5.1 Adjust time delay so that controlled area remains lighted while occupied

3.6 Provide written or computer-generated documentation on the configuration of the system including room by room description including:

3.6.1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.

3.6.2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

3.6.3 Load Parameters (e.g. blink warning, etc

3.7 Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity

FACTORY SERVICES

3.8 Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system

3.9 The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date

3.10 Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system

COMMISSIONING SUPPORT SERVICES

3.11 On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including

reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

3.12 The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents

ACCEPTANCE TESTING SUPPORT SERVICES

3.13 On all California projects, a certified lighting controls acceptance test technician (CLCATT) must verify the installation of the lighting control system. Manufacturer should include an extra day of factory technician's time to assist the CLCATT review the functionality and settings of the lighting control hardware per the requirements in the California State forms. It will be the CLCATT's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the CLCATT with this task

END OF SECTION

SECTION 26 24 16

PANEL BOARDS

PART 1 – GENERAL

1.1 Furnish and install branch circuit panel boards as specified herein and as indicated on the drawings. Submit manufacturers' data on all items.

1.2 Submit manufacturers' data on all panel boards and components including:

1.2.1 Enclosures and covers

1.2.2 Breakers

1.2.3 Surge Protective Device (SPD) equipment

1.2.4 Incident energy level calculations

1.2.5 Common submittal mistakes which will result in the submittals being rejected:

1.2.5.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

1.2.5.2 Not including all items listed in the above itemized description.

1.2.5.3 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.

1.2.5.4 Not including actual manufacturer's catalog information of proposed products.

1.2.5.5 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 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be manufactured by the same manufacturer. Circuit breakers shall be permitted to be series rated to limit the available fault current to no more than the above ratings.

2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20" wide and 5-3/4" deep for all panels 600 amp rated and less.

2.3 All busses shall be tin-plated aluminum and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panel boards shall contain ground busses.

2.4 Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws

behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.

2.5 Each panel shall have a two-column circuit index card set under glass or glass equivalent on the inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the architect prior to project completion.

2.6 Tandem mounted or wafer type breakers are not acceptable.

2.7 Multiple breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.

2.8 Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

2.9 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.

2.10 Acceptable manufacturers are Square D, Eaton, Siemens or General Electric.

2.11 Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are <u>not</u> considered equal, or approved for use on this project.

Surge Protective Device (SPD)

2.12 Surge Protective Device (SPD) panelboards, shall be provided with an integrated circuit breaker panelboard and parallel connected suppression / filter system in a single enclosure. The SPD panelboard shall meet the following parameters: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, UL 1283 and the UL 1449, Third Edition, effective September 29, 2009.

2.13 The panelboard shall be UL 67 Listed and the SPD shall be UL 1449 labeled as Type 1 or Type 2 or as Type 4 intended for Type 1 or Type 2 applications. SPD shall be factory installed integral to the panel board.

2.14 The SPD panelboard shall be top or bottom feed according to requirements. A circuit directory shall be located inside the door.

2.15 SPD shall meet or exceed the following criteria:

2.15.1 For standard areas supply SPD having 100kA per phase surge current capacity. For mountain and desert areas (areas with over 5 lightning strikes per year), SPD shall have a per phase surge current capacity of 200kA.

2.15.2 UL 1449 – Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	<u>L-L</u>	<u>MCOV</u>
208Y/120	700V	700V	700V	1200V	150V
480Y/277	1200V	1200V	1200V	2000V	320V

2.15.3 SPD shall be UL labeled with 100kA Short Circuit Current Rating (SCCR).

2.16 UL 1449 - Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

VOLTAGE	L-N	L-G	N-G	L-L	MCOV
208Y/120	700V	700V	700V	1200V	150V
480Y/277	1200V	1200V	1200V	2000V	320V

2.17 SPD shall be UL labeled with a minimum 100kVA short circuit rated (SCCR).

2.18 UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

System Voltage	Allowable System Voltage Fluctuation (%)	MCOV
208Y/120	25%	150V
480Y/277	15%	320V

2.19 SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of - 50dB at 100 kHz. No filtering is required for a 100kA SPD.

2.20 Suppression components shall be heavy duty 'large block' MOVs, each exceeding 30mm diameter.

2.21 Type 4 SPD shall include a serviceable, replaceable module.

2.22 SPD shall be equipped with the following diagnostics:

2.22.1 Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.

2.22.2 No other test equipment shall be required for SPD monitoring or testing before or after installation.

2.23 SPD shall have a response time no greater than 1/2 nanosecond

2.24 SPD shall have a 10 year warranty

2.25 The SPD panelboard shall have removable interior

2.26 The SPD panelboard main bus shall be aluminum and rated for the load current required

2.27 The SPD panelboard shall include a 200% rated neutral assembly with copper neutral bus

2.28 The unit shall be provided with a safety ground bus

(SPD) Quality Assurance

2.29 Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing transient voltage surge suppressors.

2.30 Manufacturer shall be ISO 9001 or 9002 certified.

2.31 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

2.32 The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

PART 3– EXECUTION

3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.

3.2 Provide a spare 3/4" conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panel boards.

3.3 All lugs shall be torque tested in the presence of the inspector of record.

Arc Flash and Shock Hazard

3.4 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

3.4.1 **All studies shall be performed by "Emerson Electric" (858) 695-9551, MTA (858) 472-0193, or Terra Power Solutions (858) 380-8170. Studies performed by manufactures or other engineering or testing companies must submit qualifications for approval by Johnson Consulting Engineers, 7 days prior to bid for this project**.

3.5 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16 Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.

3.6 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department

3.7 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

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:

	HUBBELL	LEVITON	PASS & SEYMOUR
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:

	HUBBELL	LEVITON	PASS & SEYMOUR
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" cover plates.

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 28 16

DISCONNECTS

PART 1 – GENERAL

1.1 Furnish and install all disconnect switches as shown on the drawings and as required by the CEC.

1.2 Submit manufacturers' data for all disconnects and fuses.

1.2.1 Disconnects

1.2.2 Fuses

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 Acceptable manufacturers shall be Square D, Cutler Hammer, Siemens or General Electric.

2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1 are not considered equal, or approved for use on this project.

2.3 All switches shall be heavy-duty type, externally operated, quick-make, quick-break, rated 600 volts or 240 volts as required, with the number of poles and ampacity as noted. All switches for motors shall be HP rated. Switches shall have NEMA-Type 1 enclosures, except switches located where exposed to outdoor conditions shall have NEMA Type 3R enclosure. Switches generally shall be fused except where noted to be non-fused on the drawings.

2.4 Where fuses are indicated, fuses shall be Bussman or Littlefuse (no known equal). Fuses shall be current limiting type with time delay characteristics to suit the equipment served.

PART 3 – EXECUTION

3.1 Mount all switches to structure or U-channel support. U-channel supports shall be cleaned and painted to prevent rust.

3.2 Switches shall be accessible with proper clearances in front per CEC 110-16.

3.3 All lugs shall be torque tested in the presence of the inspector of record.

3.4 Arc Flash and Shock Hazard

3.4.1 The contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

3.4.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16 Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.

3.4.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.

3.4.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed and in no case more than 8 cal./cm².

END OF SECTION

SECTION 26 33 23

EMERGENCY LIGHTING EQUIPMENT

PART 1 – GENERAL

1.1 Furnish and install an uninterruptible emergency lighting Inverter System and Emergency Power Control Relays to provide a reliable source of emergency power, designed to operate during periods of utility line deficiencies without any interruption in power supplied to the connected load. The system shall provide and be capable of powering any combination of electronic, power factor corrected, fluorescent, LED, incandescent or HID lighting. Other connected loads shall include but not be limited to building management systems, motors, security systems and other critical voltage or frequency-sensitive electronic loads. The system shall operate from 0-100% loading and be rated to deliver full KVA rated output at unity power factor for a minimum of 90 minutes. Upon return to normal AC utility line power, the system shall recharge the batteries without any interruption of power supplied to the load.

1.2 The Inverter System shall be listed to or comply with these standards:

1.2.1 UL 924 Standard for Emergency Lighting and Power Equipment

1.3 The Emergency Power Control Relay shall comply with UL 924

1.4 Submit Manufacturers' data sheets for all components including:

1.4.1 Warranty

1.4.2 Wiring diagrams

1.4.3 Bill of materials.

1.4.4 Product catalog sheets or equipment brochures.

1.4.5 Product guide specifications.

1.4.6 Installation information, including weights and dimensions.

1.4.7 Drawings for requested optional accessories.

1.5 **Common submittal mistakes which will result in the submittals being rejected:**

1.5.1 Not including all items listed in the above itemized description.

1.5.2 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.

1.5.3 Not including actual manufacturer's catalog information of proposed products.

1.5.4 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

Single Phase systems 2000VA or less

2.1 The Central Inverter System specified herein shall be:

2.1.1 Dual Lite “Synchron” Series Inverter System.

2.1.2 Myers Power Products Illuminator “C-M” series

2.1.3 Controlled Power Co. “UltraLite ELU” series

2.1.4 Alternate manufacturers shall comply with these specifications and shall not exceed the physical dimensions and weights indicated on the drawing schedule.

Single Phase systems over 2000VA

2.2 The Central Inverter System specified herein shall be:

2.2.1 Dual Lite “Spectron LSN” Series Inverter System.

2.2.2 Myers Power Products Illuminator “E” series

2.2.3 Controlled Ppwer Co. “UltaLite EON” series.

2.2.4 Alternate manufacturers shall comply with these specifications and shall not exceed the physical dimensions and weights indicated on the drawing schedule.

2.2.5 Equipment as manufactured by Digital Signal Power Manufacturer (DSPM) has been reviewed and is not an approved alternate for this project.

Three Phase systems

2.3 The Central Inverter System specified herein shall be:

2.3.1 High-Lites “H3FT” Series manufactured by Genlyte

2.3.2 Myers Power Products Illuminator “CIII” series

2.3.3 Alternate manufacturers shall comply with these specifications and shall not exceed the physical dimensions and weights indicated on the drawing schedule.

2.3.4 Equipment as manufactured by Digital Signal Power Manufacturer (DSPM) has been reviewed and is not an approved alternate for this project.

2.4 System operation shall be fully automatic. The charging system will maintain the batteries at full capacity at all times. On-board microprocessors will continuously monitor charger settings and the system’s overall readiness. Diagnostic circuitry shall include a software-controlled charger, continuous monitoring of operating parameters, and programmable system testing capabilities. Individual alarms and system logs shall be provided. All alarms and logs shall be automatically recorded and readily displayed via the User Interface Display (UID). The system shall also include one RS232 serial port for remote communications.

2.5 Automatic overload and short circuit protection in normal and emergency mode shall consist of 150% momentary surge capability, 120% overload for 5 minutes, and 110% overload for 10 minutes. Protection shall also include a low battery voltage disconnect, AC input circuit breaker, a

DC input breaker or Fuse, and an AC output fuse. A digitally generated sinusoidal output waveform (PWM) with less than 5% total harmonic distortion at rated linear load shall be provided to the connected load.

2.6 Available input voltage shall be as indicated on the drawings, with a frequency of 60Hz. The AIC rating shall be a minimum of 42,000 RMS symmetrical amperes.

2.7 Available output voltage shall be as indicated on the drawings, with a frequency of 60Hz + 0.05Hz.

2.8 The user interface display (UID) shall include an array of LED's, a 2-line, 40-character LCD display, and a keypad for system input. The UID shall be menu-driven and display individual system parameters using a numbered code (Hot Key). The LED array shall indicate, by color code, the following status modes:

2.8.1 AC output presence (green)

2.8.2 System ready (green)

2.8.3 Battery charging (red)

2.8.4 Inverter "ON" (amber)

2.8.5 Alarm functions (red)

2.9 To ensure only authorized personnel have system access, a multi-level password shall be required to change all functions and operating parameters. A continuous scrolling display of the following metered functions shall be provided:

2.9.1 AC input voltage, AC output voltage, AC output amps

2.9.2 Battery voltage, Battery charging amps, Battery discharge amps

2.9.3 Output volt-amps (VA), Output power (watts)

2.9.4 Ambient temperature

2.9.5 Last inverter run time, Total inverter run time, System run time, Date Time

2.10 Audible and visual alarms shall be provided, with automatic logging of the twenty-five most recent events. An alarm acknowledgment feature shall be provided, which will allow the user to silence only the current audible alarm without silencing other alarms or clearing the alarm condition until the fault has been addressed. An alarm shall be sounded if any of the following operating conditions occur:

2.10.1 Low battery voltage, Near low battery voltage, High battery voltage

2.10.2 High AC input voltage, High AC output voltage, Low AC output voltage Output, overload (VA), Low remaining run time

2.10.3 High ambient temperature

2.10.4 Tripped circuit breaker

2.11 Manual and automatic test modes shall be provided.

2.11.1 Manual user-initiated system test at any time.

2.11.2 Automatic monthly and annual self-diagnostic tests.

2.11.3 Automatic recording of the last twenty events in a Test Results log.

2.12 A three-step float charger shall be software controlled and temperatures compensated, and charge the batteries continuously while in normal “standby” condition (non emergency mode). Following a power failure, the constant current charger mode shall be initiated until battery voltage reaches the equalize stage. Equalize stage shall be maintained until the charging current drops to .5 amps, or 0.3% of the battery amp/hour rating. Battery voltage shall then enter the float stage.

2.13 Batteries shall be designed to provide a minimum 1.5 hours rated output voltage to the connected load in emergency mode without dropping below 87.5% of nominal battery voltage.

2.13.1 The batteries shall be encased in an enclosure that permits easy maintenance without requiring removal.

2.13.2 Sealed Lead Calcium: Maintenance Free Construction requires no addition of water over its useful. Life expectancy is 10-years at 77F (25C) ambient temperature.

2.14 The following optional factory-installed equipment shall be provided:

2.14.1 Normally-On Output Circuit Breaker Options:

2.14.1.1 A maximum of fourteen monitored positions are available. Single pole 120V and 277V breakers occupy one position each, while double pole 240V breakers occupy two positions. Reference drawings for required number of output breakers required.

2.14.2 Provide Universal cabinet locks for all electronic and battery cabinets.

2.14.3 Provide, using the system’s RS232 port, a fax operating status reports is transmitted over a customer-supplied dedicated analog phone line to up to six locations. Phone numbers can be programmed locally using the unit keypad or computer terminal, or remotely via a modem. Each designated fax location automatically receives a unit status report following monthly and annual tests, or when an alarm condition is detected. Status reports include readings on key operating parameters, as well as complete alarm and inverter log printouts, in uncoded, user-friendly descriptions. This option also provides for two-way communications thru terminal emulation software, such as HyperTerminal (not supplied with the inverter system).

2.14.4 Provide a factory-installed, internally-mounted two-position “make before break” switch. Compatible with all input/output combinations and any combination or quantity of output circuit breakers. Allows connecting the utility power supply to the load without placing the inverter in emergency mode.

2.15 Maintenance, Service and Enhanced Warranty Plans. The following shall be provided to assure initial and long-term viability of the system through additional maintenance and service plans and/or through enhancements to the standard two-year electronics limited warranty.

2.15.1 Factory Start-Up shall be supplied as a service to the installing contractor. The Factory Start-Up process shall verify correct installation and operation of the inverter system.

Trained, factory authorized technicians shall administer an on-site, point-by-point check of the system to include:

2.15.1.1 Internal electrical connections

2.15.1.2 AC input and Battery connections

2.15.1.3 System operating voltages

2.15.1.4 System operating parameters

2.15.1.5 Initial system “power-up

2.15.1.6 Battery discharge test

2.15.1.7 Correction of existing deficiencies

2.15.1.8 Final testing, calibration and recording

2.15.1.9 Training of available operating personnel

2.15.2 A Monitoring Program shall provide for the continuous monitoring of the inverter system by the Factory Technical Support Group. All monthly and annual system tests shall be reviewed and analyzed for early warning signs of system malfunction. Any failures shall be automatically relayed to the service department where corrective action can be recommended to the owner/operator. For activation, a user supplied dedicated analog phone line must be available.

2.15.3 Preventive Maintenance Plan (PMP) - The Preventive Maintenance Plan shall provide system coverage beyond the standard two-year factory warranty. PMP warranty service excludes the batteries, which are covered under a separate warranty plan. Installation of a Fax Modem option shall be provided for Preventive Maintenance Plan.

2.15.3.1 Additional 2-year warranty and 2-year service coverage, weekdays, Monday-Friday, 8AM to 5PM EST. If the standard factory warranty has expired before selection and purchase of a PMP plan, an on-site evaluation shall be scheduled to determine if the system requires parts and/or labor to return to factory specifications. Parts and labor required shall be charged at additional costs.

2.16 The system shall be contained in a code gauge, steel NEMA 1 enclosure, finished in a scratch resistant, powder coat finish, with a key lock, conduit knockouts at the top and sides, and front opening doors. Enclosures shall be designed to allow stacking to minimize the overall system’s footprint. All components shall be front accessible and incorporate a modular design and a quick disconnect means to facilitate servicing.

Emergency Power Control Relays - (Noted on the drawings as LVS EPC Control relay)

2.17 Insert Series power control modules are designed to allow locally switched lighting fixtures to be wired for emergency operation from either generator, inverter system, or secondary sources.

2.18 As Manufactured by:

2.18.1 “Highlights” HEPC Series Emergency Power Control modules (203) 575-2044 www.highliteslighting.com or approved equal.

2.18.2 LVS Controls (800) 982-4587 www.lvscontrols.com.

2.19 During normal operation, LEDs on the module's faceplate indicate the presence of both utility (Green) and emergency (red) power and the local switch will be capable of turning all circuit lighting fixtures on or off as required. During utility power failures, emergency lighting fixtures controlled by the module will illuminate regardless of local switch position. If, during normal operation, emergency backup power is lost, the module will automatically produce an audible alarm as an alert to this potentially hazardous condition.

2.20 Recent energy mandates require improved vigilance in the conservation of resources. By eliminating the need for night light circuits, power controls conserve energy by allowing all area ambient lighting to be turned off while still assuring the availability of emergency illumination in the event of a utility power failure.

2.21 The power control automatically initiates a test of the emergency lighting fixtures whenever the local switch is turned off. Upon turning off of the local switch, the designated emergency lighting fixtures will remain illuminated for an additional 5 seconds to assure system readiness. The power controls may also be checked manually at any time through the integral test switch provided on the module's faceplate. With the local lighting turned off and both utility and emergency power present, pressing the test switch will cause the controlled emergency fixtures to illuminate for 5 seconds.

2.22 Adapts locally switched lighting fixtures for emergency operation, bypasses local switch during power failures. Compatible with motion detector and photocells.

2.23 Full 20 amp load capability available for 120 or 277VAC operation. Approved for in-wall or in-ceiling applications.

2.24 Provided with Surge and short circuit protection.

2.25 Audible emergency power circuit failure alarm, Built-in manual emergency circuit test feature, Momentary test switch.

2.26 Provide a single module at each emergency lighting fixture where the lighting fixture is locally controlled by a room switch and or motion sensor. These modules are to be furnished and installed by the contractor installing the lighting fixtures.

2.27 Provide a single module located at the panelboard or low voltage control panel to control emergency lights controlled from a low voltage control system. These modules are to be furnished and installed by the contractor installing the lighting fixtures.

2.28 Where dimmable light fixtures are on emergency circuit, provide emergency relay control, which is dimming compatible, and will bring lights to full brightness in emergency mode.

2.29 The Module has a full 5-year replacement warranty.

PART 3- EXECUTION

3.1 Input and output conductors shall be enclosed in separate conduits. All load side wiring shall be sized as required for voltage drop conditions to assure proper operation of connected loads.

3.2 All 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 1632A and Table 16-A0. The Contractor shall submit

drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

3.3 The system shall allow connection of both “normally on” and "normally off” (optional) loads. Connected loads shall receive utility power during normal operation, and ‘no break” system inverter power during utility interruptions.

3.4 In emergency mode, the inverter system shall supply true digitally-generated AC sinusoidal output. Refer to plans for type and location of loads served by the system.

3.5 A factory trained service representative shall be dispatched to perform the initial system start-up.

3.6 Documents supplied with each system shall include:

3.7 Shop drawings showing physical dimensions, mounting information and wiring diagrams.

3.7.1 Installation/Users manual(s) for locating, mounting, interconnecting, and wiring the system, with operating and preventive maintenance procedures.

3.7.2 The system shall be installed in accordance with all appropriate manufacturers’ instructions and in compliance with all appropriate codes.

3.8 The system shall be guaranteed, under normal and proper use, against defects in workmanship and materials for a period of two years from the date of shipment. Batteries supplied as part of the systems shall be covered under a separate pro-rata warranty as described below:

3.8.1 Sealed Lead Calcium, 10-year life expectancy – One-year full replacement warranty plus an additional nine years pro-rata.

3.8.1.1 Note: Within 90days from date of shipment, batteries shall be connected to an energized charging system to maintain the Warranty. Battery life and capacity is rated at an optimum operating temperature range of 68°F to 85°F. Operating temperatures outside this range will affect battery life and capacity. Batteries are rated at 100% capacity at 77°F.

3.9 Maintenance and service programs shall be made available by the supplier to assure long-term reliability of the system.

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 <u>Common submittal mistakes which will result in the submittal being rejected:</u>

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 <u>when</u> 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 (CEC). 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

27 00 00

COMMUNICATION

SANTEE SCHOOL DISTRICT

SECTION 27 01 00

COMMUNICATIONS 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 27 10 00

VOICE / DATA/ IP PAGE INFRASTRUCTURE

PART 1 – GENERAL

1.1 Include all labor, equipment and materials necessary for providing a complete networking infrastructure system as described herein and/or as indicated on the drawings.

1.2 Related specification sections:

1.2.1 Section 26 01 00 – General Provisions
1.2.2 Section 26 05 19 – Conductors
1.2.3 Section 26 05 33 – Conduit and Fittings
1.2.4 Section 26 05 34 – Outlet and Junction Boxes

1.3 Approved minimum Product and Contractor Extended Warranty Certifications;

1.3.1 All components shall be manufactured by one of approved manufacturers, the installing Contractor must have the accompanying certification from the product manufacturer(s) for installation of an “Extended Warranted System” as required by each manufacturer and as indicated in these specifications.

1.3.1.1 Specified system warranties are to be established between the component and cable manufacturers and the District, warranties between the cable manufacturer only or installing Contractor and the District are not considered equal.

1.3.1.2 Warranty shall be a full “Performance Warranty” installed by a “Certified Contractor” as specified by one of the approved manufacturers. A “Component Warranty” will not be considered equal. All components, labor, and “Performance Criteria” shall be warranted by one of the approved manufacturers.

1.4 Acceptable manufacturers are:

1.4.1 **LEVITON / BERK-TEK**

1.4.1.1 Installing Contractor must be LEVITON Network Solutions Premier certified to install this system.

1.4.1.2 Warranty provision and training must be for the Leviton/Berk-Tek – Limited Lifetime Premium Performance Warranty program.

1.4.2 **COMMSCOPE**

1.4.2.1 Commscope’s Training and Warranty programs encompass the brand names known as Systimax and Uniprise.

1.4.2.2 Installing Contractor must be PartnerPro certified to install any of the systems under the Commscope Family of brand names. Alternate certification that apply as well is Systimax Premier Certification for products installed with the Systimax brand name.

1.4.2.3 Warranty provision and training must be for the Commscope (Uniprise and Systimax) – 25-Year Premium Performance Warranty program.

1.4.3 **ORTRONICS (Legrand) /Superior Essex**

1.4.3.1 Installing Contractor must be CIP-ESP or IP certified to install this system.

1.4.3.2 Warranty provision and training must be for the nCompass – Lifetime Premium Performance program.

1.4.4 **Panduit/General Cable**

1.4.4.1 Installing Contractor must be PanGen certified to install this system.

1.4.4.2 Warranty provision and training must be for the PanGen Certification Plus – 25-Year Siemon Premium Performance program.

1.4.5 **Siemon**

1.4.5.1 Installing Contractor must be Siemon Certified Installers (CI) certified to install this system.

1.4.5.2 Warranty provision and training must be for the Premium 6 Certification – 20-Year Premium Performance program.

1.4.6 Warranty shall be to the District, for the period as defined by the Network Infrastructure System selected for installation, after District acceptance and sign-off of the completed system. The Contractor must provide documentation from one of the approved manufacturers, as indicated in Section 1.3, indicating their qualifications for installation of this system in compliance with the manufacturer/s warranty period requirements as warranted Contractor.

1.4.7 Equipment qualifications: It is the intent of these specifications that each bidder provides all hardware, components and installation services that are necessary to ensure a fully operational wiring system including warranties, as shown in the EIA/TIA Category-6 guidelines.

1.4.8 All components, parts, infrastructure, patch cables, termination panels and cables must be classified by the manufacturer or manufacturers as a part of the "Extended Warranty" program. Contractor may not mix in components from other certified programs or materials that are not considered part of the "Lifetime" warranty.

1.4.9 Systems or components as manufactured by any other manufacturer which, are not specifically listed in 1.3 are **not** approved for use on this project.

1.5 **Installing Contractor qualifications**: Firms and their personnel must be regularly engaged in the installation of data networking cabling and equipment for systems of similar type and scope. The Contractor must have a full-service office able to respond to emergency callouts during the warranty period. The Contractor must also provide complete installation of all wiring and devices or equipment. **Subcontractors with Electrical Contractors or other warranted or non-warranted Contractors for supervised installation of any part of this system are not approved.**

1.5.1 Contractor shall have on staff a minimum of (1) BICSI RCDD as full-time employees.

1.5.2 The successful Contractor shall be a California licensed C7 or C10 Premise Wiring Contractor as defined in this specification.

1.5.3 All work shall be performed under the supervision of a company accredited and trained by the Manufacturer of the components and cable and such accreditation must be presented with the bid submittal. All personnel performing work on this project must have successfully completed the manufacturer's training courses to completely comply with the extended warranty requirements prior to performance of any work on this project. Accreditation will consist of individual employee certifications issued by the manufacturer or manufacturers.

1.5.4 All personnel engaged in the testing of premises fiber optic and copper UTP cable systems must have successfully completed the test equipment manufacturer's training courses. Certification of such training must be presented with the bid submittal. Cut sheets of the test equipment to be utilized shall be provided with Phase I project material submittals.

1.5.5 This project shall employ Category-6 cabling. The Contractor shall install the related components in relation to the performance requirements for the type of cable installed.

1.5.6 If Contractor routes cable and/or associated pathways in another route than indicated on the drawings, they shall maintain all maximum cable installation distances as required by the manufacturer's distance limitations.

1.6 In order to ensure project cohesion, a single point of contact is required to provide a "TURNKEY" solution. The work covered under this section of the specification consists of furnishing all: labor, cabling, equipment, supplies, materials, and training.

1.7 The drawings indicate a schematic routing of cables above-ceiling cable prior to bid. Where cables penetrate through walls a conduit sleeve shall be provided. Where cables pass through fire rated walls, the conduit sleeve shall be sealed to maintain the rating of wall assembly.

1.8 Unless otherwise noted in the project drawings or these specifications, the Division 26 Contractor shall provide the installation of all conduits, outlet and junction boxes, trenching and pull box installation.

1.9 General Submittal Requirements

1.9.1 **Group #1 Submittal** shall be made in electronic format within (20) working days after the award of the contract by the District. This submittal shall include the following:

1.9.1.1 Complete Bill of Materials in Excel Spreadsheet format with bills of quantities, including all materials, components, devices, and equipment required for the work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed - Description and quantity of each product, Manufacturer's Name and Model Number, Manufacturer's Specification Sheet or Cut Sheet and Specification Item Number referenced for each required product or if

not shown in the specifications, Drawing Detail Number being referenced. (ie; Spec. 27 20 00 Item 2.1.3 and/or Detail #1/E4.15).

1.9.1.2 Material Cut Sheets shall provide detailed product information and shall be original manufacturer product bulletins.

1.9.1.3 Copies of material information from vendor websites shall not be considered equal and will not be accepted. Copies of Web pages which include multiple pages of irrelevant information not associated with the product cut sheet shall not be considered equal and will not be accepted.

1.9.1.4 Material Cut Sheet part number provided shall be highlighted or provided with an arrow directed at the corresponding part number.

1.9.1.5 Equipment items which have individual components will require that all component parts be listed individually.

1.9.1.6 Description of any specialty backbox requirements

1.9.1.7 All wiring types required for installation of this system

1.9.1.8 Spare parts shall be listed individually to verify proposed quantity

1.9.1.9 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment.

1.9.2 **Group # 2 Submittal** shall be provided within (20) working days after the approval of the Group # 1 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 (1) USB Flash Drive copy with files in a AutoCAD format. Building floor plan CAD files will be made available. 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 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. Phase II Submittals drawings shall include the following:

1.9.2.1 MDF and IDF equipment rack or cabinet elevations will be required to be provided including cable routing, grounding, support, UPS, network electronics, etc. and position of all components in the rack or cabinet.

1.9.2.2 Provide labeling plan which identifies the proposed scheme for identifying all components including racks, patch panels (fiber and copper), site distribution feed cables, horizontal station cables and site conduit systems (handholes, pullboxes, etc.).

1.9.2.3 Provide shop drawings showing all end device locations, tap values, paging zones and amplifier sizing for each zone for analog speakers and horns, including devices connected to IP-Based zone controllers.

1.9.3 Common submittal mistakes which will result in submittals being rejected:

1.9.3.1 Not including the qualifications of the installing Contractor Company and Contractor's Staff.

1.9.3.2 Not including all items listed in the above itemized description.

1.9.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlights, underlining or clouding the items to be reviewed (provided for the project) or crossing out the items which are not applicable.

1.9.3.4 Not including actual manufacturer's cut sheets or catalog information of proposed products.

1.9.3.5 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.

1.9.4 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files (CAD). As a part of the written request, please include the following information:

1.9.4.1 Clearly indicate Project Name and Client, Johnson Consulting Job Number (located in the bottom left corner of JCE Engineering Stamp) and each drawing Sheet Number required (i.e. E1.1, E2.1, E4.1 etc.)

1.9.4.2 Identify the Name, Company, Title, phone number, mailing address and e-mail address of the person to receive the files.

1.9.4.3 Detail or Riser diagram sheet, System Schematic drawings or any other drawings other than floor plans or site plans, will not be made available to the Contractor.

1.9.4.4 Files will only be provided in the AutoCAD format in which they were created (i.e. version 2015 or version 2016). Files will not be made available in REVIT format.

1.9.4.5 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 and delays in requesting files will not alleviate the Contractor from submitting required documents within the required timeline.

PART 2 – PRODUCTS

2.1 Equipment racks have been detailed on the drawings and additional component information requirements have been described in the following sections and on the drawings. The following is a list of approved manufacturers for each type of rack to be furnished.

2.1.1 Alternate equipment manufacturers other than those indicated will not be reviewed or approved for use on this project.

2.1.2 **(Open Frame – 4-Post**) shall be manufactured by Chatsworth CPI QuadraRack #50120-703 Series. Reference drawing details and specifications for complete requirements.

2.2 **Open Frame 4-Post Racks**, 19" mounting Width by 84" High by 29" Deep with #12-24 mounting holes as shown in the IDF Room layout. Contractor shall be responsible for providing all racks and accessories. Furnish and install with the following:

2.2.1 The racks shall be provided with structural seismic bracing using cable runway to the top of the rack.

2.2.2 Universal 12" cable runway shall be as manufactured by CPI Model 10250-712. The cable runway shall be furnished with the additional adapters, connectors, support components, bends and offsets and extensions as required to fit the room and layout.

2.2.3 Anchor the cable runway to the wall with the appropriate width angle bracket and bolts as manufactured by CPI Model #11421-712.

2.2.4 The cable runway shall also be attached to the top of the rack with the appropriate adapter panel. Cable runway shall be directly attached to the 4-Post racks with J-Hooks.

2.2.5 Cable runway routed along walls, shall be offset from the wall a minimum of 6" and shall be supported with cantilevered wall mount brackets.

2.2.6 Floor mounted racks shall be structurally anchored to the floor with the anchors and bolts.

2.2.7 Provide full length vertical wire managers, CPI Double-Sided Narrow Vertical Manager, Part #12096-703, on each side of each rack. Vertical managers between racks may be substituted with the CPI #11729-703 6" wide double-sided manager. Single narrow vertical managers shall be provided on each end of the group of racks.

2.2.8 Provide (1) adjustable full depth vented shelf for each 4-Post equipment rack as manufactured by CPI #12700-719.

2.2.9 Provide horizontal wire managers between each patch panel or (1) manager per patch panel. Provide (1) spare manager per rack. Provide 2RMU height managers for each 48-Port patch panel and 1RMU height managers for 24-Port patch panels. CPI part #30130-719 and #30139-719.

2.2.10 Provide (1) minimum or more where detailed on drawings. Rack mounted surge arrest style power distribution unit per rack. 1 rack unit in height. TrippLite Model #PDUMH15NET2 with (8) NEMA 5-15R outlets, built-n SNMP Ethernet interface and NEMA L5-15P input with 5-20P adapter or approved equal by APC. Provide with minimum 10-foot cord for the PDU.

2.2.11 Contractor shall be responsible for neatly routing, storing and connecting the power cords from the PDUs to the electrical outlet or UPS as directed by the District. Power cords shall be dressed separately from the UTP cables or any other low voltage cable and shall be secured to the back of the rack or cable runway with Velcro ties.

2.2.12 Furnish grounding to each rack. Each rack shall be provided with a grounding terminal block, #6 Ground wire from the rack to the bus bar and a compression lug on the end of the ground wire at the bus bar. Provide grounding components as manufactured by CPI #40167-001 terminal block and #40162-901 compression lug or approved equal.

2.2.13 Provide (1) ground bus bar kit per MDF Room. Ground Bus Bar Kit as manufactured by CPI #40158-012 or approved equal. Ground Bus Bar and all bonding conductors to the bus bar shall be labeled. Grounding conductors shall be routed to the equipment racks, cable runway and electrical panel.

2.2.14 All fiber optic feed cables routed to the MDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the racks. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-FR. Maximum of (3) fiber feed cables per manager. Provide quantity of managers as required to manage all service loops.

MDF Room Requirements

2.3 The main Distribution Frame (MDF) Room is existing

2.4 Provide Fiber Optic Feed Cable Patch Panels – Fiber optic termination equipment (rack mounted), including all associated installation hardware. The equipment must have a sufficient number of ports to connect all fibers in every cable terminated at this location. Provide 25% spare capacity for future wiring requirements, including bulkheads in the fiber patch panel. Provide blank fillers for all used portions of the panel. All fiber feed cables shall be terminated in a single fiber optic patch panel up to 144 strands. Additional strands shall be terminated in the largest size required to continue the remaining fibers.

2.4.1 Contractor shall provide a minimum of 6-feet of slack on the fiber feed cable in the fiber optic patch panel. The first 48" of a tight buffered cable or the first 24" of a loose tube cable shall not be stripped back in the patch panel. Each type of cable shall have a minimum of 24" of stripped slack within the patch panel. Total slack within the patch panel shall not be less than 6-feet in length.

2.4.2 All fiber cables shall be secured to the patch panel with the Kevlar strength members at the manufacturer provided anchor point at the rear of the panel.

2.4.3 All fiber optic feed cables routed to the MDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the existing racks. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-FR.

2.5 Provide High-Definition Monitor Shelf in the existing MDF Room for programming and control of the new IP-Based Paging Server. Provide (1) High-Definition monitor shelf with integrated keyboard and touch pad for 4-post systems. Maximum 1RMU height, pull out shelf with rotatable monitor assembly. Includes 17" LCD monitor with minimum 1920X1080 resolution, with integrated 8-port KVM Switch. Monitor shall be provided with both HDMI and DVI inputs. Middle Atlantic Part # RM-KB-LCD17KVMHD or approved equal. Monitor shall be installed in one of the existing Data MDF Racks. Coordinate the exact location with the District IT Director prior to installation.

IDF Location Requirements

2.6 The Intermediate Distribution Frame (IDF) Room shall be a secondary wiring and equipment location for the data networking system. The Contractor shall include the following items at this location:

2.6.1 Provide backboard 8'-0" high x ¾" thick, with a minimum 48" width. Refer to the floorplans for the actual layout of the backboard coverage. Plywood mounting backboard shall be flame resistant, painted with fire resistant paint "white" or color to match the room finish. Contractor shall provide minimum one side finish grade plywood. Backboard shall be mounted with finish side out, regardless of location of fire rating stamp. Show proof of fire rating stamp to IOR on Inspector prior to installation.

2.7 Provide Fiber Optic Feed Cable Patch Panels – Fiber optic termination equipment (rack mounted), including all associated installation hardware. The equipment must have a sufficient number of ports to connect all fibers in every cable terminated at this location. Provide 25% spare capacity for future wiring requirements. Provide blank fillers for all used portions of the panel. All fiber feed cables shall be terminated in a single fiber optic patch panel.

2.7.1 Each IDF location shall be furnished with a minimum 24-Port patch panel, fully loaded with bulkheads. Type of connectors in the bulkheads shall be determined by the type of connectors used for termination of the fiber feed cables.

2.7.2 Contractor shall provide a minimum of 6-feet of slack on the fiber feed cable in the fiber optic patch panel. The first 48" of a tight buffered cable or the first 24" of a loose tube cable shall not be stripped back in the patch panel. Each type of cable shall have a minimum of 24" of stripped slack within the patch panel. Total slack within the patch panel shall not be less than 6-feet in length.

2.7.3 All fiber cables shall be secured to the patch panel with Kevlar strength members at the manufacturer provided anchor point at the rear of the panel.

2.7.4 All fiber optic feed cables routed to the IDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the rack. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-FR.

2.8 Category-6 Modular Patch Panels (rack mounted) with RJ45 style connectors, for terminating all twisted pair cable from each Voice/Data/IP-Page device outlet served from this location. Provide 25% spare capacity for future wiring requirements. All patch panels shall be 24 or 48-ports maximum. Provide cable support bars at the rear of each patch panel. All cable shall be secured to bars with Velcro straps.

2.9 All fiber optic feed cables routed to the IDF locations shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the racks or stored in the back of the wall mounted cabinets. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-FR. Maximum of (3) fiber feed cables per manager as required to manage all service loops. Provide a 12" diameter service loop manager in the rear of wall mount IDF cabinets by Leviton #48900-FR.

IDF UPS Requirements

2.10 General UPS Requirements – The Contractor shall coordinate with the Division 26 Contractor to properly locate the power outlet connection for the UPS in the IDF Room or Cabinet. The location shown on the floor plans is diagrammatical and does not give the Division 26 Contractor an exact placement. In addition, all UPSs must be furnished with heavy duty mounting bracket kits. A UPS installed in a wall mounted IDF Cabinet must be furnished with a 2-Post kit that can support the full weight of the unit.

2.11 Final location for the UPS, within the equipment racks or IDF locations with multiple racks, must be verified by the District IT Director or District Construction Project Manager prior to the installation of the UPS or the electrical outlet for the UPS.

2.12 UPS Requirement for an IDF location being installed at the IDF closet:

2.12.1 Provide with a minimum of (8) 20-amp, 120-volt, non-locking, NEMA 5-15/20R and (1) 30-amp, 120-volt, locking NEMA L6-30R output receptacles.

2.12.2 Provide with an input of (1) 30-amp, 120-volt, locking, NEMA L6-30P plug installed on 10'-0" power cord.

2.12.3 Provide network interface card – Model SNMPWEBCARD option in UPS. Software shall be included with the UPS.

2.12.4 Provide (1) environmental sensor/monitor in each IDF cabinet location. Provide TrippLite Model #ENVIROSENSE monitor unit and connect it to the UPS.

2.12.5 Provide TrippLite Model # SMART3000RMXLN (or approved equal by APC).

Fiber Optic Patch Cords

2.13 Fiber optic patch cords shall be furnished and installed by the Contractor.

2.14 All fiber optic patch cords furnished by the Contractor shall match the grade and glass of the fiber optic feed cable installed for the network infrastructure cabling system. The Contractor shall confirm with the District IT Department the type of connector required at the network equipment prior to ordering or installing the patch cords.

2.15 Multimode Fiber Optic Patch Cords – Parch cords shall be duplex 50/125um, laser-optimized, OM4 grade multimode optical glass. Fiber optic patch cords shall be furnished with LC connectors at the network switch port end and LC connectors at the fiber optic patch panel end. Fiber patch cords shall be furnished with ceramic ferrules. All Multimode patch cords shall be Aqua (Lt. Blue) in color. Patch cords shall be 6-feet (2-meters) in length. Provide (2) patch cords in the MDF Room and (2) patch cords in the IDF Closet.

2.16 Contractor shall be responsible for confirming the network switch connections with the District IT Director prior to ordering or installing the patch cords.

Copper Patch Cords

2.17 Copper patch cords shall be furnished and installed by the Contractor.

2.18 Provide Category-6 (Patch Panel End) patch cords with pre-molded boot, provide quantity equal to:

2.18.1 Provide 100% of the total Category-6 cable ports provided on the patch panels.

2.18.2 All patch cords to be installed by Contractor. Provide 100% of total copper patch cords required to be (4) feet in length.

2.19 Provide Category-6 (Workstation End) patch cords with pre-molded boot provide quantity equal to:

2.19.1 Provide 100% of the total Category-6 cable ports provided on the patch panels.

2.19.2 All patch cords to be installed by Contractor. Provide 100% of total copper patch cords required for data drop locations to be (10) feet in length, unless otherwise noted.

2.19.3 Patch cords installed at WAP (Wireless Access Point) locations IP Camera and IP Intercom locations shall be (2) feet in length.

2.20 Requirements for all copper patch cords furnished:

2.20.1 Color of patch cords shall be determined by the color code shown in detail drawings.

2.20.2 Patch cords shall as manufactured by Leviton, Commscope, Panduit, Ortronics or Siemon based on the network infrastructure system furnished by the Contractor.

2.20.3 Patch cords furnished must be in compliance with the manufacturer's "Channel" warranty requirements. Patch cords not warranted through the selected manufacturer Channel warranty program will not be approved for use with the network infrastructure.

2.20.4 Provide all other items as detailed on the drawings.

Campus Indoor/Outdoor Fiber Optic Feed Cable

2.21 Provide one continuous fiber optic cable routed from the Main Distribution Frame fiber patch panel to each intermediate Distribution Frame fiber patch panel, and/or other locations as shown on the drawings.

2.22 Outdoor Fiber Feed Cable Applications – Fiber optic cable shall be rated for indoor/outdoor riser rated applications. Construction shall consist of, all dielectric, tight buffer with central strength member, flame retardant PVC or PE jacket, rated OFNR, dry water-blocking compound only, and blank fillers are required. Central tube type fiber will not be considered equal.

2.23 Fiber optic feed cables for the data infrastructure must be installed as follows:

2.23.1 Provide a total of 12-strands of Multimode OM4-Rated fiber optic glass as shown on the Riser Diagram in the Detail Drawings to the IDF location.

2.23.2 Feed cables shall be clearly defined and labeled for each system. Provide color coding designations with a different color marker for the multimode and/or single mode fiber feed terminations in the fiber patch panels.

2.23.3 Terminate fiber cables with LC-Type connectors.

2.24 Cable shall contain one or all types of fibers listed below:

2.24.1 Provide Multimode 50/125-micron fiber optic glass, (minimum OM4 laser-optimized grade) for dual mode operation at 850 nm and 1300 nm wave lengths.

2.24.2 Maximum attenuation at 3.0dB/km @ 850nm and 1.0dB/km @ 1310nm. Minimum 1-gigabit Ethernet distance guarantee of 1110 meters @ 850nm and 600 meters @ 1300nm. Minimum 10-gigabit Ethernet distance guarantee of 550 meters @ 850nm/1300nm. Fiber shall be ISO-TIA OM4 plus rated.

2.24.3 Refer to drawings for cable types required. Refer to acceptable cables section for additional information and approved manufacturers.

2.25 Each fiber optic cable shall contain the quantity of strands of optical fibers as detailed on the drawings.

2.26 All fibers in a multi-fiber cable shall be fully operational within the required performance characteristics. If any individual fiber does not meet the minimum standards, the entire cable must be replaced, end to end, including connectors, without any additional expense to the customer.

2.27 Acceptable cables shall be:

2.27.1 Berk-Tek Multimode – GIGALITE 10-XB-OM4+

2.27.2 Commscope Multimode – (All Brands) Systimax LazrSpeed 550 OM4

2.27.3 Superior Essex Multimode – TeraFlex 10G-550-OM4+ (Type P)

2.27.4 General Cable Multimode – Clear Curve OM4+ (Type BM)

2.27.5 Siemon Multimode – XGLO 550 OM4 (Type T501)

2.28 Above glass types are an example of product names per manufacturer. Confirm requirements for indoor/outdoor, riser and plenum rated cable with riser drawings and site plans. Part numbers for composite style cable will vary greatly. Confirm part numbers with manufacturer.

Category-6 Station Cable

2.29 Contractor shall provide Category-6 UTP cable to each Data, Voice, IP Page, Audio-Visual Data Connection, IP Camera or any other location as indicated on the drawings and specifications. Provide quantity of cables as indicated on the drawings at each location.

2.30 Provide one Category-6, 4-pair unshielded twisted pair (UTP) cable from the nearest MDF or IDF location to each RJ45 data outlet port indicated on the drawings. Dual port outlets will require two such cables. Four port outlets will require four cables. Refer to the drawing details for jacket color requirements for each type of connection. Color of cable jacket for each type of connection shall be determined by the drawing details. Confirm color of cable jacket prior to ordering with the District IT Director. Contractor shall be responsible for providing the correct jacket color per the drawings per District Standards.

2.31 Unless otherwise shown in drawing details, the color of the Category 6 UTP cables shall be blue, shall be copper wire, individually insulated and color coded.

2.32 The cable shall be UL or ETL rated and UL verified in compliance Category-6 EIA/TIA standards. Approved cables for Network Infrastructure System:

2.32.1	Commscope (Systimax)	–	GigaSpeed XL – 1071E Series
2.32.2	Commscope (Uniprise)	–	CS37R
2.32.3	Superior Essex	–	NextGain Cat 6eX - #54-246-xA
2.32.4	Berk-Tek	–	LANMARK 2000 – 10167477
2.32.5	General Cable	–	GigaSpeed 6500 71339XX–
2.32.6	Siemon	–	9C6R4-E4-XX-RBA

2.33 Where data cables are indicated to run underground, Contractor shall use a Category-6 OSP-rated cable. Approved cables for Network Infrastructure System: Commscope #CS34O OSP-Rated with black PE jacket (or Cat-6 OSP-Rated versions by the Approved Manufacturers)

2.34 Manufacturer names and part numbers are shown as a point of reference and do not specifically designate required packaging or color for the cable. Contractor shall verify colors and packaging options shall be determined by Contractor preferences.

Category-6 Outlets

2.35 Unshielded twisted pair Category-6 outlets shall be an RJ45 Enhanced performance type 8-position / 8-conductor modular jacks and shall comply with Category-6 performance requirements. Provide single port, dual port, four port or quantity as indicated on the floor plans at each outlet location. All outlets shall be wired in an EIA/TIA 568B configuration.

2.36 Provide Category-6 insert installation kits for all locations furnished with Category-6 UTP cabling.

2.37 Refer to the detail drawings for color of the Category-6 outlets required. Contractor shall be responsible for confirming all color requirements prior to ordering or installing.

2.38 Provide the following Category-6 UTP data connector per Network infrastructure warranty requirements:

2.38.1 Leviton eXtreme Cat6+ Quick Port Series 61110-R

2.38.2 Systimax (Commscope) GigaSpeed XL Series MGS400

2.38.3 Uniprise (Commscope) UNJ 600 Series UNJ600

2.38.4 Ortronics Clarity 6 Tracjack Series OR-TJ600

2.38.5 Panduit MiniCom TX6 Plus Series CJ688TG

2.38.6 Siemon MAX-6 Series MX6-F

Outlet Faceplates

2.39 Provide a two-port faceplate for all one and two port outlet locations. Provide blanks for all unused openings.

2.40 Provide a four-port faceplate for all three and four port outlet locations. Provide blanks for all unused openings.

2.41 All fax/modem locations shall be provided as single port outlets. Requirements shall be the same as a single port data outlet as shown on the Technology Legend.

2.42 For single port voice outlet locations intended for wall telephone connections, a wall telephone type faceplate with attachment studs shall be provided. The wall telephone jack shall be 8-pin, RJ45 type and use IDC wire terminations only. Provide Category-6 insert, within stainless steel wall plate faceplate. Provide faceplate from the approved manufacturers listed in the specifications.

2.43 Provide single port or dual port small surface mounted outlet box for IP Speaker data outlets. Provide surface mount box by Leviton QuickPort Series 41089-xxx or equal by one of the approved manufacturers listed in the specifications. Provide surface box for all IP Speaker data locations mounted in the backcan for the speaker as shown in the detail drawings.

2.44 Provide single port or dual port small surface mounted outlet box for IP Camera data outlets inside the J-Box for the camera location. Provide surface mount box by Leviton QuickPort Series 41089-xxx or equal by one of the approved manufacturers listed in the specifications. The location shall also be furnished with a blank weather-tight faceplate to protect the data termination until the cameras are installed.

2.45 All faceplates and surface mount outlet boxes shall be furnished with label windows. All labeling shall be installed within the label window.

2.46 Confirm color of all faceplates prior to ordering. All data outlet faceplates shall have a unique sequential identification number in the label window of the faceplate. Hand-written labels are not permitted. All color schemes shall be approved by the customer prior to installation.

2.47 Colored outlet inserts are required for this project. Refer to the detail drawings for the exact color scheme to be provided. Inserts submitted that do not follow the color and identification requirements will be rejected. Inserts installed that do not follow the color coding as shown in the detail drawings will be replaced at the Contractor's expense.

2.48 All labels will be installed under label window. Labels adhered to the surface of the faceplate will not be accepted. Contractor must provide clear laminating type of cover material over the surface mounted labels where used.

2.49 Reference the drawings for special outlet configurations or plate requirements.

PART 3 – IP PAGING REQUIREMENTS

3.1 The Contractor shall furnish and install all IP-based speakers, horns, all associated hardware and software.

3.2 Data Contractor shall be responsible for furnishing enclosures for all IP-based speakers and horns. Contractor shall provide vandal-resistant screws with all enclosures for attachment of the speaker grill or exterior horn baffle. Exterior horn locations shall be provided with stainless steel vandal resistant screws and baffle. Provide (2) tools with the

project for removal of the vandal-resistant hardware, delivered to the District IT Department.

3.3 All surface mounted enclosures shall be furnished and installed by the 27 10 00 Contractor in all areas shown in the floor plans including exterior surface mounted enclosures.

3.4 Recessed flush mount enclosures shall be furnished by the 27 10 00 Contractor and installed by the Division 26 Contractor, unless otherwise noted on the Legend or Floor Plans. Recessed enclosures shall be furnished with manufacturer provided “wing” bracket panels that attach to the side of the enclosure and shall be used for attachment to the structural members. The 271000 Contractor must procure and deliver the recessed enclosures to the Division 26 Contractor during the rough-in phase of the project.

3.5 IP-Based paging speakers, horns and associated enclosures shall be as manufactured by Atlas/IED IPX-Series.

3.6 Provide IP-Based Paging Speakers and Horns for the following types of locations as shown on the drawing floor plans and legend:

3.6.1 Interior POE+ surface mounted IP-Based Speaker with microphone, Atlas/IED Part #IP-SM - provide surface mount angled speaker enclosure Part #IP-SEA-SD in white finish.

3.6.2 Interior POE+ recessed IP-Based Speaker with microphone, Atlas/IED Part #IP-SM - provide recessed flush straight speaker enclosure Part #IP-FEST-SD.

3.6.2.1 IP-Based speaker flush mounted in a non-accessible (Hard Lid) ceiling space shall be secured to the structure above with a single 12-AWG support wire attached to the recessed enclosure. Contractor shall field modify the enclosure to allow for connection of the support wire.

3.6.3 Interior POE+ IP-Based 1-foot by 2-foot drop-in type Speaker with microphone in an accessible ceiling, Atlas/IED Part #IP-12SYSM. Speaker shall be provided with integrated enclosure. Speaker shall include T-bar attachment for cut-in location in accessible ceiling.

3.6.3.1 IP-Based speaker in accessible ceiling shall be secured to the structure above with a single 12-AWG support wire attached to the backcan of the speaker. Contractor shall field modify the backcan to allow for connection of the support wire.

3.6.4 Exterior POE+ vandal and weather resistant surface mounted IP-Based Page Horn Atlas/IED Part #IP-HVP - provide weather resistant, stainless steel surface mount straight enclosure Part #IP-SEST-HVP finished with white textured epoxy. Exterior Page Horn shall be furnished with a powder coated aluminum grill and vandal resistant zinc plated steel baffle. Grill and baffle shall be included with page horn.

3.6.5 Exterior POE+ vandal and weather resistant recessed IP-Based Page Horn Atlas/IED Part #IP-HVP - provide recessed stainless-steel straight enclosure Part #IP-FEST-HVP with mounting wings. Exterior Page Horn shall be furnished with

a powder coated aluminum grill and vandal resistant zinc plated steel baffle. Grill and baffle shall be included with page horn.

3.6.6 Provide a 2-foot long, CAT-6, UTP patch cord, for the speaker/horn location to connect to the data drop located in the enclosure, color of patch cord per District IT Department instructions. Provide patch cords for 100% of IP-based paging speaker and horn locations. Provide (10) spare patch cords delivered to the District IT Department.

3.6.7 IP speakers/horns shall be connected to a POE port on a network switch in the MDF / IDF Room or Cabinet. Coordinate the connection of the POE powered devices with the District IT Department. IP-Based Speakers/Horns must be patched to a POE powered switch to allow for proper operation.

3.6.8 All speaker/horn connections to be terminated at the data patch panel and identified with a colored insert or color tabbed label, per the District Standards, or as shown in the detail drawings and the specifications.

IP-Based Paging Software and Server

3.7 Contractor shall furnish and install the software and server for the IP-Based Paging system.

3.8 Provide IP-Based Paging software for the project. The software shall be loaded on the Contractor furnished server. Contractor shall provide all programing for the paging announcements, pre-recorded emergency announcements and pass class bell notifications. Coordinate the pass class bell schedules and desired paging tone to be used with the District IT Department and the Site Principal. Software shall be as manufactured by Atlas/SingleWire “Informacast Advanced” software platform. Provide latest version of software available at the time of installation.

3.9 Contractor shall interface the IP-Paging software with the District’s VoIP call management software program on the existing Mitel VoIP Telephone System. Provide all programming information required to allow the District to set the parameters for access to the existing call management software. Coordinate with the District IT Department for access to the programming interface with the existing VoIP Telephone System. Contractor shall program system to allow page zone calling from the VoIP telephone sets. Access codes for the paging application shall be selected by the District.

3.10 Contractor is responsible for providing all licensing requirements and software updates (as required to bring product up to date) to drive the speakers, horns, program tones, bell schedules and announcement controls. Speakers and Horns shall be furnished with “Lifetime” licenses in the project bid. Annual license fees are not an acceptable alternative.

3.11 Programming of speakers and horns for page coverage zones, tones, time schedules, pass class bells, pre-recorded emergency announcements and VoIP interface to be completed by the Contractor. The District will be responsible for providing IP addressing to the Contractor for the network to identify all system IP devices.

3.12 Contractor’s responsible for providing MAC addressing and identification of individual speakers and horns or any other IP based device in the system. Provide a spreadsheet list to the District IT Department of all devices with the MAC addresses, locations, page zone, speaker/horn type and Room Number.

3.13 Contractor to provide a minimum of 6-hours of meeting time with the District to confirm all programming requirements. The Contractor shall provide Meeting Minutes and proposed bell schedules, access control codes, pre-recorded message requirements and proposed bell tones to the District and the Project Engineer for approval. Contractor shall not program system until programming proposals have been approved.

3.14 Provide rack mounted server in the existing MDF Room in Building 'E' for the new IP Paging software control. Provide server with the following minimum requirements:

3.14.1 Provide Dell Poweredge R340 rack mount server or approved equal. Minimum server configuration: Intel Xeon E-2124 3.3Ghz, 8M Cache, Turbo, 4-Core/4-Thread, 71 W processor; 16GB 2666MT/s DDR4 ECC UDIMM, Memory; 64 Bit Windows Server 2019 Essentials Edition OS; Microsoft IIS; Microsoft.NET 4.5; On Board Broadcom 5720 Dual Port 1 GB LOM Ethernet Interface; 1TB 7.2K RPM Sata 6Gbps 512N 3.5 "Hot Plug Hard Drive; 3.4" Chassis for up to (4) Hot plug hard drives: Dual Hot Plug 350W redundant power supplies; Nema 5-15P, 15-amp, 10-foot power cord; "Ready Rails" static mounting rails for 2 or 4 Post Rack; DVD +/RW Sata internal drive; USB keyboard and Optical Mouse.

3.14.2 Provide optional Video Card with HDMI port in the Server for connection to the Monitor/KVM switch in the MDF Rack. Provide (1) HDMI patch cable, length as required, to make the connection.

3.14.3 Contractor shall receive written confirmation of the server requirements with the District IT Director prior to ordering. Approval of the project submittals does not provide the Contractor approval of server for ordering purposes. Final server configuration shall be approved in writing with a copy submitted to the Construction Manager and Project Engineer. Upgrades to the Server configuration that are not included in the bid specifications shall be clearly outlined in the submittal along with any additional costs for the upgrades.

3.15 Contractor shall furnish and install the server in the MDF Room existing data racks or at an alternate location designated by the District IT Department. Connect the server to the School's LAN network switch as designated by the District. Coordinate the installation and set-up with the District IT Department and the local IT support personnel.

PART 4 – VIDEO SURVEILLANCE REQUIREMENTS

4.1 Provide (2) Category-6 UTP cables from the IDF closet to each camera location. All cables installed in underground conduit shall be rated for Wet Location. The cables shall be terminated in the junction box on a surface mount box. The camera locations shall be provided with a weatherproof grommeted stainless steel faceplate for future use. Label the faceplates on the inside with an adhesive label so the labels won't fall off.

PART 5 – WIRELESS ACCESS POINTS (WAP) REQUIREMENTS

5.1 The District will provide all Wireless Access Point units and programming will be by the District IT Department. The Contractor shall install each Wireless Access Point as required and provide patch cord installation at the WAP. The Contractor shall provide a list including the room number, location, and MAC address of each device installed to the District IT Department. Provide minimum 10' slack cable at each WAP location stored above the WAP location on J-Hooks as shown in the detail drawings.

5.2 Refer to drawing details for installation requirements for WAP locations. The Contractor shall furnish and install all mounting brackets for the WAP locations in the accessible ceiling and for the wall mounted locations.

5.3 Contractor shall install the Exterior WAP units at the locations shown on the drawings. Coordinate with the District IT Department for all mounting brackets and connection of all WAPs.

PART 6 – INSTALLATION

6.1 Upon completion of 10% of the cabling installation, the Contractor shall notify the Project Engineer for an inspection of the methods and types of materials used on the project. The Contractor shall give a minimum of 72 hours notification to the Project Engineer for the scheduling of the inspection. The Contractor will be given a written review of the findings, so if adjustments are required, they can be done before the project proceeds. The Contractor shall be responsible for adhering to the findings and a follow-up inspection will not be provided.

6.2 Pull strings shall be provided with all cable runs including but not limited to: conduit stub ups, conduit sleeves, cable trays, open wiring routes, innerduct and point-to-point conduits. Pull strings shall be free from cable bundles in open wiring routes. Pull strings shall not be substituted for pull ropes for the exterior site conduits.

6.3 Velcro cable management straps are required on all Category-6 cable bundles, the last 20 feet or upon entry into equipment closet, a maximum of 12” apart. Cable bundles shall also be routed through cable managements or “D” rings in the equipment closet.

6.4 Data Contractor shall supply protective bushings or slide on rings at the ends of all exposed conduits used for data system cabling. This is to include all conduits installed for any future data cabling requirements. Contractor shall submit planned protection bushings prior to installation of cabling for approval.

6.5 Velcro cable management straps are required on the cabling in the rear section of the vertical managers in the equipment racks. Straps shall be a maximum of 12” apart. At a minimum, Velcro straps shall be provided at each point the cables are routed to the patch panels from the main bundle.

6.6 Every fiber in every fiber optic cable must be terminated at both ends of a fiber patch panel in the MDF/IDF closet or cabinet location. Termination shall be accomplished using the correct style of connectors as directed by the specifications with a strain relief boot. All connectors shall be of the same manufacture to ensure compatibility. Polarity of fiber strands must be observed at all times.

6.7 Labeling

6.7.1 Each cable run shall be permanently labeled at each end with a unique sequential number which corresponds to a similar number provided for each data outlet and patch panel point. A printed label shall be placed at each of the following locations:

6.7.1.1 On the cable at the rear of the patch panel or termination block. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2” by 1.5” wrap around label Part #29689 (NO ACCEPTALE EQUAL).

6.7.1.2 On each cable in the j-box behind the faceplate location. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTALE EQUAL).

6.7.1.3 On the cable at the terminal strip prior to termination point. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTALE EQUAL).

6.7.1.4 On the face of the patch panel, provide a ¾" by ¾" label with a letter or number identifying the patch panel designation. For special purpose data connections such as WAP, Audio-Visual, IP Page and IP Camera ports, the label shall be designated with colored label icon or marker.

6.7.1.5 On the face of the faceplate in the label holder window. The label shall be clearly defined with a minimum #10 font size.

6.7.2 Handwritten labels are not permitted. Where cable ID includes room number identification, the Contractor shall obtain written verification of final room numbers prior to beginning labeling (numbers on plans do not always match final room numbers). Cable pulling cross reference lists will not be accepted with final documentation.

6.7.3 Each patch panel port shall be identified with a unique sequential labeling scheme. Port identification labeling pattern shall be consistent throughout the project.

6.7.4 All faceplates shall be identified with permanent printed labels. Labels must not be subject to removal by incidental contact. Contractor shall be responsible for replacing defective labeling for a period of one year from date of final sign-off of project.

6.7.5 All fiber optic and UTP feed cables shall be identified with permanent, water resistant, printed labels. Labeling information shall include closet identifications, quantity of conductors (UTP) or strands (fiber) and house pair designations (UTP). Cables shall be labeled in the IDF/MDF closets at the site conduit entrance point, riser conduit entrance point and prior to entering either punch blocks or patch panels. Labels for fiber and copper feeds shall include both the name of the origination point and the destination point, house pair or house fiber strand count, cable composition (i.e., 12-Strand MM 50/125 LO; 6-Stand SM). See details for additional requirements.

6.7.6 Labeling will follow recommended EIA/TIA standards or as requested by the customer. Contractor will confirm labeling pattern prior to final identification or testing. All test results will be identified by the final labeling scheme. Contractor shall be required to have the labeling scheme approved in writing by the District IT Director prior to manufacture or installation of the labeling.

6.7.7 All fiber optic cables and/or innerduct shall be tagged with fiber optic warning tags in every manhole or pullbox. Fiber warning tags shall also be placed at each end of the cable in the termination closets in clear view. A minimum of (3) tags are required at each end, with a label tag on each cable in the service loop. Fiber warning tags shall be placed on fiber optic cable and/or innerduct routed through open ceiling environments at increments no less than 15 feet apart.

6.7.8 Refer to detail drawings for additional labeling requirements.

6.8 Where open wiring cables are run through the ceiling space (only permitted where specifically noted on the drawings), the wire shall be bundled together and supported above the ceiling.

6.9 All cables must be fastened to the building structure via “j-hooks” or an approved Category 6 suspension system, and not directly in contact with ceiling system. For “j-hooks” maximum fill capacity is as follows: 1-5/16” hooks – 35 cables; 2” hooks – 60 cables; 4” hooks – 120 cables. For quantities beyond 120 cables, use a sling support system such as “Erico Cable Cat” or equal. Maximum fill capacity 200 cables. D-rings, “Caddy #WMX cable hangar”, “Caddy Bridle Rings”, drive rings or any other type of wire ring support is not allowed.

6.10 Where cables pass through a fire-resistant portion of the structure, conduit sleeves shall be provided to maintain the rating of wall penetrated. Sealing of all penetrations with an approved fire barrier is required. Conduits and sleeves must remain accessible for future use. Permanent sealants may not be used to seal sleeves and conduits.

6.10.1 The 27 10 00 Contractor shall be responsible for fire-stopping all unused conduit sleeves in the ceiling or through rated walls. The Electrical Contractor shall be responsible for fire-stopping around the conduit or sleeve, unless the sleeve is installed by the 27 10 00 Contractor, in which case, the 27 10 00 Contractor shall be responsible for all fire-stopping requirements.

6.10.2 Expanding foam is not an acceptable sealant for any conduit opening. Contractor shall be responsible for complete replacement of the conduit and cabling in any conduit filled with expanding foam used as a sealant.

6.11 Fiber optic feed cables connecting to equipment racks from the MDF Room or from an adjacent IDF location, shall be installed with not less than a 20-foot service loop between the rack and mounted on the backboard. See drawings for fiber optic service loop requirements.

6.12 Provide 6 inches of cable slack at computer data system outlets inside conduit box.

6.13 In an accessible ceiling area, provide a 10-foot (stored in a Figure-8 configuration) service loop above the all data/voice outlet locations. Service loop must be securely tied up off of ceiling tiles or ceiling surface and supported at two opposite points. Neatly coil cable without exceeding minimum bend radius limitations. Do not provide length in excess of 15 feet, as it may cause improper test results and errors.

6.14 Do not provide a service loop in the MDF/IDF Room on the UTP cables, unless otherwise noted. Cables shall be neatly routed around the perimeter of the room to the cable runway from the point of entrance into the room.

6.15 The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturer’s recommendations.

6.16 Cables installed in manholes and pullboxes shall be supported with Velcro ties or loosely fitted UV rated tie wraps, on wall mounted cable support racks. The cables shall be clearly labeled in the manhole or pullbox.

6.17 Provide a full 360-degree loop of slack cable around manhole and pullbox interiors. Cables entering handholes from the bottom, shall not be allowed to touch the bottom of the cover when closed and shall not be pinched or crushed in any way.

6.18 Cable pulling shall use a split mesh grip over the cable jacket. Connection directly to optical fibers and copper wire conductors shall not occur.

6.19 When pulled through conduits, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the manufacturer.

6.20 Where cables are pulled through or pulled from a center run, pull without splices or terminations, lead out the cables at all manholes, pullboxes, and conduits, taking care to feed them in again by hand for the next run.

6.21 For each cable pull where a cable direction change is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc., shall be used to ensure proper cable pulling tension and side wall pressures. Cables shall not be pulled directly around a short right-angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius. The maximum possible size radius sheaves and feed-in tubes, usable in the available working space shall be provided in all situations, to ensure the minimum possible cable sidewall pulling pressure. Do not use devices with multi-segment “roller” type sheaves.

6.22 Cable lengths over 250 feet shall be machine pulled, not hand pulled. Cables shall be pulled in a continuous, smooth operation without jerking or stop-start motion after initiation of pull. Maximum cable pulling speed shall be less than 50 feet per minute. Minimum pulling speed shall be greater than 15 feet per minute.

6.23 A pull string shall be placed with all UTP and paging station cables at the time of installation. Conduit runs and surface raceway for station cabling shall be furnished with a minimum 2-Ply spiral wrap style, pull string rated for 240 ft/lbs. pulling strength, such as manufactured by Greelee #431 or approved equal. Includes all conduit stubs and cables routed through open ceiling and cable trays. Pull strings shall be tied off in the junction box and in the ceiling. Provision for the installation of the pulls string shall apply to all empty and spare conduits as well. Single ply type pull string will not be accepted as a substitute for the 2-ply pull string.

6.24 A measuring pull tape shall be placed with all feed cables at the time of installation. Indoor riser and outdoor conduit runs between buildings designated for feed cabling, in excess of 150 feet shall be provided with a minimum ½” polyaramid style, measuring true tape pull string annotated with footage increments rated for 2500 ft/lbs. pulling strength, such as manufactured by Greenlee #39245 or approved equal. Conduit runs less than 150 feet shall be furnished with a ¼” polyaramid style, measuring true tape pull string annotated with footage increments rated for 1250 ft/lbs. pulling strength, such as manufactured by Greenlee #39243 or approved equal. Provision for the installation of the measuring pull tape shall apply to all empty and spare conduits as well. Standard twine style pull strings and standard nylon or polypropylene style pull ropes will not be accepted as a substitute for the polyaramid measuring tape pull string.

6.25 When pulling cable through conduit, cables shall be pulled straight into or out of the raceway without bends at the raceway entrance or exit. Pull in cable from the end having the sharpest bend (i.e., bend shall be closest to the reel). Keep pulling tension to minimum by liberal use of lubricant, hand turning of reel, and slack feeding of cable into

duct entrance. Employ not less than one man at reel and one at manhole or pullbox during this operation. Cables shall be pulled directly from cable reels.

6.26 All cables shall be new and extend continuous from each MDF or IDF backboard or rack to all outlet locations.

6.27 Where cables are not installed in a conduit or other raceway system, they shall not be routed parallel with other line voltage equipment or wiring (120 volt and above) with 36" or within 12" of line voltage equipment or wiring where crossing.

6.28 Where OSP-Rated UTP cables or OSP-Rated fiber optic cables are routed exposed through ceiling for more than 50'-0", Contractor shall install the cable in innerduct or EMT conduit in the ceiling. Innerduct installed in the accessible ceiling space shall be a minimum of riser rated and minimum of 1" in diameter. Innderduct shall be supported minimum of every 3-feet to the structural members.

TESTING

6.29 All Category-6 cables shall be point to point (link) tested after installation/termination and verified to operate at minimum 1000Mbps. Performance of installed cables shall satisfy all current addendums to the EIA/TIA 568A standard for Category-6 wiring. In addition, testing shall satisfy all proposed amendments to the existing ISO/IEC requirements. The wiring shall support all specified communication protocols. Testing shall support the Category-6 requirements by the EIA/TIA.

6.30 Upon completion of testing cable links for both copper and fiber optic cabling, the Contractor shall supply a copy of the original database files downloaded from the tester in original format on a USB Flash Drive. Contractor shall provide with the testing database files, an original copy of the tester's manufacturer software program (included in original cost) for record management and archiving, in a Windows format (i.e., Fluke Linkware software program).

6.30.1 The manufacturer's software program will be used by the Project Engineer to review all test results, and then turned over to the District to keep as their record copy with the final approved test results. Provide (3) copies of tests on USB Flash Drives. Do not submit test results for review in Excel or PDF file formats, as the submittal will be rejected and not reviewed.

6.31 Contractor will repair or replace cable runs or connecting hardware that do not meet specified criteria.

6.32 Multimode fiber optic cables shall be tested bi-directionally at 850nm and 1300nm. All fiber strands shall be tested with an OTDR (Optical Time Domain Reflectometer). All fiber test results shall contain final source and destination information that matches IDF or MDF labeling shown on the fiber optic patch panels and final documentation. OTDR tests results shall be included with the copper test results and submitted with the tester's software for review. Do not submit test results for review in Excel or PDF file formats, as the submittal will be rejected and not reviewed.

6.33 Test procedures shall comply with EIA/TIA 526-14 Method B. Test results shall meet the minimum following criteria:

6.33.1 Fiber optic test results shall not exceed 2db total attenuation loss in addition to inherent loss published by manufacturer tested at minimum 2000 Mhz for 805nm and 500 Mhz for 1300nm for the fiber optic cable.

6.34 End to end attenuation Fiber Optic feed cabling testing shall be performed with a temporary test jumper cable at each end of the installed fiber cable. The test jumper utilized shall be the same fiber core size and grade of glass as the installed cable. The measured attenuation of the test jumpers, test connectors, and test interconnection sleeve between the two test jumpers shall be less than 1dB as calibrated at the time of the test at indicated wave lengths and frequencies. Test jumpers shall be "zeroed out" before testing of fiber stands begins.

6.35 Final As-Built Drawing Submittals – Provide (1) hard bound copy of "E-size" As-Built drawings and (3) copies on USB Flash Drive in AutoCad (2014 or newer version) format. A Hand marked-up copy of the original construction drawings will not be accepted as the final As-Built drawing submittal. Final As-Builts shall include copies of the floor plan drawings of each building, detailed elevations of each MDF or IDF locating all equipment, quantities outlets and speaker locations, locations of all sleeves and identification of all final cable routes. In addition, the drawings shall include all outlet locations with cable identification numbers.

END OF SECTION

SECTION 27 20 00

INTEGRATED AUDIO-VISUAL SYSTEM

PART 1 – GENERAL

SUMMARY

1.1 The Contractor shall furnish all labor, project management, materials, tools, equipment, and resources necessary for the installation, startup, and testing of the system shown on the plans and described in the specifications.

1.2 Related Specification Sections:

1.2.1 Section 26 01 00 -General Provisions

1.2.2 Section 26 05 33 -Conduit and Fitting

1.2.3 Section 26 05 19 -Conductors

1.2.4 Section 26 05 34 -Outlet and Junction Boxes

1.3 The Contractor shall furnish and install the system as defined by the plans and specifications. The Contractor must demonstrate to the Owner that the system is complete and complies with all operational requirements set forth in the plans and specifications.

1.4 The work covered under this section of the specifications consists of furnishing all labor, equipment, supplies and materials, and in performing all operations necessary for the turnkey and fully completed installation of an audio/ video system in accordance with the specifications and accompanying drawings, except as specifically noted otherwise.

1.5 Cables for the system shall be pulled through the conduit systems furnished by the building Contractor. The 27 20 00 Contractor shall be responsible for providing all cables required and for coordinating and supervising the cable installation. The 27 20 00 Contractor shall be responsible for insuring the integrity of the cables before and after installation.

1.6 In order to ensure project cohesion a single point of contact is required to provide a "TURNKEY" solution. The work covered under this section of the specification consists of furnishing all labor; cabling; equipment; software; supplies; materials and training. The Contractor will perform all operations necessary for the "TURNKEY" and fully completed installation in accordance with the specifications herein. As such, the successful Contractor must be factory trained on all aspects of system hardware. The successful Contractor shall be a California licensed C7 or C10 premise wiring Contractor as defined in this specification. Subcontractors may not be utilized in the implementation of the plant wiring installation.

1.7 Approval to bid shall not release the Contractor from full specification compliance requirements. Final system acceptance testing shall govern final system acceptance and compliance with the specifications.

1.8 Failure to provide a functional equivalent shall result in the removal of the alternate system at the Contractor's expense.

1.9 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.

1.10 Where the words 'provide' or 'provision' is 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.

1.11 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.

DEFINITIONS

1.12 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.

1.13 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'.

1.14 Finish Space: Any space ordinarily visible, including exterior areas.

Contractor Qualifications

1.15 The successful bidder shall be a California licensed C7 or C10 premise wiring Contractor as defined in this specification. Subcontractors may not be utilized in the implementation of the installation or programming.

1.16 The successful bidder shall have design staff with a minimum of the following and shall include all certifications with their bid.

1.16.1 (1) BICSI certified (RCDD) Registered Communications Distribution Designer.

1.16.2 CTS-D Certification

1.16.3 Extron XTP Systems Engineer Certification

1.16.4 Extron TLP Programming Certification

1.16.5 Extron Global Configuration Certification

1.17 The successful bidder shall have installation staff with a minimum of the following and shall include all certifications with their bid.

1.17.1 CTS-I Certifications

1.17.2 Extron Advanced A/V Certifications.

1.17.3 Contractor must have a minimum of (4) full time certified installation technicians with Extron Certifications.

1.18 All bidders must provide a listing of two similar size projects having the same scope of work using the proposed information delivery equipment. This listing shall be complete with facility names, completion dates, names of contacts, and their telephone numbers. Referenced projects must have been completed in the past 18 months.

1.19 The bidder shall have a factory trained service department the service department shall be on call 24 hours a day, 365 days a year, to arrive and initiate onsite service the specified equipment upon (24) hours' notice.

1.20 The Contractor shall employ factory-trained technical/service personnel for service and maintenance of the system. Their résumés will be required. The factory-trained technical/service personnel shall have a minimum of two-years' experience installing the proposed system. The Bidder shall submit the names and copies of the certificates issued by the factory. The bidder shall instruct the Owner's technical personnel in the operation, care, and maintenance of the system.

CODE COMPLIANCE

1.21 All material and equipment shall be clearly listed, labeled, or certified by Underwriters Laboratories, Inc. All power supplies and computers shall be clearly UL Listed. Any system which is not UL Listed at time of bid will be rejected.

1.22 All acceptable systems shall be approved under Part 15, Subpart B, Section 15.107b of the FCC Rules and Regulations. Bidders must provide the FCC Registration Number of the proposed system. Systems that are not in compliance with the FCC will not be considered. Any system that is not FCC compliant at time of bid will be rejected. All equipment must be clearly labeled with FCC compliance stickers.

1.23 The system shall be installed in accordance with local and national electrical codes.

1.24 The manufacturer and Contractor shall provide the Owner with a release for use of all copyright materials, corporate logos, and corporate trademarks at time of bid.

SUBMITTALS

1.25 Index all submittals and reference to these specifications. All submittal items shall be assembled and submitted in a single complete binder per submittal group. Partial submittals will not be reviewed. Submit items in groups as indicated below: All submittals, warranty information, close - out documents, and as built documents must be submitted independently for owner, in order to provide record documentation for the project owner.

1.26 **Group # 1 Submittal** shall be made <u>within (20) working days</u> after the award of the contract. This submittal shall include the following:

1.26.1 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:

1.26.1.1 Complete Bill of Materials in Excel Spreadsheet format with bills of quantities, including all materials, components, devices, and equipment required for the work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed - Description and quantity of each product, Manufacturer's Name and

Model Number, Manufacturer's Specification Sheet or Cut Sheet and Specification Item Number referenced for each required product or if not shown in the specifications, Drawing Detail Number being referenced. (ie; Spec. 27 20 00 Item 2.1.3 and/or Detail #1/E4.15).

1.26.1.2 Material Cut Sheets shall provide detailed product information and shall be original manufacturer product bulletins.

1.26.1.3 Copies of material information from vendor websites shall not be considered equal and will not be accepted. Copies of Web pages which include multiple pages of irrelevant information not associated with the product cut sheet shall not be considered equal and will not be accepted.

1.26.1.4 Material Cut Sheet part number provided shall be highlighted or provided with an arrow directed at the corresponding part number

1.26.1.5 Equipment items which have individual components will require that all component parts be listed individually.

1.26.1.6 Description of any specialty backbox requirements

1.26.1.7 All wiring types required for installation of this system

1.26.1.8 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment

1.26.1.9 Spare parts shall be listed individually to verify proposed quantity

1.27 **Group # 2 Submittal** shall be provided within (20) working days after the approval of the Group # 1 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 (1) USB Flash Drive copy with files in a AutoCAD format. Building floor plan CAD files will be made available. 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 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. Phase II Submittals drawings shall include the following:

1.27.1 Furnish complete shop drawings for all systems specified. Each drawing shall have a descriptive title and all sub parts of each drawing shall be completely described. All drawings shall have the name of the project, architect, consultant, and electronics Contractor in the title block.

1.27.2 Furnish complete scaled drawings of all equipment racks, consoles, special assemblies, etc. Each drawing shall show all equipment with its manufacturer and model number.

1.27.3 Furnish complete scaled installation drawings detailing locations of all equipment such as control panels, plug panels, video monitors, video projectors, equipment

racks, speakers, etc. All conduits with cable quantities and types and all terminal block locations shall be shown also.

1.27.4 Provide single line riser diagrams of all racks, consoles, control panels, speaker assemblies, etc. Each drawing shall delineate circuit numbers for all cables and terminal connections. Provide typical wiring termination for all devices.

1.28 All equipment items referenced by manufacturer name and model number shall be the only approved product to be furnished for use on this project. Where alternate items are acceptable (or approved alternate) will be noted with the product description.

1.29 Products as manufactured by “Extron” have been specified to coordinate with an existing facility and other contracts to be issued for this project. Alternate products will not be approved.

SEISMIC ANCHORING

1.30 All sound systems, A/V equipment or enclosures shall be anchored to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section1632A and Table 16-A0. The Contractor shall submit drawings signed by the Contractor’s registered structural engineer indicating method of compliance prior installation.

CLEANUP

1.31 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.

1.32 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.

1.33 During the progress of the work, keep the premises clean and free of debris.

GENERAL COORDINATION

1.34 The A/V drawings may reference components by manufacturer which conflict with the written specification requirements, where this occurs the written specifications shall be followed.

1.35 Warranty: All components and installation shall be warranted by the Contractor to the School District for a period of **2-years** after District acceptance and from date of sign-off of the completed project. Additional Extended Equipment warranties shall be provided as follows;

1.35.1 **Provide a (3) three-year warranty for all Laser Projectors provided for the project**.

1.35.2 **Provide a (3) Three-year warranty for all Commercial Grade Flat Panel Displays provided for the project**.

PART 2 — CLASSROOM PRODUCTS

2.1 Refer to the floor plans for the extent of the Audio-Visual System that is to be furnished for each of the classrooms or teaching spaces.

2.2 Provide detailed drawings of the proposed mounting systems for all speakers. The design drawings shall include independent structural calculations to verify compliance with seismic zone 4 requirements.

2.3 Contractor shall provide engraving on portable components with an example of the following text - “Property of SSD”. Engraving shall be clear and legible and shall be professionally applied.

2.4 The Contractor shall refer to the Audio/Video Patch Cable section of this specification for the descriptions of the type and style of patch cable to be furnished for the different Audio-Visual and data patch cable connections. Patch Cable Section includes the different requirements for cable runs based on length and style of connector. HDMI cables shall be furnished as outlined in this section based on the length of the cable and the model of HDMI cable required will vary. Individual patch cord specifications are not shown in the room system descriptions, only the type of cable required will be shown.

2.5 Contractor shall furnish and install all Audio-Visual system components as shown in the A/V system details and these specifications. Refer to the Audio-Visual System Diagrams, for each of the different room system requirements, for additional information. The drawing details and specifications shall be considered as one overall document. Contractor shall provide all systems as complete turn-key operational Audio-Visual systems.

2.6 **Provide lump sum of $5,000 for the purchase of (2) LED/Laser Projectors as shown in the specifications**. The projectors shall be furnished in size based on the requirements shown in this specification. The final projector will be determined by the Contractor’s final submittal for the approved purchase with the Lump Sum allowance.

2.6.1 **Lump sum amount shall cover Projectors invoice cost only plus tax**. Shipping, Contractor mark-up, installation, patch cables, programming and set-up, all mounting hardware and labor costs shall be included as part of the Contractor bid and not part of the lump sum amount. Actual make, model and final size of the Projectors will be determined prior to installation and shall be approved by the Project Engineer and District Project Manager prior to purchase.

2.6.2 Contractor shall submit an itemized spreadsheet to the Project Engineer, Architect, Construction Manager and District Project Manager for the projectors being proposed for purchase including the following information; Make, Model, Size (Diagonal), Native Resolution, Invoice Cost and Tax. The submittal shall include manufacturer cut sheets for each type and size of each model submitted, with proper part numbers highlighted. The itemized spreadsheet shall detail each location with Room Number. The spreadsheet shall be provided to the Construction Team a minimum of 12 weeks prior to the first proposed purchase date to allow enough time for approval, purchase and delivery of the Projectors. The Contractor shall not proceed with purchase or warehousing of the equipment without written approval.

2.6.3 The specified projectors shall be installed LAS Workroom #4 and OT/PT Classroom #10 ceiling mounted in the accessible ceiling. Refer to the Electrical and Architectural floor plans for additional information on the location of the projectors.

2.6.4 Projector specifications based on Optoma Model #ZW506-W with a Laser DMD (Laser Phosphor) type projection system. Any suggested projector equivalent must contain at a minimum all input/output connections as the specified

projector; display shall provide as good or better minimum brightness, contrast ratio, native resolution, lamp life, native aspect ratio and lens shift capability as the specified projector. Models not currently in production (discontinued) at the time of the submittal, will not be considered for approval.

2.7 Provide installation of projection screens for the Classroom Audio-Visual Systems. The projection screens will all be manual type non-tensioned recessed screens. Projection screens shall be located per the drawings.

2.7.1 Contractor shall provide all hardware and structural support including, but not limited to, channel strut, brackets, seismic bracing and hardware. Power shall be furnished by the Division 26 Contractor. All screens must be installed to comply with local codes and Zone 4 Seismic requirements.

2.7.2 All new projection screens will require a structural support mechanism to the building structure. The basic requirements will be shown in the detail drawings, but the exact requirements must be field verified by the Contractor. Contractor shall refer to the drawing details for the type of structural support system to be provided based on the type of screen used and the building conditions. The Contractor shall furnish and install all support.

2.7.3 Coordinate the screen's location with the installation of the projectors. The location of both the projector and screen must be properly coordinated to insure the proper image size and orientation. Projector and screen locations shown on the floor plans are diagrammatical. Exact locations must be field verified by the Contractor prior to the installation of either component.

Standard Projector System AV Requirements

2.8 Standard Projector System shall be furnished with a Standard Throw Laser DMD Projector with a recessed projection screen. The Projector System shall be provided with a new Amplified Speaker System and an ADA Assistive Listening System Transmitter. The modifications shall be furnished by the Contractor as shown in the drawing details. The system shall be designed to allow for the seamless addition of a Teacher's microphone system in the future.

2.9 Provide installation of projectors with audio/video components, mounting systems and all local wiring as shown in the drawing details. Projectors shall be located per the drawings and specifications.

2.9.1 Standard Throw Projectors – Projectors shall be furnished and installed by the Contractor. Projectors must be able to fill a 109" diagonal screen or surface (16:10 aspect ratio) from a distance not greater than 16 feet from the surface. Projectors shall be the non-interactive type. Contractor shall be responsible for furnishing and installing the all software, tools and control systems as required for proper operation. Each of the projection systems must be properly calibrated during the installation process to allow for the images and inputs to be presented properly.

2.9.2 The Contractor shall install the projector using the complete manufacturer installation instructions in the installation manual. The Contractor shall follow all the steps shown for complete calibration of the image size and position on the screen. **Projectors shall be leveled to insure a proper image shape**. Projectors may not be tilted or skewed to align the image with the projection area

on the screen. Do not make the adjustments to the image size with the keystone functions.

2.9.3 The Contractor shall be responsible for the image size and proper operation of the projector until the project is signed off by the District Project Manager and the Project Engineer. Changes in the orientation of the projector due to incidental contact during construction shall be resolved by the Contractor.

2.10 Provide manual front projection screen at the front of the classroom where shown on the drawings. Contractor shall provide all hardware including, but not limited to; manufacturer adapter hardware, unistrut, hardware, support systems and mounting brackets. The projection screen shall be mounted recessed above the accessible ceiling.

2.10.1 Coordinate the screen location with the installation of the projector. Screen shall be mounted to allow for the projector to be mounted with the proper image drop of the screen's usable image area and with a drop as recommended by the manufacturer's throw calculator. Screen must be aligned with projector to create the proper image size and orientation.

2.10.2 Mount screen to the structural members of the ceiling area above the screen. The structural support members are above the screen in the accessible ceiling. Additional structural support shall be furnished and installed by the Contractor as shown in the project drawings. The support of the screens will require a unistrut support system to be constructed or additional bracing members to be installed between the building support members. Contractor to field verify the exact conditions prior to installation of the screen.

2.10.3 The projection screen shall be have the Auto-Return function and screen drop distance set as required in the installation instructions from the manufacturer and the detail drawings installation requirements. The black-out area at the top of the screen shall be set to match the drop distance shown in the projector calculator.

2.10.4 Draper Model "Access Fit/Series M" with Auto-Return manual projection screen, 57-1/2" High by 92" Wide by 109" Diagonal at 16:10 aspect ratio loaded with front projection screen surface by Draper Model "OptiView Contrast Grey XH800E" with a 0.8 Gain and 180-Degree Viewing Cone.

2.10.5 Order screen to provide standard 12" of black out drop at the top of the screen. Verify ceiling height shown on the Architectural drawings. Image area shall begin at the top of the screen, based on the throw of the projector. The actual quantity of screen drop required for viewing shall be adjusted and pre-set to drop the exact same distance each time the screen is pulled down.

2.10.6 Provide option for (2) additional mounting brackets for the projection screen, with a total of (4) mounting brackets being used for the installation as shown in the manufacturer's installation instructions.

2.10.7 Provide the optional 4-foot long Aluminum Operating Pole for each projection screen provided for the project. The poles shall be delivered to the Site Administrative Contact for distribution to the Teaching Staff. Contractor shall be responsible for submitting a Transmittal to the Construction Manager and the Project Engineer confirming delivery to the site

2.10.8 Provide any additional items as shown on the A/V wiring details and diagrams

2.11 Document Cameras, Laptops and Personal Computers with Monitors shall be furnished by the District and installed by the District. Provide cable loom wrap around all patch cables from devices to the wallplates. AppleTV Devices and required ceiling mount bracket shall be furnished by the District and installed by the Contractor. Coordinate the installation timeline with the District IT Department for delivery of the AppleTV devices and the ceiling mount bracket.

2.12 Contractor shall furnish and install all projection system components as shown in the A/V system details and specifications. System shall consist of components that will use the projector as the audio-visual switch. All video inputs shall be directly wired to the projector. Audio shall be routed as shown in the AV Wiring Diagrams in the detail drawings, to allow the Amplified Speaker System to serve as a system-wide amplification device. Refer to the detail drawings for additional installation configuration requirements, mounting systems and additional parts.

2.13 Teacher's interface wall plate; The Teacher's PC wallplate will serve as the main input location to the projector system. Provide all patch cables for the system. See Projector System A/V diagram for wall plate requirements. Provide the following interfaces at each of the Teacher's wallplate locations;

2.13.1 Provide (1) Single Gang wallplate at each of the Teacher's Input location (Shown as the "LO" symbol on the drawings). The input location may also occur at rooms that are not classrooms, with the input wallplate still being designated with the "LO" symbol. Provide (1) HDMI with audio passive feed-through digital input wallplate Extron Model #WPD-110A on a single gang Decora Style faceplates at Teacher's Desk (LO) location. Refer to the AV Wiring Diagrams for the exact wallplate configuration.

2.13.2 Contractor shall furnish and install the High Speed 90º Swivel-Type HDMI patch cable and 3.5mm audio patch cable to the Teacher's PC (or other input device). The 90º HDMI end of the patch cable shall be connected to the faceplate to allow the cable to drop straight down along the wall. All patch cables shall be 12 feet in length at the Teacher's wallplate location. Refer to the patch cable section for the exact patch cable requirements.

2.13.3 Provide an HDMI (Female) to DisplayPort (Male) adapter for each of the Instructor's Wallplate locations. The adapter shall be provided with the HDMI and Audio patch cable assemblies.

2.13.4 Provide (1) HDMI fiber optic/copper hybrid with detachable ends (video) and (1) 3.5mm (audio) cable from the pass through wallplate to the projector location. The HDMI cable shall be directly connected to HDMI Input #1 on the projector. The 3.5mm audio cable shall be directly connected to the 3.5mm audio Input #1 on the projector. Cables shall be a maximum overall length of 66-feet. Do not install cables exceeding this distance limitation without providing an external HDMI cable equalizer. Provide cables as shown in the patch cables section of this specification.

2.13.4.1 Notify Project Engineer prior to installation of any cables for any rooms where the distance limit may be exceeded to discuss a resolution. Contractor may furnish an external cable equalizer for HDMI cables over 66-feet in length or provide a HDMI signal regenerator wallplate Decora Insert in lieu of the HDMI pass-through insert. The actual resolution must be approved by the Project

Engineer and the District Project Manager prior to ordering or installation of the alternate equipment.

2.13.5 Connect the Audio Output from the projector to the input connection on the DSP Mixer for routing of the System Audio to the speakers. Provide stereo audio connection cable from the projector to the DSP Mixer in the ceiling enclosure.

2.13.6 All wallplates shall be the Extron Decora style. Color of plates is to be confirmed by the Contractor prior to installation.

2.14 Provide ceiling mounted enclosure in the accessible ceiling of the Classrooms to house the Amplifier for the Speaker System, the DSP/Mixer, ADA Assistive Listening Transmitter, equipment power supplies and future accessories.

2.14.1 Each enclosure will be furnished with power by the 260000 Contractor. The enclosure shall be provided with a quad outlet in the ceiling enclosure. The power shall be hard wired to the outlet in the ceiling enclosure. The enclosure shall also be furnished with a surge suppressor as shown in the detail drawings. Refer to the detail drawings for additional requirements.

2.14.2 The Ceiling enclosure, Premier Mounts Model #GB-AVSTOR3, shall be installed in the accessible ceiling near the projector location. The 2-foot by 2-foot enclosure fits directly into the ceiling grid system. The enclosure shall also be furnished with seismic bracing installation kit by Premier Mounts Model #QLCS, “Quick-Lock” cable support system for seismic bracing from the deck above. In addition, the enclosure shall be provided with threaded rod for structural support into deck above. Provide threaded rod based on distance to deck above and the structural members, refer to the drawing details for installation requirements.

2.14.3 The power supplies for all AV equipment must be installed inside the AV enclosure.

2.14.4 Confirm typical placement of the enclosure prior to installation of any AV cabling. The enclosure shall be no more than three feet from the projector location (distance on ceiling, not actual distance).

2.14.5 Speaker System Amplifier, DSP/Mixer and the ADA Assistive Listening Transmitter shall be placed in the Ceiling Mounted AV Enclosure. Refer to the Classroom AV Diagram for additional requirements and for the location of the Ceiling Enclosure.

2.14.6 Field modify the ceiling enclosure to mount the antenna for the ADA System transmitter on the outside of the enclosure. Confirm location of the antenna with the other components to be installed in the enclosure prior to installing the antenna or drilling any holes. Refer to the ADA Assistive Listening System specifications for additional instructions.

2.14.7 Provide surge suppressor at the ceiling enclosure location for the devices installed in the enclosure. Surge suppressor shall be rated for 15A, six outlets, and shall have outlet sections that swivel. Provide Cyber Power Model #CSB600WS

2.15 A 4-Port Category-6 UTP data outlet shall be provided at the ceiling enclosure by the 27 10 00 Contractor. The data outlet shall be used for network connections to the WAP, AppleTV

and the IP-Based Paging Speaker. Coordinate the data outlet location with the 27 10 00 Contractor. Patch cables for the WAP and IP-Based Paging Speaker will be furnished and installed by the 27 10 00 Contractor.

2.16 District shall furnish and install an AppleTV device at the Ceiling AV Enclosure location. Coordinate the installation of the AppleTV device with the District IT Department. The AppleTV shall be connected to the projector with an HDMI cable. Connect the AppleTV device to the LAN via the data outlet installed in the AV Enclosure. Refer to the Library Audio-Visual Diagram in the detail drawings.

2.16.1 Provide an HDMI patch cable for the connection from the AppleTV device to the projector. The cable shall be furnished per the AV Patch Cable section of this specification. The District shall connect the cable to the projector and the AppleTV device.

2.16.2 Provide Category-6 patch cable for the District furnished AppleTV device, length as required to connect to the data outlet in the AV Ceiling Enclosure. Coordinate connections at the enclosure with District IT Department.

2.17 Provide a DSP/Mixer Audio router and processor for distribution and control of audio signals in the Classoom. Provide a 3 input X 2 output Audio Digital Matrix Processor by Extron Model MVC 121 Plus in the ceiling enclosure.

2.17.1 Provide audio input to the DSP/Mixer Processor from the 3.5mm Audio Main Audio Output from the Projector. Refer to the specifications for each individual device for additional requirements.

2.17.2 Provide audio output channels from the DSP/Mixer Processor to the amplifier and the ADA System Transmitter. Refer to the Classroom AV System Diagram for additional requirements.

2.17.3 Provide variable line level audio output to the Speaker System Amplifier mounted in the ceiling enclosure. The audio level shall be set with the DSP function while the speakers are installed and operational. The DSP processing shall be set for each source input into the Mixer. Provide the audio cable required for the connection. Test the audio output at the speakers for each input device.

2.17.4 Provide fixed line level audio output to the ADA Assistive Listening Systems Transmitter mounted in the ceiling enclosure. The audio level shall be set flat to allow the users to control volume on the receivers. Provide the 3.5mm audio cable required for the connection.

2.17.5 The DSP/Mixer shall be set up for a plug-and-play connection of a future microphone system for the Teacher. The Contractor shall program the third input as a balanced microphone input through the programming settings. The District shall be able to connect the future microphone system without having to re-program the DSP.

2.17.6 The DSP Matrix Processor via the DSP software shall be used to set the routing and equalization of all of the audio inputs/outputs. The Contractor shall balance each individual input and output to provide optimum signal quality. The Music Type Presets on the Control Panel shall each be set with individual EQs to match the music or audio type chosen.

2.17.7 System shall be provided with Extron's DSP Configurator Software for management of the complete speaker system. Contractor shall provide all programming and software and shall provide the District with all software presets. Set Administrator Password access to prevent inadvertent changes to the programming after the installation.

2.18 Provide an Amplified Speaker System in each classroom for audio support for the projector. See the detail drawings and diagrams for additional requirements for the system. The Amplified Speaker System shall be provided the following;

2.18.1 Provide a compact 70-Volt Amplifier in the Ceiling AV Enclosure to power the ceiling speakers in the room. Route the Audio Output from the Projector to the Input on the Amplifier. The speakers shall be connected to both outputs from the Amplifier to insure a balanced power load. Provide Extron Model #XPA U 1002-70V Amplifier.

2.18.2 The ceiling mounted speakers shall be wired with 18-AWG speaker wire from the amplifier. Each classroom shall be provided with (4) ceiling speakers. Ceiling speakers shall be wired to the amplifier at 70-Volts in pairs, with the speakers each tapped at 12-watts. Provide recessed ceiling speakers by JBL Model #Control CT Micro+ (or Approved Equal).

2.18.3 The ceiling mounted speakers shall be furnished with the optional support backing plates from JBL Model #MTC-24NC and a seismic support wire. The backing plates shall be secured to the ceiling tile grid system as shown in the manufacturer's instructions. Contractor shall be responsible for providing seismic restraints for the ceiling speakers as shown in the drawing details.

2.19 Provide a complete Assistive Listening System in each room furnished with an AV System. The Assisted Listening System shall be furnished and installed to meet CBC Section 11B-219 and comply with CBC Section 11B-706 and the ADA requirements for hard-of-hearing. The ADA system shall be integrated into the sound reinforcement system. Mount the RF base transmitter in the ceiling mounted AV Enclosure, at the location shown on the floor plans.

2.19.1 Per ADA Assistive Listening System CBC Section 11B-706.3 – "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".

2.20 Provide Williams AV Assistive Listening System for each classroom.

2.20.1 Provide (1) ADA System Stationary FM Transmitter – Model #PPA T45

2.20.2 (1) Remote Antenna Kit – Model ANT 034

2.20.3 (1) Signage Kit – Model IDP 008 Assistive Listening Notification Signage

2.20.4 The antenna shall be mounted to the top side of the ceiling enclosure with the antenna pointed inside the accessible ceiling. Contractor shall drill a small hole in the top to install the F-Type female to female bulkhead for the antenna. Plug the short RG-59 coaxial extension cable into the Transmitter and bulkhead. Install antenna on bulkhead.

2.21 Provide ADA System Receivers to be used for the entire building. The Receivers shall be delivered to the Librarian for distribution on an "as-needed" basis to the users.

2.21.1 (6) 17-Channel FM Receivers – Model PPA R37 with (2) NiMH "AA" rechargeable batteries, Model #BAT 026

2.21.2 (6) Neck Loop Induction Accessory with 3.5mm male plug Model NKL 001

2.21.3 (6) Folding Headphones with 3.5mm male plug Model HED 024

2.21.4 Provide (1) 12-Bay Body-Pack Charger Model CHG 3512 for use with all the ADA Systems furnished for the Classroom Building. The Charger shall be provided at the Library Media Center Desk location accessible to all of the Teachers. Provide Charger with power supply.

2.21.5 Provide (1) 100-Count Pack of replacement headphone earpads for use with all the ADA Systems furnished for the Classroom Building. The earpads shall be used as sanitary replacements for the earphones

2.22 Provide spare parts to be used for the ADA Systems installed in the Classroom Building. Provide the following spare parts:

2.22.1 (1) 17-Channel FM Receiver – Model PPA R37

2.22.2 (2) Neck Loop Induction Accessory with 3.5mm male plug Model NKL 001

2.22.3 (2) Folding Headphones with 3.5mm male plug Model HED 024

2.22.4 (4) NiMH "AA" rechargeable batteries, Model #BAT 026

2.22.5 (2) Signage Kits – Model IDP 008 Assistive Listening Notification Signage

2.23 Complete documentation of the materials provided, and all warranty information shall be furnished, along with the serial numbers shall and MAC addresses to the District on the As-Built documentation to support the warranty information. Deliver all equipment in the original manufacturer's supplied packaging.

PART 3 - LIBRARY FLAT PANEL AUDIO-VISUAL SYSTEM

3.1 The Library shall be furnished with (2) Large Commercial Grade LED Flat Panel Display Systems with Local AV Input, Sound Reinforcement and ADA Assistive Listening System.

3.2 All other Flat Panel symbols shown on the floor plans are for future use and will not be provided with either a Flat Panel Monitor or installation mount for the future monitor. The reference on the floor plans to the Flat Panel installation details is shown to illustrate the required heights of the J-Boxes for the Data and Audio-Visual outlets and for the power outlet provided by the Division 26 Contractor. The 272000 Contractor shall provide a blank wallplate for the Audio-Visual junction box. The 271000 Contractor will furnish and install the data outlet at the required height.

3.3 Document Cameras, Laptops, AppleTV Devices and Personal Computers shall be furnished by the District and installed by the District. Provide cable loom wrap around all patch cables from devices to the wallplates.

3.4 **Provide lump sum of $7,000 for the purchase of (1) 80" Library Flat Panel Monitor for the Student Area and (1) 60" Library Flat Panel Monitor behind the Resource Desk as shown in the specifications**. The Flat Panel Monitors shall be furnished in size based on the requirements shown in this specification. The final Flat Panels will be determined by the Contractor's final submittal for the approved purchase with the Lump Sum allowance.

3.4.1 **Lump sum amount shall cover Flat Panel Monitors invoice cost only plus tax**. Shipping, Contractor mark-up, profit and overhead, installation, patch cables, programming and set-up, all mounting hardware and labor costs shall be included as part of the Contractor bid and not part of the lump sum amount. Actual make, model and final size of Flat Panel Monitors will be determined prior to installation and shall be approved by the Project Engineer and District Project Manager prior to purchase.

3.4.2 Contractor shall submit an itemized spreadsheet to the Project Engineer, Architect, Construction Manager and District Project Manager for the monitors being proposed for purchase including the following information; Make, Model, Size (Diagonal), Native Resolution, Invoice Cost and Tax. The submittal shall include manufacturer cut sheets for each type and size of each model submitted, with proper part numbers highlighted. The itemized spreadsheet shall detail each location with Room Number and the associated Flat Panels (and sizes) for that room. The spreadsheet shall be provided to the Construction Team a minimum of 12 weeks prior to the first proposed purchase date to allow enough time for approval, purchase and delivery of the Flat Panels. The Contractor shall not proceed with purchase or warehousing of the equipment without written approval.

3.4.3 The specified 80" Larger Flat Panel shall be installed in the Library on the Southeast wall (plan south) that is shared with the adjacent Book Storage Room and the specified 60" Flat Panel shall be installed on the South wall (plan south) directly behind the Library Resource desk, between the tall storage cabinets. The Flat Panel mount installed between the tall storage cabinets must be centered between the cabinets and installed at the height shown on the floor plans. Refer to the Electrical and Architectural floor plans for additional information on the location of the Flat Panel.

3.4.4 Flat Panel specifications based on Sharp 80" Model #PN-LE801 and Sharp 60" Model #PN-LE601 Commercial Grade Professional Display. Any suggested Flat Panel equivalent must contain all input/output connections; display shall provide as good or better minimum brightness, contrast ratio, native resolution and maximum display colors as the specified Flat Panel. Models not currently in production (discontinued) at the time of the submittal, will not be considered. **Flat Panels must have a minimum of (3) HDMI Inputs.**

3.5 Contractor shall furnish and install a commercial grade Large Flat Panel Display with Soundbar and components as shown in the A/V system details and specifications. System shall consist of components that will use the Flat Panel as the audio-visual switch. All video inputs shall be directly wired to the Flat Panel. Audio shall be routed as shown in the AV Wiring Diagrams, in the detail drawings, to allow the Amplified Soundbar to serve as a system-wide audio amplification device. Refer to the detail drawings for additional installation configuration requirements, mounting systems and additional parts.

3.5.1 Contractor shall submit to the Project Engineer the final mounting height of the LED Flat Panel Display prior to the installation of any surface mount brackets. The final mounting height shall be presented in the form of an RFI with copies

being submitted to the Project Engineer, Construction Manager and Project Electrical Contractor. The exact mounting height must be determined prior to the electrical rough-in stage of the project. The mounting height shown in the drawing details must be confirmed prior to the rough-in stage of the project. No flat panel mounts may be roughed-in until the locations and heights are confirmed and accepted by the Project Engineer.

3.5.2 The Large LED Flat Panel Display shall be mounted on the wall at the location shown on the floor plans and the Amplified Soundbar shall be suspended below the Flat Panel Display. The Soundbar shall move with the Flat Panel when adjusted away from the wall. Field verify the exact position of the Flat Panel Display and Soundbar with the District Project Manager prior to installation.

3.5.3 Provide Flat Panel with a surface type wall mount by Chief Manufacturing Model #PDRUB dual arm support as shown on the drawing details. Refer to the detail drawings for the flat panel mounting, outlets and conduit requirements. Contractor shall furnish the adapter plate from Chief to mount to the model of flat panel provided. The height for each flat panel may differ from the height shown in the installation detail drawing. Confirm all heights of the mounts with the floor plans prior to installing the mounts.

3.5.4 The final location of the Soundbar shall be determined by any clearance required to access any controls or connections on the Soundbar and clearances required to make adjustments (Pan, Tilt and Extension) to the Flat Panel. The Soundbar shall be located as close to the bottom of the panel as possible to lessen the exposed cable connections.

3.5.5 Provide surge suppressor at the flat panel location for the TV and devices installed at the flat panel. Surge suppressor shall be rated for 15A, six outlets, and shall have outlet sections that swivel. Provide Cyber Power Model #CSB600WS.

3.6 MicroPC Computer, with included VESA mount, shall be furnished and installed by the Contractor. Refer to the detail drawings and AV Diagrams for the requirements for the AV equipment and interface devices.

3.6.1 Connect the MicroPC HDMI Video/Audio output to the Flat Panel Display. The HDMI output on the Micro PC shall be used to connect to HDMI Input #3 on the Flat Panel Display. Provide HDMI patch cable, length as required, as shown in the patch cable section of the specifications.

3.6.2 Attach the MicroPC to the rear of the Flat Panel Display with the VESA mount adapter plate. The MicroPC shall be mounted to the Flat Panel Display or wall mounting bracket with the VESA mount using the proper type bolts and nuts. Refer to the detail drawings for additional requirements. Provide VESA mount adapter for the MicroPC by Dell Model #452-BDEQ (Or Approved Equal).

3.6.3 Connect the MicroPC to the 2-Port data outlet behind the Flat Panel Display. Coordinate with the District IT Department for assignment of an IP Address for the MicroPC.

3.6.4 The MicroPC shall be programmed for access to the Campus LAN and any software or internet access as required by the District for the Library Display. Contractor shall meet with the School Administration and the District IT Director for set-up of the computer and for access restrictions. Contractor shall submit

meeting minutes to the Project Engineer and District Project Manager detailing the meeting decisions. Allow for a minimum of two man-hours for the coordination meeting.

3.6.5 The MicroPC wireless and Bluetooth connectivity shall be programmed by the Contractor with password protection. Coordinate all passwords and programming with the School Administration and the District IT Director. All passwords shall be recorded and included in the final As-Built drawings. Extend Bluetooth receiver as required to allow for proper operation of the MicroPC.

3.6.6 MicroPC shall be furnished with the following minimum requirements:

3.6.6.1 PC Specs: Intel i3-9100T Quad-Core Processor; Windows 10 Pro 64-Bit OS; 8GB DDrR4 2666MHz Memory; M.2 128GB PCIe MVMe Class 35 SSD; Intel Wireless-AC 9560 Dual-Band 2X2 802.11ac Wireless/Bluetooth card

3.6.6.2 Connections:(1) 3.5mm Audio In; (1) 3.5mm Audio In; (2) USB 3.1 Ports (Front); (1) RJ45 Ethernet; (2) USB 2.0 Ports (1with Smart Power on); (2) USB 3.1 Ports (Rear); (1) DisplayPort; (1) HDMI

3.6.6.3 Dell Model #KM636 Wireless Keyboard and Mouse (or Approved Equal)

3.6.6.4 Provide MicroPC as manufactured by Dell Model #OptiPlex 3070 Micro (or Approved Equal)

3.7 The 27 10 00 Contractor will provide a 2-Port Category-6 UTP data outlet at the Flat Panel Display. Coordinate the data outlet location with the 27 10 00 Contractor.

3.7.1 Provide Category-6 patch cable from the data outlet to the Ethernet Port on the MicroPC behind the Flat Panel Display, length as required. Install patch cable for the network connection.

3.8 District shall furnish and install an AppleTV device next to the ceiling enclosure. Coordinate the installation of the AppleTV device with the District IT Department. The AppleTV shall be connected to the Flat Panel with an HDMI cable. Connect the AppleTV device to the LAN via the data outlet in the ceiling enclosure. Refer to the Library Audio-Visual Diagram in the detail drawings.

3.8.1 Provide fiber optic/copper hybrid HDMI patch cable (length as required up to 100-feet) for the connection from the AppleTV device to the Flat Panel. The cable shall be furnished per the AV Patch Cable section of this specification. Connect AppleTV to the HDMI #2 Input on the Flat Panel, unless otherwise directed by the District. The detachable ends are required to allow for proper installation in the conduit.

3.8.2 Provide Category-6 patch cable for the District furnished AppleTV device, length as required to connect to the data outlet at the ceiling enclosure. Install patch cable for the network connection. Coordinate connections with District IT Department.

3.8.3 Audio from the AppleTV shall follow the HDMI video. The Flat Panel shall serve as the AV switch for routing of the audio and video.

3.9 Instructor's Interface Wall Plate; The Instructor's wallplate will serve as the main input location to the Flat Panel system. Provide all patch cables for the system. See Library Flat Panel A/V Diagram for wall plate requirements. Provide the following interfaces at the Instructor's wallplate location;

3.9.1 Provide (1) Single Gang wallplate at the Instructor's Input location (Shown as the "LO" symbol on the drawings). Provide (1) HDMI with audio passive feed-through digital input wallplate Extron Model #WPD-110A on a single gang Decora Style faceplates at Instructor's (LO) Input wallplate location. Refer to the AV Wiring Diagrams for additional requirements.

3.9.2 Provide (1) HDMI (video) and (1) 3.5mm (audio) cable from the pass through wallplate to the Flat Panel location. The HDMI cable shall be directly connected to HDMI Input #1 on the Flat Panel. The 3.5mm audio cable shall be directly connected to the 3.5mm audio Input #1 on the Flat Panel. Terminate the Audio cable on the terminals on the Input Wallplate location. Provide cables as shown in the patch cables section of this specification.

3.9.3 Contractor shall furnish and install the High-Speed HDMI Swivel-Type and 3.5mm audio patch cables to the Instructor's Laptop or other Audio Input device. The 90 HDMI end of the patch cable shall be connected to the faceplate to allow the cable to drop straight down along the wall. All patch cables shall be 12 feet in length at the Instructor's wallplate location. Refer to the patch cable section for the exact patch cable requirements.

3.9.4 Provide an HDMI (Female) to DisplayPort (Male) adapter for each of the Teacher's Wallplate locations. The adapter shall be provided with the HDMI and Audio patch cable assemblies.

3.9.5 Flat Panel Audio Output - Provide (1) Audio cable from the 3.5mm Audio Output on the Flat Panel Display to the MVC121+ in the ceiling enclosure. Terminate the cable on the MVC121+ DSP/Mixer input for routing to both the ADA Assistive Listening Transmitter and the Soundbar.

3.9.6 Pass the cables through the conduit and J-box behind the flat panel. The J-box shall be provided with a pass-through faceplate with a minimum of 1-1/4" opening. Neatly dress cables on the back of the flat panel with Velcro ties.

3.9.7 All wallplates shall be the Extron Decora style. Color of plates is to be confirmed by the Contractor prior to installation.

3.10 Provide ceiling mounted enclosure in the accessible ceiling of the Library to house the ADA Assistive Listening Transmitter, equipment power supplies and future accessories. The Library has accessible ceiling clouds that will be used for the installation of the enclosure. See the floor plans for more information.

3.10.1 Each enclosure will be furnished with power by the 260000 Contractor. The enclosure shall be provided with a quad outlet in the ceiling enclosure. The power shall be hard wired to the outlet in the ceiling enclosure. The enclosure shall also be furnished with a surge suppressor as shown in the detail drawings. Refer to the detail drawings for additional requirements.

3.10.2 The Ceiling enclosure, Premier Mounts Model #GB-AVSTOR3, shall be installed in the accessible ceiling near the projector location. The 2-foot by 2-foot enclosure fits directly into the ceiling grid system. The enclosure shall also be

furnished with seismic bracing installation kit by Premier Mounts Model #QLCS, “Quick-Lock” cable support system for seismic bracing from the deck above. In addition, the enclosure shall be provided with threaded rod for structural support into deck above. Provide threaded rod based on distance to deck above and the structural members, refer to the drawing details for installation requirements.

3.10.3 The power supplies for all AV equipment must be installed inside the AV enclosure.

3.10.4 Confirm typical placement of the enclosure prior to installation of any AV cabling. The enclosure shall be no more than three feet from the projector location (distance on ceiling, not actual distance).

3.10.5 DSP/Mixer and the ADA Assistive Listening Transmitter shall be placed in the Ceiling Mounted AV Enclosure. Refer to the Classroom AV Diagram for additional requirements and for the location of the Ceiling Enclosure.

3.10.6 Field modify the ceiling enclosure to mount the antenna for the ADA System transmitter on the outside of the enclosure. Confirm location of the antenna with the other components to be installed in the enclosure prior to installing the antenna or drilling any holes. Refer to the ADA Assistive Listening System specifications for additional instructions.

3.10.7 Provide surge suppressor at the ceiling enclosure location for the devices installed in the enclosure. Surge suppressor shall be rated for 15A, six outlets, and shall have outlet sections that swivel. Provide Cyber Power Model #CSB600WS.

3.11 A 4-Port Category-6 UTP data outlet shall be provided at the ceiling enclosure by the 27 10 00 Contractor. The data outlet shall be used for network connections to the WAP, AppleTV and the IP-Based Paging Speaker. Coordinate the data outlet location with the 27 10 00 Contractor. Patch cables for the WAP and IP-Based Paging Speaker will be furnished and installed by the 27 10 00 Contractor.

3.12 Provide a DSP/Mixer Audio router and processor for distribution and control of audio signals in the Library. Provide a 3 input X 2 output Audio Digital Matrix Processor by Extron Model MVC 121 Plus in the ceiling enclosure.

3.12.1 Provide audio input to the DSP/Mixer Processor from the 3.5mm Audio Output connection on the Flat Panel Display. Refer to the specifications for each individual device for additional requirements.

3.12.2 Provide audio output channel from the DSP/Mixer Processor to the Soundbar Input and the ADA System Transmitter Input. Refer to the Classroom AV System Diagram for additional requirements.

3.12.3 Provide variable line level audio output to the Soundbar mounted below the Flat Panel. The audio level shall be set with the DSP function while the Soundbar is installed and operational. The DSP processing shall be set for each source input into the Mixer. Provide the audio cable required for the connection.

3.12.4 Provide fixed line level audio output to the ADA Assistive Listening Systems Transmitter mounted in the ceiling enclosure. The audio level shall be set flat to

allow the users to control volume on the receivers. Provide the 3.5mm audio cable required for the connection.

3.12.5 The DSP/Mixer shall be set up for a plug-and-play connection of a future microphone system for the Librarian. The Contractor shall program the third input as a balanced microphone input through the programming settings. The District shall be able to connect the future microphone system without having to re-program the DSP.

3.12.6 The DSP Matrix Processor via the DSP software shall be used to set the routing and equalization of all of the audio inputs/outputs. The Contractor shall balance each individual input and output to provide optimum signal quality. The Music Type Presets on the Control Panel shall each be set with individual EQs to match the music or audio type chosen.

3.12.7 System shall be provided with Extron's DSP Configurator Software for management of the complete speaker system. Contractor shall provide all programming and software and shall provide the District with all software presets. Set Administrator Password access to prevent inadvertent changes to the programming after the installation.

3.13 Provide an Amplified Soundbar System at the Large LED Flat Panel Display for audio support. See the detail drawings and diagrams for additional requirements. The Amplified Soundbar System shall be provided the following;

3.13.1 The Soundbar shall be hung from the VESA wall mount bracket on the back of the Flat Panel, directly below the flat panel display. Provide a Universal Soundbar adapter bracket to hang the Soundbar. Refer to the manufacturer's installation instructions for requirements for mounting the soundbar. The soundbar shall be mounted with enough clearance to allow the full vertical adjustment of the wall mount bracket and for access to the connection ports on the Soundbar. The Soundbar shall be securely attached to move with the Flat Panel when it is adjusted out or away from the wall. Provide Universal Soundbar Bracket Model #OCSBA (Or Approved Equal).

3.13.2 Connect the Variable Audio Output from the MVC121+ DSP/Mixer to the 3.5mm Audio Input on the soundbar. Provide 3.5mm stereo audio connection cable from the MVC121+ DSP/Mixer in the ceiling enclosure to the Soundbar.

3.13.3 The Soundbar shall be as manufactured by Yamaha Model #ATS-1080 (or Approved Equal) The Soundbar's volume shall be controlled with the original Yamaha remote control supplied with the Soundbar.

3.13.4 Install the Yamaha MusiCast APP for the Soundbar on the Librarian's Computer. The Soundbar's Bluetooth connectivity shall be programmed by the Contractor with password protection. Coordinate all passwords and programming with the School Administration and the District IT Director. All passwords shall be recorded and included in the final As-Built drawings. The password shall be given to the Librarian with the User Guide during the Flat Panel AV System training class.

3.14 Provide a complete Assistive Listening System in each room furnished with an AV System. The Assisted Listening System shall be furnished and installed to meet CBC Section 11B-219 and comply with CBC Section 11B-706 and the ADA requirements for hard-of-hearing. The ADA system shall be integrated into the sound reinforcement system. Mount the RF

base transmitter in the ceiling mounted AV Enclosure, at the location shown on the floor plans.

3.14.1 Per ADA Assistive Listening System CBC Section 11B-706.3 – "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".

3.15 Provide Williams AV Assistive Listening System for each classroom.

3.15.1 Provide (1) ADA System Stationary FM Transmitter – Model #PPA T45

3.15.2 (1) Remote Antenna Kit – Model ANT 034

3.15.3 (1) Signage Kit – Model IDP 008 Assistive Listening Notification Signage

3.15.4 The antenna shall be mounted to the top side of the ceiling enclosure with the antenna pointed inside the accessible ceiling. Contractor shall drill a small hole in the top to install the F-Type female to female bulkhead for the antenna. Plug the short RG-59 coaxial extension cable into the Transmitter and bulkhead. Install antenna on bulkhead.

3.15.5 ADA Receivers shall be used from the provision for classrooms and the rest of the entire building. The Librarian will distribute the receivers to the users.

PART 4 - TRAINING

4.1 **Training**

4.1.1 **Contractor will provide a minimum of 8 clock hours of on-site training for site staff on the Classroom and Library A/V systems. Training time may be split to provide multiple training sessions by the District as required to fully train the staff**. Training for personnel shall be provided by certified technology specialists. The scope of training shall encompass system operation and procedures. Staff training shall include an integrated information overview, media retrieval procedures as well as operational procedures for local control configurations. The Contractor shall provide a detailed written outline clearly describing the proposed plan for all training, for approval by the Engineer and Owner's representative. The Staff shall be trained for use of all AV System accessories such as proper microphone storage and charging, document camera set-up and use and volume control options.

4.1.1.1 In Addition; Training for staff will include the following basic system concepts; Faculty and staff will need to know how to power on/off the system; how to access one or more media resources via the remote control; use and operation of audio/video input/output devices and techniques; operational procedures and "what not to do" to prevent system malfunctions; procedures for recovery after a power outage; control of the flat panel and projector systems and trouble-shooting tips. Trainers should incorporate hands-on techniques to maximize staff opportunity to incorporate and develop curriculum that is both meaningful and targeted for their student needs. Clearly written support materials shall be provided to all training participants along with a laminated quick reference guide that will be retained after the

training classes. Manuals describing operation and use of the system shall also be provided to the staff for future reference.

4.1.2 Schedule final training within 2-weeks of all of classroom systems being completed.

4.1.3 All System Types - Contractor shall record at least (1) training session per School site, of each type of Audio-Visual System, in minimum High Definition Video (1080p format), and save to a flash drive to turn over to the District. Training video shall be retained as property of the District.

4.1.4 **Contractor will provide a minimum of 4 clock hours of on-site training for District Technical Staff on the Classroom and Library A/V systems.** Training for Technical Personnel shall be provided by certified technology specialists. The scope of training shall encompass system operation and procedures, basic programming, trouble-shooting minor problems, projector set-up and settings, flat panel settings, mount adjustments, audio component connections and programming, etc. Technician training should include an integrated information overview, operational procedures for local control configurations. The Contractor shall provide a detailed written outline clearly describing the proposed plan for all training, for approval by the Engineer and Owner's representative.

4.1.5 Contractor shall furnish the District IT Department with a full spreadsheet list of the device MAC Addresses, Switch Ports used and Cable ID (Labeling) information that all Audio-Visual equipment is connected to in the IDFs and AV cabinets. The information shall be provided to the District before all systems are activated and shall be coordinated with the District IT Department.

4.1.6 Contractor shall provide a laminated quick reference guide for the Teacher's, and/or Staff using the Classroom and Library AV Systems, that outlines the operational procedures for starting up the system, selection of inputs, volume control, use of system microphones and charging procedures, use of ADA Assistive Listening System receivers and use of a Document Camera. The quick reference guide shall be given to each person that attends a training class and each classroom system shall be left with a quick reference guide given with the system components distributed by the Principal. Coordinate with the Principal for distribution and quantity of guides required.

4.1.7 A separate laminated quick reference guide shall be produced for the flat panel monitor system and left with the system at the time of installation. Coordinate with the School Administration for distribution and quantity of guides required.

PART 5 - PATCH CABLE ASSEMBLIES

5.1 Audio/Video Patch Cables

5.1.1 All patch cables must be factory manufactured. All patch cables shall be in a length as required to provide the proper operation of the equipment, unless otherwise noted. Contractor is responsible for confirming all connector gender requirements prior to ordering.

5.1.2 **Audio Patch Cables 2-feet to 25-feet in length for Installation Connections;** All 3.5mm stereo audio cable assemblies shall be a male to male cable fully shielded cable with 3.5mm bayonet style connectors. Extron Mini Audio Cables Series (Or Approved Equal). Provide minimum length of 2 feet.

5.1.3 **Audio Patch Cables 12 feet in length for Input Wallplate Connections;** All 3.5mm stereo audio cable assemblies shall be a male to male cable fully shielded cable with 3.5mm bayonet style connectors. Extron Mini Audio Cables Series (Or Approved Equal). See the AV System Diagrams in the drawings and AV Input Wallplate requirements in the specifications for further instructions.

5.1.4 **HDMI Cable Assemblies 12 feet in length for Input Wallplate Connections;** All HDMI patch cables must be 4K/30 verified and must conform to the HDMI Premium and High Speed cable standards. Cables shall be furnished with 180º swivel head design, Vanco Pro Digital High Speed HDMI Swivel Cable Model #299012 (Or Approved Equal), UL and CL3 rated. See the AV System Diagrams in the drawings and AV Input Wallplate requirements in the specifications for further instructions.

5.1.5 **HDMI Patch Cables 1.5-feet to 15-feet in length for Installation Connections;** All HDMI patch cables must be 4K verified, ultra-flexible construction and must conform to the HDMI High Speed cable standards. Patch cable shall be Extron HDMI Ultra Series High Speed patch cable assemblies (Or Approved Equal). Length of patch cable shall be as required for proper operation.

5.1.6 **HDMI Cable Assemblies 33-feet to 66-feet in length for Installation Connections;** All HDMI patch cables must be 4K/30 verified and must conform to the HDMI Premium and High Speed cable standards. HDMI cable assemblies must be a fiber optic/copper hybrid construction with detachable ends. Cables shall be Hall Research CHD-DE* 4K Javelin™ Active HDMI Cable w/Detachable Ends or Kramer CP-AOCH Series High Speed. Length of patch cable shall be as required for proper operation.

5.1.6.1 HDMI cable assembly must be installed with the manufacturer furnished “cable pulling sock”. Damaged or inoperable cable assemblies due to improper installation procedures shall be replaced by the Contractor at no expense to the District. Please note Manufacturer’s Cautionary Warning on product specification sheet – “*DAMAGED DUE TO CONNECTOR BEING PULLED HARDER THAN 20 kg, IS NOT COVERED BY WARRANTY - To pull cable through conduits or tight spaces, never grab the connector, as it is easy to exceed the force limit on the connector, instead, remove the detachable end, protect the connector using a cable pulling sock and make sure the force is applied directly to the cable jacket*.”

5.1.7 **HDMI (Female) to DisplayPort (Male) Adapter;** HDMI to DisplayPort adapter for HDMI patch from the AV Input Wallplate to the Input Device (Laptop, PC, etc.) at the Teacher or Instructor’s location. HDMI (Female) to DisplayPort (Male) Adapter as manufactured by Hall Research Model #GC-DP-HDMI-P (Or Approved Equal).

5.1.8 **Category-6 Patch Cables 25-feet or Less;** Category-6 UTP patch cables shall be as manufactured by Commscope, Panduit, Leviton or Ortronics, (Or Approved Equal.

5.1.9 All patch cables shall be provided for each type of connection required to provide a complete and operational system. All patch cables shall be factory manufactured.

PART 6 - INSTALLATION AND EXECUTION

6.1 Verify that all electrical requirements including junction boxes, empty conduit and power circuits and receptacles are in place as shown on the drawings.

6.2 Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

6.3 Installation practices shall follow “standard broadcast wiring” and installation practices, as excerpted from “Recommended Wiring Practices, “Sound System Engineering”, (2nd Edition) D. Davis, and Performed to the highest standards of acknowledged industry practices. Upon request the A/V Contractor shall furnish all equipment and labor to verify the compliance with the following:

Optical:

6.3.1 Center to corner light fall off shall be less than 50% for video/data projectors.

6.3.2 Center to corner light fall off shall be less than 35% for optical projectors.

6.3.3 Images shall be level and square with the appropriate aspect ratio.

6.3.4 Image shall be free from visible vibration.

Audio System:

6.3.5 Signal-to-noise ratio (including crosstalk): 55-dB minimum.

6.3.6 Total harmonic distortion: 0.1% maximum from 30 Hz to 15,000 Hz.

6.3.7 System frequency response: ±1.0 dB, 20 Hz to 20,000 Hz.

6.3.8 Program reproduction system with point-source loudspeakers: Flat response from 63 Hz to 2.5 kHz ± 2-dB, decreasing uniformly from a relative level of 0-dB at 2.5 kHz to a relative level of –10-dB at 10 kHz as measured on axis of loudspeaker.

6.3.9 Sound output capability: Program levels of not less than 100 dB without objectionable distortion, rattles, or buzzes.

6.3.10 Hum and noise is inaudible (below the background noise level of the space) under normal operation and as observed in normal seat locations.

Video System:

6.3.11 Signal-to-noise ratio (peak to RMS, unweighted DC to 4.2 MHz): 55-dB minimum.

6.3.12 Crosstalk (unweighted DC to 4.2 MHz): 45-dB minimum.

6.3.13 Frequency response: ± 0.5 dB to 4.2 Mhz.

6.3.14 Line and field tilt: 2% minimum.

6.3.15 Differential gain: 3% maximum.

6.3.16 Differential phase: 2□ maximum.

6.3.17 System timing sync coincidence: within 50 nanoseconds.

6.3.18 Color timing: ± 2□at 3.58 Mhz.

Radio Frequency (RF) System:

6.3.19 Visual Carrier level: +0 dBmV minimum and +16 dBmV maximum at system outlets for utilized channels.

6.3.20 Adjacent Channel Visual Carrier: 3-dB maximum differential at system outlets.

6.3.21 Non-adjacent Channel Visual Carrier: 0-dB maximum differential at system outlets.

6.3.22 Carrier-to-Noise Ratio: 42-dB minimum

6.3.23 Amplitude Response: Flat ± 1.0 Db

6.3.24 Signal-to-Noise Ratio: 45-dB minimum for the maximum level of the signal and the interference resulting from cross modulation from other signals on the system, after demodulation.

6.3.25 Outlet-to-Outlet Isolation: 25-dB minimum.

6.4 Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.

6.5 Where manufacturer does not provide bending radius information, minimum bending radius shall be 10 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the engineer and the owner.

6.6 Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support cables installed above removable ceilings. Install adequate support structures for 10-foot cable service loops at each TC.

6.7 Furnish screw-type terminal blocks, boards, strips or connectors for cables that interface with racks, cabinets, consoles or equipment modules. Attach wires terminating at screw-type terminals with crimp-on lugs. “Telephone-style” punch down blocks are not acceptable for signal or data wiring.

6.8 Group cables according to signals being carried. To reduce signal contamination, form separate groups for the following:

6.8.1 Power cables.

6.8.2 Control cables.

6.8.3 Video cables.

6.8.4 Camera cables.

6.8.5 Audio cables for signals less than minus 20 dBm.

6.8.6 Audio cables for signals between minus 20 dBm and plus 30 dBm.

6.8.7 Audio cables for signals above plus 30 dBm.

6.9 All wire and cable shall be continuous and splice-free for the entire length of run. For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of appropriate length.

6.10 Install no cable with a bend radius less than that recommended by the manufacturer.

6.11 Provide strain relief for cables. Provide connectors with metal shell/casings. Provide a minimum of three feet of free cable coiled in a floor pocket. Use spiral wrap to group similar cable types.

6.12 All shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, panels, or equipment enclosures. Tin all terminated shield drain wires and insulate with heat-shrink tubing.

6.13 Separately dress, route and land microphone and line level cables directly to equipment.

6.14 Use only rosin core 60/40 tin/lead solder for all solder connections.

6.15 All cables shall be neatly labeled with wrap around type written labels.

6.15.1 On the cable at the rear of the faceplate or termination location at the control location. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part # 29689 (NO ACCEPTABLE EQUAL)

6.16 All faceplates shall be labeled with type-written permanent labels securely attached to the faceplates identifying all A/V connections. (ie; Doc Cam, PC, Audio Only, etc.) Cables at the projector and A/V switch shall be also be labeled to match the faceplates.

6.17 Lace, tie or harness wire or cable in accordance with accepted professional practice. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point. Provide service loops where harness of different classes cross or where hinged panels are to be interconnected. Only Velcro style tywraps or cable ties shall be allowed for any cable dressing applications.

6.18 Each major component of equipment shall have the manufacturer's name, address, model number, and rating on a plate securely affixed in a conspicuous place. NEMA code ratings, UL label, or other data which is die-stamped into the surface of the equipment shall be stamped in a location easily visible.

6.19 Upon completion of the work, remove all refuse and rubbish from and about the premises, and leave the relevant areas and equipment clean and in an operational state.

6.20 During the installation, and up to the date of final acceptance, protect finished and unfinished work against damage and loss. In the event of such damage or loss, replace or repair such work at no cost to the owner.

6.21 Prior to final acceptance, provide minimum of three complete sets of drawings showing all cable numbers and construction details in accordance with the actual system installation. Revise the device layout drawings to represent actual installation locations and coordinate these with the electrical Contractor. The operation manual shall contain all instructions necessary for the proper operation of the installed system and manufacturers instructions. The maintenance manual shall contain all information required for the "proof of performance" as required and all manufacturers' maintenance information.

Inspection and Test upon Completion

6.22 Check out and final connections to the system shall be made by the Contractor of the products installed. Technicians shall demonstrate operation of the complete system and each major component to the Owner.

6.23 System field wiring diagrams shall be provided to the owner by the system Installer (Contractor) prior to completion of the installation.

6.24 Upon completion of the installation, four (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and names, addresses, and telephone numbers of parts source. Final payment shall not be made until operational and maintenance manuals have been received.

6.25 The Contractor shall be responsible to provide service within 24 hours (or by mutual consent) after notification by the Owner or his representative, within the hours of 8:00 AM to 5:00 PM from Monday through Friday. Service request forms shall be supplied by the Contractor and the faxing or mailing of such a request form shall constitute notification by the Owner of a service request.

6.26 The Contractor shall provide two "preventative maintenance" service calls, spaced six months apart, for cleaning of all source devices and overall inspection of the system.

PROJECT CLOSEOUT

6.27 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this division, in accordance with these specifications and as described below.

6.28 Equipment Lists and Maintenance Manuals:

6.28.1 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:

6.28.1.1 Name, model, and manufacturer.

6.28.1.2 Complete parts drawings and lists.

6.28.1.3 Local supply for parts and replacement and telephone number.

6.28.1.4 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.

6.29 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.

RECORD DRAWINGS

6.30 The Contractor shall maintain record drawings as specified in accordance with these specifications, and as noted below.

6.31 Final As-Built Drawing Submittals – Provide (1) hard bound copy of "E-size" As-Built drawings and (3) copies on USB Flash Drive in AutoCad (2014 or newer version) format. A Hand marked-up copy of the original construction drawings will not be accepted as the final As-Built drawing submittal. Final As-Builts shall include copies of the floor plan drawings of each building showing projector locations, screens, detailed Audio-Visual System Diagrams showing all equipment and connections, quantities of input wallplates and speaker locations, identification of all final cable routes. In addition, the drawings shall include all outlet locations with cable identification numbers

6.32 Drawings shall show locations of all concealed and exposed conduit runs, giving the number and size of conduit 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 the actual changes made.

6.33 One set of record drawings shall be delivered to the Engineer in accordance with these specifications.

END OF SECTION

SECTION 27 51 16

WIRELESS CLOCK SYSTEM

PART 1 – GENERAL

1.1 The Contractor shall provide additional Wireless Clocks to the existing Wireless Clock System as shown on the drawings and as described in these specifications including all connectors, power supplies, and auxiliary equipment as may be required and as specified herein.

1.2 Clocks, Transmitter and associated components shall be furnished for the New LRC & Classroom Building.

1.3 Related Specification Sections:

1.3.1 Section 26 01 00 - General Provisions

1.4 **Acceptable clock manufacturers shall be Primex Wireless.**

Equipment manufactured by Sprint, TOA, Telecor, Practek, Precise, QIS or any other manufacturer not listed above have been reviewed and are not considered equal or approved for use on this project.

Quality Assurance

1.5 All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections. The distributor must also provide complete installation of all wiring and devices or equipment.

1.6 The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least five years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.

1.7 The contractor shall guarantee availability of local service by factory- trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On-the-premise maintenance shall be provided at no cost to the purchaser for a period of one (1) year from date of installation unless damage or failure is caused by misuse, abuse, neglect, or accident.

1.8 Deliver products in factory containers. Store in clean, dry space in original containers. Protect products from fumes and construction traffic. Handle carefully to avoid damage.

Submittals

1.9 Phase I Submittal shall be made **within (20) working days** after the award of the contract by the District. This submittal shall include the following:

1.9.1 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:

1.9.1.1 Quantity of each type of equipment item.
1.9.1.2 Description of each item.
1.9.1.3 Manufacturer's Name and Model Number.
1.9.1.4 Manufacturer's Specification Sheet.
1.9.1.5 Equipment items which have individual components, will require that all component parts be listed individually.
1.9.1.6 Description of any specialty backbox requirements.
1.9.1.7 All wiring types required for installation of this system.

1.10 **Common submittal mistakes which will result in the submittals being rejected:**

1.10.1 Not including the qualifications of the installing contractor.

1.10.2 Not including all items listed in the above itemized description.

1.10.3 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.

1.10.4 Not including actual manufacturer's catalog information for proposed products.

1.10.5 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

Wireless Clock System

2.1 Acceptable clock manufacturer shall be by Primex Wireless, N3211 County Road H, Lake Geneva WI 53147 (800) 537-0464 FAX (262) 248-0061 EMAIL www.primexwireless.com **(no approved equal)**.

2.2 Provide a complete synchronized wireless master - satellite time system - Primex Wireless Command Point transmitter.

2.3 Clock system shall continually synchronize clocks throughout the facility and shall be capable of clock readouts in multiple time zones where desired.

2.4 Time system shall be a synchronized master-satellite time system. The system shall synchronize all clocks to each other. The system shall utilize GPS technology to provide atomic time. The system shall not require hard wiring. Clocks shall automatically adjust for Daylight Savings Time.

2.5 Clocks shall be synchronized to within 10 milliseconds 6 times per day, and the system shall have an internal oscillator that maintains plus or minus one second per day between synchronizations, so that clock accuracy shall not exceed plus or minus 0.2 seconds.

2.6 The system shall include internal clock so that failure of the GPS signal shall not cause the clocks to fail in indicating time.

2.7 The system shall incorporate fail-safe design so that failure of any component shall not cause failure of the system. Upon restoration of power or repair of failed component, the system shall resume normal operation without the need to reset the system or any component thereof.

2.8 Clock locations shall be as indicated, and clocks shall be fully portable, capable of being relocated at any time.

Regulatory Requirements

2.9 The end user will hold a license, known as a “Radio Station Authorization” granted by the FCC. This license grants the end user protected use for wireless transmission at the designated frequency.

2.10 The system must operate in accordance with a “Radio Station Authorization”, Form FCC 601 – LM, granted by the Federal Communications Commission (FCC). This license will be issued to and held by the end user.

2.11 FCC 1068 – A “Telecommunications Bureau Supplemental Information” must be completed and signed by end user prior to license issuance.

2.12 This license will designate a unique “call sign” for each end user.

2.13 Transmitter and receiver shall comply with Part 90 of FCC rules as follows:

2.13.1 This device may not cause harmful interference and this device must accept interference received, including interference that may cause undesired operation.

2.13.2 System shall be installed in compliance with local and state authorities having jurisdiction.

2.14 Transmitter frequency shall be governed by FCC Part 90.35.

2.15 Transmitter output power shall be governed by FCC Part 90.257 (b).

2.16 Permits: Obtain operating license for the transmitter from the FCC.

Project Site Conditions

2.17 Clocks shall not be installed until painting and other finish work in each room is complete.

2.18 Coordinate installation of the GPS Receiver and the Ground Plane Antenna with work on the roof so that the brackets and related fasteners are watertight. Antenna cable connections must be sealed with a flexible watertight sealant, such as silicone.

Sequence of Operation

2.19 Transmitter: When power is first applied to the transmitter, it checks for and displays the software version, then it checks the position of the switches and stores their position in memory. The transmitter shall synchronize with the Main Transmitter in the existing MDF Room for the correct time.

2.20 Clock: When the batteries are inserted into the clock: A) Press the red button when the red second hand is at the 12:00 position. At this time the microprocessor will lock in the location of the second hand. B) After the red second hand has passed over the minute hand (first second hash mark after minute hand), press and release the red button. At this time the microprocessor then assumes the location of the hour hand.

2.20.1 After the red button has been pressed twice, the microprocessor will start searching the channels. It will start at channel No. 1 and proceed one by one until it either decodes a

valid signal or reaches channel No. 16. If no signal is detected the receiver will be shut off and try again later. If a signal is received, the micro processor will store the channel number, set the clock to the receive time, then for the next minute the clock will beep every time that it receives a valid time signal. If the clock is in a good signal area it will beep once a second. If the clock beeps every few seconds, the clock is in a marginal signal area. Clocks can operate in marginal signal areas, but battery life will be about 25 percent shorter.

2.20.2 After initial set, the clock will shut off the receiver. On a pre-scheduled basis, the microprocessor will turn the receiver back on and starting with the stored channel, it will again look for a valid time signal. However, the beeper will not operate.

2.20.3 If the clock has not decoded a valid time signal for seven days, then it will go back to double step mode. Non-signal reception can be caused by low batter voltage. If this occurs, replace the batteries.

Equipment

2.21 General: The time system shall include a transmitter, roof mounted GPS Receiver, roof mounted antenna, indicating clocks and all accessories for complete operation.

2.22 **Transmitter: Transmitter Located in IDF Closet; Primex Wireless Model #XR01EM, consisting of a 1-watt wireless transmitter with a GPS Receiver and an External Ground Plane Omnidirectional Antenna mounted on the roof. Transmitter shall be synchronized with the existing Main Transmitter in the MDF Room. Unit shall obtain current atomic time from the GPS Receiver. The clock system shall transmit time continuously to all clocks in the system. Do not provide a repeater for this location.**

2.23 Connect transmitter to the existing Master Clock for synchronization of the class pass bells. Provide all programming and set-up of the system to properly integrate with the Intercom and Call Manager systems.

Transmission

2.24 Frequency Range: (Five watts and One watt) at frequency of 72.100 to 72.400 MHz.

2.25 Radio technology: Narrow band FM

2.26 Number of channels: 16

2.27 Channel bandwidth: 20 kHz maximum

2.28 Transition mode: One-way communication

2.29 Data rate: 2 Kbps

2.30 Operation range: 0 degrees C. to 70 degrees C.

Transmitter

2.31 Transmitter output power: +30 dBm (five watts)

2.32 Frequency deviation: +/-4 kHz

2.33 Transmitter power requirements: 120 VAC 60 Hz

2.34 Internal power requirements: 3.3 volts DC

2.35 Carrier frequency stability: +/- 5 ppm

2.36 Transmitter shall have 16 selectable channels to assure interference-free reception.

2.37 Transmitter shall have the following switches:

2.37.1 Time zone adjust switches for all time zones in the world. Includes all US time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii.

2.37.2 Daylight Saving Time bypass switch.

2.37.3 12-hour or 24-hour display.

2.38 Transmitter housing shall incorporate a display which shall include the following:

2.38.1 Time readout

2.38.2 AM and PM indicator if 12-hour time display is set

2.38.3 Day and date readout

2.38.4 Indicator for Daylight Savings or Standard Time

2.38.5 LED which shall flash red in event of reception problem

Transmitter GPS Receiver and Antenna

2.39 Installer to select appropriate cable length for distance between GPS Receiver and the Transmitter, from the following:

2.39.1 GPS Receiver: Included with the Transmitter, GPS roof mounted, with 15-foot cable attached (additional cable lengths available: 50, 100, 150 and 200-feet from Primex Wireless).

2.39.2 The GPS Receiver shall be a complete GPS Receiver including receiving antenna in a waterproof case, 3-7/8 inches by 4-3/16 by 2 inches, designed for roof or outdoor mounting. Provide mounting bracket for attachment to the rigid conduit. The antenna shall be mounted on the rigid conduit provided by the Division 26 Contractor stubbed 3-feet above the roof line. Coordinate the location of the conduit with the Division 26 Contractor. Route the Antenna cable from the Transmitter location to the roof.

2.39.3 Provide a 5-foot service loop attached to the backboard below the transmitter shelf, prior to connecting cable to transmitter. Refer to the floor plans for the location of the transmitter shelf in the IDF Closet.

2.39.4 Cable shall be neatly dressed at the receiver location and provided with a minimum 12” drip loop to prevent water ingress into the conduit and to the IDF Closet.

2.40 Provide an external Ground Plane Antenna for the Wireless Clock Transmitter located in the IDF Closet. Ground Plane Antenna shall be Primex Wireless Model “Outdoor Ground Plane Antenna” (or approved equal) with 100-feet of included coaxial antenna cable. The Contractor shall trim the antenna cable length to remove excess. Provide a 5-foot service loop attached to the backboard below the transmitter shelf, prior to connecting cable to transmitter. Refer to the floor plans for the

location of the transmitter shelf in the IDF Closet. The antenna shall be mounted on the rigid conduit provided by the Division 26 Contractor stubbed 3-feet above the roof line. Coordinate the location of the conduit with the Division 26 Contractor. Route the Coaxial Antenna cable from the Transmitter location to the roof.

2.41 Antenna and GPS Receiver shall be mounted to the 1-1/4” Rigid conduit provided by the Division 26 Contractor, on the roof of the building. Antenna shall be mounted a minimum of 36" above the roof. GPS Receiver shall be mounted to allow for clear view of the sky, aimed at the satellite. Provide pole mount for antenna to adapt to the 1-1/4” conduit. Distance shall not exceed 100 feet from the Transmitter to the Antenna/GPS Receiver location overall.

2.42 Conduit shall be furnished with a single exit weatherhead. Contractor shall seal weatherhead with the silicone sealant.

2.43 Installer to select appropriate cable length for distance between the Ground Plane Antenna and Transmitter from the following:

2.43.1 Provide coaxial cable for roof mounted antenna. Extend the cable to the antenna location from the Transmitter. Ground Plane Antenna is provided with 100-feet of coaxial cable. Cable shall be trimmed to remove excess cable and re-terminated by the Contractor. Test cable for proper loss parameters. Match the existing cable terminations from the manufacturer. Do not leave more than a 5-foot service loop in the IDF Closet.

2.43.2 Cables shall be neatly dressed at the antenna location and provided with a minimum 12” drip loop to prevent water ingress into the conduit and to the IDF Closet.

2.44 Cable Connection Sealant; Provide approved electrical grade non-hardening silicone sealant for cables exiting the weatherhead. Contractor shall be responsible for sealing the weatherhead after the cables have been installed. Sealant shall be rated for outdoor full exposure and have a minimum 20-year life rating. Provide by GE Silicone 2*+ Roof Sealant (or approved equal).

Wireless Clocks

2.45 Standard Clocks: Provide Primex Wireless clocks, 12-1/2” diameter Platinum Slim Metal Series Model #14319, brushed aluminum finish as selected from manufacturer’s finishes. Clocks shall be wall mounted (unless using ceiling mounted model) and shall have zylex polycarbonate lens. Face for all clocks shall be white with custom logo furnished by District. Contact the District Administration for the School Logo Art on file. Hour and minute hands shall be black. Clocks shall be provided with red sweep second hand.

2.45.1 Clocks shall be battery operated and shall have 5- year battery life.

2.45.2 **Clocks shall be provided with School District custom logo faceplate insert. Price of clocks shall include custom logo. Artwork shall be provided by the District. Contractor to coordinate delivery of artwork with the manufacturer as to not delay installation of clocks.**

2.45.3 Clocks shall be capable of automatically adjusting for Daylight Saving Time. An on-off switch located on the transmitter shall disable this function if desired.

2.45.4 Time shall be automatically updated from the transmitter 6 times per day.

2.45.5 Clocks shall remember the time during changing of batteries.

2.45.6 Clock lock: Tamper proof/theft resistant hangers and slots in the backs of the clocks.

2.45.7 Provide (2) alkaline D cell batteries with each clock.

2.45.8 Clock receivers shall be as follows:

2.45.8.1 Decode sensitivity: > - 110 dBm

2.45.8.2 Receiver power: Two alakine “D” cells

2.45.8.3 Antenna type: Internal

2.45.8.4 Antenna gain: -7 dBd

2.45.9 If transmitter stops transmitting valid time signals due to power failure, the clocks will continue to function as accurate quartz clocks until a valid time signal is decoded.

Transmitter:

2.46 Locate transmitter at the height indicated in the drawing details, on a fixed shelf on the plywood backboard in the IDF Closet. Provide a single-sided shelf, black color, for the wireless transmitter mounted to the wall by CPI Model #40074-700 (or approved equal). Provide (2) adjustable rack shelf straps to hold the transmitter in place and secure it to the shelf. Strap must be routed behind shelf prior to securing the shelf to the backboard. Straps shall be constructed of a nylon material a minimum of 1” wide. Provide Rack Shelf Straps as manufactured by Rack Solutions Part #1USHL-STRAP (or approved equal).

2.47 Connect to external antenna assemblies mounted on the roof of the building.

2.48 Connect power supply to the transmitter.

2.49 Set the channel number on the display to correspond to the FCC license.

2.50 Plug power supply into electrical outlet.

Clocks: (Perform the following operations with each clock)

2.51 Install D cell batteries.

2.52 Set clock to correct time in accordance with manufacturer’s instructions.

2.53 Observe clock until valid signs re received and clock adjusts itself to correct time.

2.54 Install the clock on the wall in the indicated location, plumb, level and tight against wall. Attach using Clock-Lock hanging method and suitable fasteners as approved by clock manufacturer.

2.55 Wire Guards: Secure to wall, using approved theft-resistant fasteners.

2.56 The GPS Master-Satellite Time System shall interface directly to the master clock (class pass) system.

Adjusting

2.57 Prior to final acceptance, inspect each clock, adjust as required, and replace parts which are found defective.

Cleaning

2.58 Prior to final acceptance, clean exposed surfaces of clocks, using cleaning methods recommended by clock manufacturer. Remove temporary labels from clock faces. Do not remove labels from backs of clocks.

Demonstration

2.59 Provide training to Owner's representative on setting and adjusting clocks, replacing batteries and routine maintenance.

PART 3 - EXECUTION

Inspection and Test upon Completion

3.1 Check out and final connections to the system shall be made by a factory-trained technician in the employ of a manufacturer of the products installed. In addition, factory-trained technicians shall demonstrate operation of the complete system and each major component to the Owner.

3.2 All materials and installation shall be guaranteed to be free of defects in material and workmanship for two years after final acceptance of installation and test.

END OF SECTION

28 00 00

ELECTRONIC SAFETY & SECURITY

SANTEE SCHOOL DISTRICT

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 30 01

FIRE ALARM VOICE EVACUATION 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, wiring 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 Quantities of 10% spare devices as per 1.16.
1.6.1.3 Description of each item.

1.6.1.4 Manufacturer's Name and Model Number.
1.6.1.5 Manufacturer's Specification Sheet.
1.6.1.6 Back box type and dimensions per device type.
1.6.1.7 California State Fire Marshall Listing Sheets for all components.
1.6.1.8 Equipment items which have individual components, will require that all component parts be listed individually.
1.6.1.9 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 an 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 devices, panels conduits, wireways, tray, pullboxes, junction boxes, number and type of conductors, and other devices.

1.7.1.2 Point to point wiring diagrams showing wiring from panel terminals to each device.

1.7.1.3 Riser diagram indicating all wiring and circuits.

1.7.1.4 Current State Fire Marshal listing sheets for all components and devices.

1.7.1.5 Provide battery power supply calculations, indicate point of power supply connection, means of disconnect, over-current protection, etc. for each panel.

1.7.1.6 Provide detailed information on conductors to be used-manufacturer, type, size, insulation, etc.

1.7.1.7 Provide voltage drop calculations for all conductor run is from each panel (i.e., main FACP, remotes, power extenders, etc.) for each panel.

1.7.1.8 Provide written sequence of system operation matrix.

1.7.1.9 Provide list of zones. (Every device that is addressable.)

1.7.1.10 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 shall be performed by control modules at each unit when required as part of a complete area coverage design scheme. 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.

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, speakers, speaker/strobes exterior speakers devices etc. along with all required programming, 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 50' of conduit, boxes and all wiring for each of the 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 FCI.

1.20 Alternate equipment as manufactured by any other manufacturer not specifically listed above will not be approved for use on this project.

1.21 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 is an existing FCI E3 with Voice Evacuation.

2.1.2 The automatic fire alarm system should comply with (CBC/CFC 907.2.3).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 (CFC 907.6.6.3)

2.1.3 The system shall be a fiber network and fiber cabling shall be single mode, with capabilities, 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 80character LCD display, master controller operator's 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 "Voice Message" 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. With every new system, a documentation cabinet shall be installed at the system control unit or at another approved location at the protected premises (NFPA 72, 7.7.2.1)

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 Provide a minimum 100 watts of amplification in each FACP with a minimum of 25% spare capacity.

2.1.7 The unit shall support a minimum of 3000 intelligent addressable points 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.

2.1.8 The unit shall also provide a minimum of (2) class B strobe circuits with additional circuits as indicated on the drawings.

2.1.9 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 The master fire alarm panel shall be equipped with a manual pull lever type, supervised report station.

2.5 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.

2.6 TRANSPONDER PANELS shall provide voice evacuation/annunciation with a minimum 100 watts of audio amplification to support 70v speaker devices and a minimum of (2) Class B Strobe NAC circuits and be fiber networked to the system. Provide for 25% additional capacity for amplification in each Transponder panel.

2.7 REMOTE POWER SUPPLIES shall provide a minimum of (4) Class B NAC circuits.

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 SPEAKER / STROBE DEVICE shall be of the semi-flush type designed for mounting to a standard 4 11/16” deep electrical back box. Each device shall be provided with a semi-

flush accessory plate. Exterior speakers 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 18.5.5.5.7 California Amendments (2016).

2.10 SPEAKERS shall operate at either 25 or 70 VRMS and provide tap setting from 1/8 to 2 watts and provide efficient design for high intelligibility at a minimum wattage across a frequency range of 300 to 8000 HZ and shall be white in color. Speakers shall be ADA, NFPA and ANSI compliant. The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (dBA) above the average ambient sound level or 5 dBA above the maximum sound level having a duration of not less than 60 seconds, whichever is greater, in every occupiable space within the building (CFC 907.5.2.1.1). The maximum sound pressure level for audible alarm notification appliances shall be 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than 95 dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72 and audible alarm notification appliances shall not be required.(CFC 907.5.2.1.2) To meet the requirements of Section 10.9, the alarm audible signal pattern used to notify building occupants of the need to evacuate (leave the building) or relocate (from one area to another) shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern (NFPA 72, 18.4.2).

2.10.1 Speakers for typical classrooms shall be tapped at ¼ watt with exterior speakers tapped at 2 watts. Other areas such as Theaters, Auditoriums, Gymnasiums, Team Rooms, Cafeterias, Kitchens and all shop areas shall be tapped at ½ watt.

2.10.2 Contractor shall also include (2) additional site visits within the first year to adjust speaker output on a space by space basis as requested by the owner.

2.11 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.

2.11.1 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).

2.11.2 Maximum pulse duration to be 0.20 of a second with an ADAAG 4.28.3(3). Visual alarms maximum duty cycle of 40%.

2.11.3 Capable of providing minimum candela. Intensity as shown on plans (effective strength measured at the source).

2.11.4 The flash rate to be a minimum of 1 Hz and a maximum of 2 Hz per NFPA 18.5.3.1.

2.12 HEAT DETECTOR DEVICES shall be analog addressable, fixed temperature x rate of rise, fixed at 200EF and a 15EF/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 200EF.

2.13 SMOKE DETECTOR DEVICES shall be analog addressable, photo-electric.

2.14 SMOKE DETECTOR/CO–CARBON MONOXIDE combination detectors shall be analog addressable, photo-electric type and provided in all Group E Classrooms with a sounder base to alarm individual classrooms with a 4-pulse temporal pattern as well as transmitting a signal to the staffed remote annunciator.

2.15 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.

2.16 DIGITAL ALARM COMMUNICATOR TRANSMITTER. The control panel shall 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.

2.17 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 Panelboard 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 and the engineer of record. Complete fire alarm system shall comply with Chapter 14 of NFPA for testing and inspection and be sound-tested for audibility in all spaces requiring voice evacuation. This testing shall be performed in the presents of the project electrical engineer. Adjust speaker taps or provide additional speakers as required to provide correct audibility.

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, then 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

31 00 00

EARTHWORK

SANTEE SCHOOL DISTRICT

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Site clearing as specified herein.

B. Related Sections:

1. Section 31 20 00, Earth Moving.
2. Section 33 44 19, Utility Storm Water Treatment.
3. Section 01 50 00, Temporary Facilities and Controls.
4. Section 32 91 00, Plantation Preparation for Tree Protection.

C. Principal items of Work included herein:

1. Site clearing and Grubbing.

1.02 REFERENCES

A. Demolition shall be as per 2016 California Fire Code, Title 24, Part 9, Chapter 33.

1.03 PROJECT SITE CONDITIONS

A. The Contractor shall be responsible to furnish and maintain all temporary barricades, warning lights, and other types of protection and to prevent accidental injury to the general public and personnel on the project.

B. Existing improvements and existing active utility lines to remain (whether above or below ground) within the new construction area shall be properly and adequately protected from damage during the entire construction period. The Contractor shall be responsible to restore to their original condition any of these existing items that are damaged or disturbed.

C. The Contractor shall be responsible to protect adjacent properties, roads, right of ways, utilities and other improvements above or below ground from damage in performing the work.

D. Comply with applicable sections of the storm water pollution prevention plan, including but not limited to, erosion control, soil, waste and maintenance areas. Comply with the

E. Salvaged Materials: Owner requires that a minimum of 50% (by weight) of all non-hazardous construction materials be recycled, composted and/or salvaged. Salvage shall conform to the following:

1. Contractor shall submit salvage plan showing how all materials are to be sorted, salvaged and recycled. Plan must include all final destinations for each type of material.

2. Salvaged items must be transported from site as they are removed, unless materials are to be reused on site.

3. Storage or sale of removed items on site will not be permitted, unless materials are to be reused on site.

4. Contractor shall provide certification for all salvaged materials. Certifications may take the form of receipts from recycling facilities, manufacturers, or any other legitimate form of certification. Certification types shall be outlined in salvage plan and approved by Owner.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 EXECUTION

A. Completely remove from the site (as required for construction) existing vegetation, trees, shrubs, bushes, debris, poles, posts, houses, sheds, garages, structures, footings, foundations, piers, curbs, walls, steps, slabs, pavement, substructures, underground utilities, cesspools, weir boxes, irrigation lines and appurtenances, septic tanks, fences, basement walls and slabs, tanks, manure, etc., unless otherwise indicated, including any other items necessary to construct the new work under this contract.

B. Items removed shall be disposed of, off the property, in a legal manner.

C. Trees and tree stumps unless indicated to remain, shall be removed, together with the bulk of the roots, to a minimum depth of 3 feet below the existing grade or finish grade, whichever is lower, within a radius of eight feet beyond perimeter of trunk at ground line. The resulting holes created by the tree removal shall be filled with clean earth and compacted to the same density as specified in Section 31 20 00, Earth Moving, for fills. Holes resulting from the tree removal shall not be backfilled until approved by the Inspector or other designated authority.

D. During demolition operations, thoroughly wet down debris to allay the dust as necessary. Remove debris from the site as it accumulates. Accumulation of debris will not be permitted.

E. Holes resulting from the removal of septic tanks, cesspools, or any other underground tanks or structures shall be backfilled in accordance with Section 31 20 00, Earth Moving and/or geotechnical report.

F. Discussing existing vegetation into existing surface soils will not be permitted under any circumstances.

G. Coordinate timing of demolition of existing temporary drainage structures with construction of new permanent drainage structures.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

The Architect shall advise the District on the minimum number of soil borings that are required by code based on the size and configuration of the proposed structures and pavements for the purpose of soliciting Geotechnical services from a qualified Geotechnical engineer. In the event a project site is located near unusual geologic features, i.e., severe slopes, rock outcrops, etc., the Architect shall advise the District, in consultation with the Geotechnical engineer, how many additional borings they think would be needed in order to establish with some measure of confidence, that the subsurface conditions can be characterized as accurately as is reasonably possible. The Architect's assistance in this aspect of the project shall not convey any liability for the accuracy or completeness of the Geotechnical report. The Architect is acting in an advisory capacity only. The Geotechnical engineer shall at all times remain the sole design professional responsible for all Geotechnical recommendations.

When existing buildings prevent access to preferred boring locations, other methods should be considered such as slant drilling to obtain adequate coverage of the site.

Upon receipt of a Geotechnical report, the Architect shall review it and shall ask for clarification or additional information as they deem necessary.

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: All required excavation, grading, preparation of subgrade for fills, proper placement of fills, including backfilling and compaction, watering, rolling, and compacting of fill material in place, and finish grading.

B. Principal items of Work included herein:

1. Excavation
2. Filling
3. Backfilling
4. Geotechnical Engineer Inspection and Testing
5. Grading
6. Miscellaneous related work necessary for a complete job.

C. Related Sections:

1. Site Clearing, Section 31 10 00.

2. Final subgrade preparation for asphalt paving, Section 32 12 16 – Asphalt Paving.

3. Aggregate base beneath asphalt paving is specified under Section 32 12 16 – Asphalt Paving.

4. Excavation and Fill, Section 31 23 00 for Utilities and Storm Drains.

5. Utility Storm Water Treatment, Section 33 44 19 (Architect to Verify).

6. Off-Site Improvements, division 2 (Architect to Verify)

7. Operations and Maintenance for Planting, Section 32 01 90.

1.02 PROJECT DATA

A. Geotechnical Reports: The existing soil conditions at the site have been investigated, and a report of findings is on file at the Architect's office for review by the Bidders during the bidding period. This information is offered as supplemental information only, and no guarantee of existing soil or other conditions is intended. Architect to verify with Geotechnical Engineer for the desired wording for this paragraph.

Geotechnical / Geologic Investigation:

Title:
Report Date:

Prepared by:
Project No.

B. The existing soil conditions at the site have been investigated and a report of the findings is on file at the District Office.

1.03 PERFORMANCE REQUIREMENTS

A. All grading work shall be performed in accordance with 2016 CBC, Title 24, Part 2.

B. The Grading Code of the County of San Diego, City of _____, and any special requirements of the permit.

C. The Preliminary Geotechnical Investigation prepared by _ date__.

D. Applicable General and Special Conditions of these specifications hereinafter set forth in full or by reference.

E. A final Grading Report shall be submitted by the Geotechnical Engineer in accordance with 2016 CBC, Title 24, Part 2.

1.04 QUALITY CONTROL

A. Testing and Inspections:

1. A Geotechnical Engineer, designated by the Owner, shall be engaged to perform continuous inspection of the placing and compacting of fills and backfills within the limits of grading of this project. Work shall be done in accordance with these specifications, the requirements of California Building Code, Chapters 18A and 33, and as recommended and approved by the Geotechnical Engineer. Costs for such inspection and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical Engineer in advance so that he may be present to perform his services as needed.

2. The Geotechnical Engineer shall also make an investigation of the fill material to establish the ability of the soil to sustain the vertical loads to be imposed on the fill by the proposed structure, and to confirm the expansion and other specified characteristics of the fill material.

3. The Geotechnical Engineer shall submit compaction reports to the Architect, Structural Engineer and the Civil Engineer at the completion of the Work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Architect and Civil Engineer informed of the progress of the grading work.

1.05 SITE CONDITIONS

A. Protection:

1. Protect adjacent property as required to prevent caving and sloughing of material onto adjacent property.

2. Utility lines and structures shown shall be protected and treated as indicated. Where utilities not shown are encountered, report it to the Architect before proceeding with excavation. Remove inactive lines as directed, and plug the remaining ends. The Contractor shall bear the cost for all repairs to damaged utilities.

B. Environmental Requirements: Contractor must comply with all requirements of the applicable County of San Diego and the City of _____ dust control ordinances. Comply with applicable sections of the Storm Water Pollution Prevention Plan, including but not limited to erosion control, material stockpiling, vehicle parking and maintenance areas.

1. Construction operations and maintenance of equipment shall be performed only during the time period(s) and days allowed by local ordinance or government agency having jurisdiction.

2. Earthwork operations shall be scheduled to complete the Work as quickly as possible to reduce the noise, dust and air pollution impacts.

PART 2 - PRODUCTS

2.01 FILL MATERIAL

A. Additional earth material required to complete the work shall be provided by the Contractor at his expense.

B. All earth imported products to the site shall meet or exceed United States Environmental Protection Agency (US EPA), Department of Toxic Substances (if applicable), and State of California regulations for clean fill. Proof of compliance is the responsibility of the Contractor.

C. If this is a DTSC regulated site – contractor shall revise this paragraph to reflect the language agreed to in any PEAs, or other mitigation agreements.

D. All imported material shall be approved by the Geotechnical Engineer prior to hauling on site. Contractor shall deliver samples to testing lab, labeled with location, project name, and date.

E. Imported earth shall be of granular nature with sufficient binder to form a firm, stable, unyielding subgrade. Adobe or clay soils will not be acceptable. Earth imported shall be relatively non-expansive with an expansion index of less than 50, be clean and free from rubbish and debris and rock larger than 3 inches in maximum dimensions, not have sulfate content greater than 1,000 parts per million, and be subject to the approval of the Geotechnical Engineer. Imported fill material shall have an electrical resistivity exceeding 3,000 ohm cm. when saturated with distilled water, measured in accordance with the minimum resistivity procedure of California Test 643 or the soil resistivity box procedure shown in ASTM G57-06. Imported material to be used in areas to receive planting shall be approved by the Landscape Consultant of such quality as to support plant life.

F. Bedding and backfill material for storm drain and utility lines shall be imported clean sand with a sand equivalent of at least 30 (California Test Method #217), and shall be placed in a minimum thickness of 6 inches for bedding and backfilled to 12 inches above the top of pipe.

2.02 SPECIAL REQUIREMENTS

A. If imported soils are used within the upper 12 inches of areas to be planted, these soils shall conform to the requirements for planting soils as specified herein. Otherwise the upper 12 inches of all areas to be planted in the future shall consist of material obtained from the upper 12 inches of existing on-site soils.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.

B. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and same shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.

C. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.

D. An on-site, Pre-grading Meeting with the Architect, the General Contractor, and Geotechnical Engineer, Civil Engineer, Inspector and the Utility Line and Earthwork Subcontractor(s) is required prior to all grading related operations. The Pre-Job Conference will immediately follow the Pre-Construction Conference. Attendance is mandatory**.** City Inspection representatives and Utility Company representatives may also attend.

E. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

F. A 6 foot high, temporary chain link fence and gates, (pair 26' wide, minimum) shall be erected prior to any grading operations at the construction limits perimeter. Coordinate the exact location with Architect and Inspector.

3.02 EXCAVATION

A. Strip vegetation in accordance with Section 31 10 00 - Site Clearing. This material shall be disposed off site in a legal manner. All non-hazardous materials shall be composted, if possible. Contractor shall provide certification of composting location.

B. Excavate unsuitable materials including compressible alluvium, expansive clay, organic material, contaminated soils, or other unsuitable materials. Any remaining dry, loose or soft materials should also be removed until a stable, unyielding condition under equipment loads is achieved. After making the recommended removals and prior to fill placement, the exposed ground surface shall be scarified to a depth of approximately 8 inches, brought to slightly above optimum moisture content, and compacted to at least 95% of the maximum dry density obtainable by the ASTM D1557-12 Standard Test Methods of Laboratory Compaction Characteristics of Soil Using Modified Effort. Surfaces on which fill is to be placed which are steeper than 5:1 (horizontal to vertical) should be benched so that the fill placement occurs on relatively level ground.

The observed on-site soils contain clay that appears to be potentially expansive. These soils are not considered suitable for foundation, floor slab or pavement support. If expansive clay soils are located within 3 feet of the bottom of foundations, floor slabs or other concrete walks or slabs, or within 18 inches of paving base course, they shall be removed and replaced with non-expansive compacted fill soils. The over-excavated area shall extend horizontally at least 10 feet beyond the building perimeter. The replacement fill material may consist of on-site or imported non-expansive soil with an Expansion Index of less than 50.

C. Based on the proposed Grading Plans, a cut/fill transition will cross the building pad area. Over-excavation of the building pad area shall be performed to allow placement of at least 4 feet of non-expansive compacted fill beneath all foundations or slabs to 10 feet beyond the building area.

The building area is defined as outside face of any structure (i.e. wall, column, post) supporting or attached to overhead framing or roof structure, including masonry site walls over 5 feet high.

D. Excavate to the depths, lines and grades indicated. Excavate sufficiently over-size to permit installation and removal of concrete forms and other required work.

Should soil of inadequate density and bearing capability be encountered at the elevations indicated on the drawings, or where new fill is to be placed upon existing loose fill material exposed by excavation, the excavation shall be carried to the depth required to attain soil of bearing quality as determined by the Geotechnical Engineer.

E. Footing pads, if poured neatly, may be excavated to the net pad widths plus two-inches if approved by the Architect. Approval shall not be given until the completed excavation has been inspected.

F. Should footing excavations exceed required dimensions or should sloughing occur, fill such extra space with concrete at no additional cost to the contract. If unsuitable material is found at the indicated depths, immediately notify the Architect.

G. Notify the Inspector 48 hours before foundation excavations are ready for inspection.

H. The bottoms of footings shall be free of loose material, debris, and water before concrete is placed.

I. Cut banks shall be neatly trimmed to the required finish surface as the cut progresses, or the Contractor shall have the option of leaving the cuts full and finish grading by mechanical equipment which shall produce the finish surfaces as shown on the Drawings.

J. Surplus earth not needed for filling and grading shall be disposed of in a legal manner off the site.

3.03 FILLING

A. Fill material shall be placed in horizontal lifts not to exceed 6-inches in depth. Backfill placed in narrow restricted areas, such as along utility trenches, may be placed in 12-inch thick lifts. All fill material shall be free of rocks larger than 3 inches in maximum dimensions. Each layer shall be brought to slightly over optimum moisture content and, while still moist, shall be compacted by rolling and tamping. The rolling and/or tamping of each layer shall continue until the density thereof is not less than 95% of the maximum density obtainable using the ASTM D1557-12.

B. Where fills are placed on existing slopes exceeding a slope of five horizontal to one vertical, the slopes shall be benched in accordance with the Geotechnical Engineer's requirements and local governing public agencies' requirements and compacted as herein specified before placing fill material on same so that fills shall be placed in horizontal layers as specified. Widths of benches shall be as directed by the Geotechnical Engineer.

C. Rock encountered in the excavation on this site may, at the option of the Contractor, be broken up into pieces not larger than 3 inches in maximum dimension and be incorporated in the fill material if spread as directed by the Geotechnical Engineer. Otherwise, rocks larger than 3 inches in maximum dimension shall be removed from the site. Rocks and stones larger than 1 inch in maximum dimension will not be permitted within the top 12 inches of finished grade in non-paved areas. Contractor is responsible for examining geotechnical report to determine if rock or hard digging will be encountered and make provisions in the bid for removal of such materials. No additional payment will be made for rock removal or hard digging.

D. Fill banks shall be graded full and compacted beyond the grade of the finish bank. After the banks have been filled, they shall be trimmed to the finish grades and limits shown on the Drawings. Slopes shall be inclined no steeper than 2:1 (horizontal to vertical).

E. Imported fill soils shall have an Expansion Index of less than 50 based on ASTM D4829, and an R-Value of at least ___ for pavement areas.

The top 12 inches of the pavement subgrade shall be compacted to at least 95% of maximum dry density as determined by ASTM D1557-12.

F. Retaining walls shall be backfilled with soil having an Expansive Index of 20 or less. The backfill area shall include the zone defined by a 1:1 sloping plane, back from the base of the wall. Retaining wall backfill should be compacted to at least 90% relative compaction based on ASTM D1557-12. Backfill should not be placed until walls have achieved adequate structural strength. Heavy compaction equipment which could cause distress to walls should not be used.

3.04 GRADING

A. The entire area within the limits of grading as indicated on the Drawings shall be constructed to the lines, grades, elevations, slopes, and cross sections indicated on the Drawings. When the grading has been completed, the areas shall be rolled smooth with a steel tandem roller or equal. Should any low spots develop during the rolling operation, such spots shall be filled and rerolled smooth. Slopes, banks, and drainage depressions shall present a neat, uniform appearance on completion of the work. Provide temporary access roadways as needed during construction.

B. It shall be the Contractor's full responsibility to take all measures necessary during grading to protect slope areas, both cut and fill, and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. It shall be the Contractor's responsibility to maintain completed slopes until all slopes are in satisfactory compliance with the job specifications.

3.05 COMPACTION

A. All fills shall be compacted to at least 95 percent of maximum density obtainable using the ASTM D1557-12. Areas which are scarified shall be recompacted to these same requirements. The soil within the upper 12 inches of pavement subgrade should be compacted to at least 95% relative compaction based on ASTM D1557-12.

B. Compaction by flooding is expressly prohibited.

3.06 CRIBBING AND SHORING

A. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating, together with suitable forms of protection against bodily injury to personnel employed on the work and the general public.

The responsibility for the design, installation, and maintenance of required cribbing and shoring shall be entirely that of the Contractor and shall be in accordance with the current requirements of CAL-OSHA, the Industrial Accident Commission of the State of California, and all other public agencies having jurisdiction.

3.07 DUST CONTROL

A. During grading operations, water shall be applied to the surfaces in the working area at frequent intervals and in sufficient quantities to lay the dust and for proper compaction. No other method will be permitted.

3.08 GRADING TOLERANCES AND SUBGRADE PROVISIONS

A. Rough grading shall consist of grading to the finish grade elevations indicated on the grading plans, including, but not limited to, excavation, scarification, filling, compacting, importing, exporting, preparation of sub-grades, building pads, slopes, berms, ramps, etc. Rough grading shall also include grading to and providing the finished subgrade surface for all asphalt and cement concrete areas, building, ramps, gutters, etc. Rough grading shall be performed within a tolerance of 1/10 of a foot of the elevations indicated on the Drawings (including subgrade elevations) however, this is not to be construed as being permissible to leave the entire area 1/10 of a foot consistently high or low by that amount.

3.09 CLEANING

A. Upon completion of work in this Section, remove rubbish, trash, and debris resulting from operations. Remove unused equipment and implements of service, and leave entire area involved in a neat, clean, and acceptable condition.

END OF SECTION

SECTION 31 22 19

FINISH GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. Provide materials, labor and equipment necessary for the completion of finish grading as indicated on the Drawings and specified herein.

B. Related Sections:

1. Earth Moving, Section 31 20 00.

2. Excavation and Fill, Section 31 23 00, for Utilities and Storm Drains.

3. Operation and Maintenance of Planting, Section 32 91 00, for Landscaping Planting and Maintenance.

4. Utility Storm Water Treatment, Section 33 44 19, for Storm Water Pollution Protection.

5. Temporary Tree and Plan Protection, Section 01 56 39.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Refer to Section 31 20 00 – Earth Moving, for material for fill and planting areas, also Section 32 91 00.

PART 3 - EXECUTION

3.01 PREPARATION FOR FINISH GRADING

A. The entire area within the limits of grading as indicated on the Drawings shall be constructed to the lines, grades, elevations, slopes, and cross sections indicated on the Drawings. When the grading has been completed, the areas shall be rolled smooth with a steel tandem roller or equal.

Should low spots develop during the rolling operation, such spots shall be filled and re-rolled smooth. Slopes, banks, and drainage depressions shall present a neat, uniform appearance on completion of the work.

B. Fine grade to bring areas to required lines and grades. The subgrade elevation within the building area for slabs on grade (without a base course) shall be within 0.50- inch along a 10 foot straight edge.

C. Slope finish grades to drain surface water away from buildings, walks, paving, and other structures. Generally, grade with uniform slope between points where elevations are given, or between such points and existing grades. Excavate and grade swales to provide drainage away from and around buildings.

D. Areas to Receive Paving or Surfacing: Review plans and details for each area. See plans for paving and base course thickness. Review Drawings for sitework details.

E. Areas to Receive Topsoil and/or Planting: Where not otherwise indicated, areas outside of buildings shall be given uniform slopes between points for which finish grades are shown, or between such points and existing established grade, except that vertical curves or roundings shall be provided at abrupt changes in slope.

F. Rocks or cobbles larger than 1 inch in diameter shall not be placed in the upper 12-inches of planting area fill, and rocks or cobbles larger than 3/4-inch shall not appear on the finish graded surface.

G. Surplus or Imported Material:

1. Surplus material not needed for filling shall be removed from the site in a legal manner.

2. Provide additional earth material per Section 31 20 00, Earth Moving.

H. Preparation for Fills:

1. Prior to placing fills, the existing surface shall be scarified and recompacted to at least 95 percent maximum dry density per the ASTM D1557-12 procedure.

3.02 FIELD QUALITY CONTROL

A. Compaction of soils performed on this project shall be at least 90 percent of the maximum dry density per the ASTM D1557-09 procedure. New turf and planted areas shall be compacted to 85 percent. Aggregate bases shall be compacted to 95 percent.

B. All layout shall be performed by a qualified licensed civil engineer or surveyor.

END OF SECTION

SECTION 31 23 00

EXCAVATION AND FILL FOR STORM DRAINS AND UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Excavation and backfill for utilities and storm drains as indicated on the Drawings and specified herein, including off-site work.

1.02 REFERENCE STANDARDS

A. Title 24, California Code of Regulations, California Building Code, 2016, and County of San Diego Grading Ordinance.

B. CAL-OSHA requirements.

C. Standard Drawings of the County of San Diego.

D. The Standard Specifications for Public Works Construction, current edition.

1.03 PERFORMANCE REQUIREMENTS

A. Be fully responsible to furnish and maintain temporary barricades, warning lights, and other types of protection and to prevent accidental injury to the general public and personnel employed on the project.

B. Provide adequate cribbing, sheathing, and shoring as necessary to safely retain the earth sides of excavations and trenches from caving and other damage resulting from excavating, together with suitable forms of protection against property damage and bodily injury to personnel employed on the work and the general public. The Contractor shall be responsible for the design, for installation, and maintenance of required cribbing and shoring.

C. Protect new and existing utilities from damage during the course of installation, and repair work so damaged at no additional cost to the Owner.

1.04 PERMITS

A. Obtain permits, fees, or bonds required for the work performed under this section. Owner will pay the cost of permanent construction permits. Bonds and encroachment permits shall be paid by the Contractor.

1.05 INSPECTION AND TESTING

A. A Testing Laboratory designated by the Owner and approved by the Division of the State Architect, will be engaged to perform tests and inspections of the placing and compacting of backfills. Work shall be done in accordance with these Specifications. Costs for inspection and conforming tests shall be paid by the Owner.

B. Contractor shall be responsible for notifying the Testing Laboratory at least 48 hours in advance of the time where testing services are needed.

C. The Testing Laboratory shall submit compaction reports to the Architect, and shall notify the Architect immediately of test failures.

D. Refer to Section 01 45 23 - Testing and Inspecting Services for additional requirements.

1.06 QUALITY ASSURANCE

A. Underground utility lines shall not be covered by backfill until "As-Built" elevations and dimensions have been recorded on Record Drawings, and until the utility lines have been inspected and satisfactorily tested. As-built elevations shall be provided by the contractor's licensed surveyor. See Section 01 71 23, Field Engineering.

B. Before commencing backfilling of utilities, take photo-graphs showing relationship of below ground utilities to structure(s) or other physical reference point. Provide three-ring binder containing 5" x 7" prints of photos, and negatives categorized by locations and indicating utilities shown.

Number each photograph and provide a site plan with a location shown for each photo. The location of the number shall correlate with the place the photo was taken and the direction the camera was pointed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bedding sand shall be as defined by Standard Specifications for Public Works Construction, current Edition (Green Book) Section 202.2, and shall be free of expansive material and organic matter. Bedding material for utility lines and storm drains outside the property lines shall be as required by the agency having jurisdiction.

B. Backfill material shall be as required in Section 31 20 00 – Earth Moving. All requirements specified in that section for fill, backfill, import, and planting soil shall apply to material used for utility and storm drain trenches.

C. Engineer to enter any specific requirements from Geotechnical Report for Project.

PART 3 - EXECUTION

3.01 PREPARATION

A. Underground Utilities: Carefully lay out the route of each underground utility prior to trenching. Coordinate the work of various trades to avoid conflicts.

B. Clearances: Maintain required horizontal and vertical clearances from structural footings for utility trenches running parallel to footings. In the event of conflict the Architect shall be notified.

C. Saw cut and remove any pavement necessary for installation of all utilities shown on the plans, including architectural, landscape, civil, plumbing, electrical and low voltage. Provide new pavement to match the existing pavement removed, if not specifically shown differently on the plans. In all cases, the worst case rules.

3.02 TRENCHING

A. Excavate trenches for utilities to the required lines, grades and elevations indicated on the drawings and as specified. Hand trim changes in direction and bottoms of trenches. Accurately shape and thoroughly compact trench bottom to required grade. Keep trenches clean until installed work has been approved.

B. Trench Dimensions: For adequate pipe clearances and dimensions provide the following minimum dimensions unless otherwise required by the drawings, specifications, utility company regulations, codes, or manufacturers recommendations.

1. Pipe Depths:

a. Sewer: Minimum 30 inches plus pipe diameter plus 4 inch bedding.

b. Storm Drain: Minimum 24 inches plus pipe diameter plus 4 inch bedding.

c. Gas: 30 inches plus pipe diameter plus 4-inch bedding.

d. Domestic Water:

PVC: 36 inches plus pipe diameter plus 4 inch bedding.

Other: 36 inches plus pipe diameter plus 4 inch bedding.

e. Irrigation Water:

1) 3 inch diameter or less: 18 inches plus pipe diameter plus 2 inch bedding.

2) 4 inch diameter or more: Same as domestic water.

2. Trench Widths:

a. Sewer: 6 inches plus pipe diameter min.

b. Storm Drain: 6 inches plus pipe diameter, min..

c. Gas: 8 inches plus pipe diameter, min.

d. Domestic Water: 8 inches plus pipe diameter, min.

e. Joint Trench: Joint trenches are allowed in accordance with the current edition of the Greenbook, Standard Specifications for Public Works Construction and local jurisdiction standards. Contractor shall submit a trench plan to the project engineer for approval prior to proceeding with joint trenches not shown on the plans. Contractor cannot assume joint trenches are allowed during bidding, unless joint trenches are shown on the plans.

3.03 BEDDING

A. Lay pipe in compacted bedding sand of thickness as specified above and backfill with bedding sand to a height of 12 inches above the top of the pipe. Place sand in 6 inch

layers, compacting each lift to a minimum relative density of 90 percent. Compaction by flooding is prohibited.

B. For irrigation piping laying requirements refer to Section 32 84 00 – Planting Irrigation.

3.04 BACKFILLING

A. Backfill with approved native or import soils as specified in Article 2.01 herein.

B. Spread, water, and mix backfill to obtain optimum moisture content. Compact by mechanical means in 6 inch lifts to a minimum relative density of ninety percent (95%) in accordance with ASTM D1557-12, after the first 12-inches.

C. Continue backfilling as required to secure final grade elevations.

D. Backfill existing utilities which may be uncovered during course of construction in the same manner as specified herein for new utilities.

E. Coordinate backfilling with representative of Owner's Testing Laboratory.

3.05 CLEANUP

A. Transport unsuitable material to a legal off-site disposal area.

END OF SECTION

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes, but is not limited to the following:

1. Shoring and bracing necessary to protect existing buildings, streets, walkways, utilities and other improvements and excavation against loss of ground or caving embankments.

2. Maintenance of shoring and bracing.

3. Removal of shoring and bracing, as required.

B. Types of shoring and bracing systems include, but are not limited to, the following:

1. Steel H-section (soldier) piles.

2. Timber lagging.

3. Steel sheet piles.

C. Reference Section 31 20 00 – Earth Moving.

1.02 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.

B. Layout drawings for excavation support system and other data prepared by, or under the supervision of, a qualified professional engineer, licensed in the State of California. System design and calculations must be acceptable to local authorities having jurisdiction.

1.03 QUALITY ASSURANCE

A. Engineer Qualifications: A professional engineer legally authorized to practice in jurisdiction where Project is located, and experienced in providing successful engineering services for excavation support systems similar in extent required for this Project.

B. Supervision: Engage and assign supervision of excavation support system to a qualified professional engineer foundation consultant.

1. Submit name of engaged consultant and qualifying technical experience.

C. Regulations: Comply with codes and ordinances of governing authorities having jurisdiction.

1.04 JOB CONDITIONS

A. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

B. Survey adjacent structures and improvements, employing qualified professional engineer, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

C. During excavation, resurvey benchmarks weekly, maintaining accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident.

1.05 EXISTING UTILITIES

A. Protect existing active sewer, water, gas, electricity and other utility services and structures.

B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal and discontinuing of services.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide adequate shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

B. Structural Steel: ASTM A36.

C. Steel Sheet Piles: ASTM A328

D. Timber Lagging: Any species, rough-cut, mixed hardwood, nominal 3 inches thick, unless otherwise indicated.

PART 3 - EXECUTION

3.01 SHORING

A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

B. Shoring systems retaining earth on which the support or stability of existing structures is depending must be left in place at completion of work.

3.02 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.

C. Install internal bracing if required, to prevent spreading or distortion of braced frames.

D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

E. Remove sheeting, shoring, and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities and utilities.

F. Repair or replace, as acceptable to Architect, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION

32 00 00

EXTERIOR IMPROVEMENTS

SANTEE SCHOOL DISTRICT

SECTION 32 01 31

STABILIZED DECOMPOSED GRANITE SURFACE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section includes: Constructing a decomposed granite surface.

1.02 REFERENCES

A. American Society of Testing and Materials (ASTM):

1. C136, Method for Sieve Analysis for Fine and Coarse Aggregates.

1.03 QUALITY ASSURANCE

A. Installation shall be by a contractor and crew with at least one year of experience in placing decomposed granite with stabilizer on projects of similar nature or dollar cost.

B. Paving: Contractor shall replace without additional cost to the Agency all areas of paving which may become defective within on (1) year after date of acceptance.

C. Sterilization: Contractor shall maintain all areas of paving free of vegetation growing through from below for (90) days after date of acceptance. Any procedure required for eradication of such vegetation growth shall be done by the Contractor at no additional cost to the Agency.

1.04 SUBMITTALS

A. As specified in Section 01 33 00, and as follows:

1. Submit sieve analysis of proposed material to ensure it meets grading requirements.

2. Products: Five lb. sample and sieve analysis for grading of decomposed granite or crushed 3/8” minus aggregate. Color to be selected by Architect.

3. Sieve analysis and color of crushed aggregate screenings shall be approved in Writing by the Architect before any material is delivered to the project site.

4. Test Results: from an independent testing laboratory for compliance of gradation of decomposed granite material or 3/8” minus crushed aggregate in accordance with ASTM C136 – Method for Sieve Analysis for Fine and Coarse Aggregates.

1.05 MOCK-UPS

A. Install 4 ft. wide x 10 ft. long mock-up of decomposed granite or 3/8 inch minus crushed aggregate paving with stabilizer binder additive at location as directed by Owner’s Representative.

B. This area shall be the standard from which the work will be judged and shall it be incorporated into the work.

1.06 EXCESS MATERIALS

A. Provide Owner's Representative with the following excess materials for use in future decomposed granite or crushed 3/8" minus aggregate paving repair:

1. 40-50 lb bags of aggregate paving.
2. 1 – 40 lb. bag of the stabilizer binder additive.

1.07 PROJECT CONDITIONS

A. Use lightweight hauling equipment. Exercise care in using equipment, avoiding damage to adjacent plant and tree growth. Do not install decomposed granite or crushed 3/8" minus aggregate paving during rainy conditions or below 40 degrees and falling.

PART 2- PRODUCTS

2.01 BASE STABILIZER BINDER

A. Provide a stabilizing organic non-toxic binder, buff in color and without a marked odor. The swell volume shall have a minimum of 35 ml/g with a minimum mucilliod content of 80 percent. The light extraneous matter shall not exceed a maximum of 20 percent with the heavy extraneous matter not exceeding 5 percent. The material shall be screened with 90-100 percent passing a 200 mesh sieve. Base shall be min. 4" deep and compacted to 95% compaction. Base stabilizer binder shall be applied throughout the entire layer of decomposed granite surfacing.

B. Organic-Lock or equal, provided by:

Envirobond Products Corporation
6191-2100 Bloor Street West
Toronto, Ontario, Canada
M6S 5A5
1-866-636-8476
info@envirobond.com
www.envirobond.com
www.organic-lock.com

2.02 TOP STABILIZER BINDER

A. Provide an additional top stabilizing agent to a minimum of 1". Use Gator Stone Bond, or equal on foot traffic paths.

2.03 DECOMPOSED GRANITE OR 3/8-INCH MINUS CRUSHED AGGREGATE SCREENINGS

A. Clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from the crushing and screening of naturally friable granite. Blending of course sand with rock dust is not acceptable.

B. Crushed Stone Sieve Analysis Percentage of Weight Passing:

Square Mesh Sieve AASHTO T011-05-UL and T027-11-UL

Conform to the grading requirements shown below:

SIEVE DESIGNATION	PERCENT PASSING
3/8”	100
No. 4	95-100
No. 8 (2.36 mm)	75-80
No. 16 (1.18 mm)	55-65
No. 30 (0.600 mm)	40-50
No. 50 (0.300 mm)	25-35
No. 100 (0.150 mm)	15-20
No. 200 (0.075 mm)	10-15

C. Acceptable local supplier: Southwest Boulder & Stone, Fallbrook, California (760) 451-3333, or Gail Materials, Riverside, CA, 951-667-6106, or approved equal.

2.04 WEED CONTROL FABRIC

A. Acceptable Manufacturers: Note – needle punched material is unacceptable.

1. Typar #3401 thermally spunbonded polypropylene, non-woven, thin geotextile weed control fabric, 4.0 oz/lineal yard weight.

2. Mirafi TenCate N Series, non-woven polypropylene geotextile.

3. CSI Geotextile Fabric, polypropylene, non-woven, weed control fabric.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. Subgrade that is to receive decomposed granite shall be prepared immediately prior to placing of surfacing. After area to be paved is brought approximately to required grades, scarify to a minimum depth of 6 inches.

B. After scarifying, loosened material shall be worked to a finely divided condition and the moisture content brought to optimum by the addition of water, by the addition and blending of dry, suitable material or drying of existing material. Subgrade shall then be compacted to at least 95% standard Proctor density per ASTM D698 -12. Re-grade high and low areas to a uniform grade.

C. No placement of decomposed granite surfacing material shall be allowed until approval of subgrade by the Engineer.

3.02 INSTALLATION

A. Blending Base stabilizer: Blend a minimum 16 lbs. of stabilizer binder per ton of decomposed granite or crushed 3/8” minus aggregate screenings. It is critical that Stabilizer be thoroughly and uniformly mixed throughout decomposed or crushed 3/8” minus aggregate screenings.

B. Placement of Decomposed Granite Screenings or 3/8" Crushed Minus Aggregate Screenings: Upon thorough moisture penetration, compact aggregate screenings to 95% relative compaction by compaction equipment such as: double drum roller (2-4 ton) or single drum roller (1000 lbs.) vibratory plate tamp. Do not begin compaction for 6 hours after placement and up to 48 hours. A minimum of 4" of base shall be installed.

C. Application of Top Stabilizer: Spread 1" (minimum to reach the proper grade) decomposed granite over compacted base. Rake or screed to the desired level. Apply Gator Stone Bond using a watering can or pump sprayer, apply Gator Stone Bond to the surface at a rate of 10 square foot per gallon. Allow Gator Stone Bond to fully penetrate through the material. While the surface is still damp, but not saturated, compact the surface with a vibratory plate compactor, to a compaction of 95% of ASTM D698-12.

D. Contractor shall take precaution in compacting decomposed granite or crushed 3/8" minus aggregate screenings when adjacent to planting and irrigation systems.

E. Repairs and Protection: Remove and replace decomposed granite or crushed 3/8" minus aggregate paving that is damaged, defective or does not meet requirements of this section.

F. The final surface elevations shall not deviate more than 3 /8 in. under a 10 ft long straightedge. Rework to tolerance as required.

G. The surface elevation of decomposed granite shall be flush with adjacent paving, drainage inlets, concrete collars or headers.

3.03 BLENDING BASE STABILIZER

A. Blend 16 lbs (call manufacturer for exact blend) of stabilizer per 1-ton of decomposed granite or crushed 3/8" or ¼" minus aggregate screenings. It is critical that stabilizer binder be thoroughly and uniformly mixed throughout decomposed granite or crushed 3/8" minus aggregate screenings. Bucket blending is not acceptable. Blending with a rake and or shovel is not acceptable.

3.04 FORMS

A. Concrete, 6" metal or Redwood headers where shown shall be installed prior to placement of crushed stone material. Header shall be realigned as needed in the event it is deformed during placement and compaction.

3.05 WEED CONTROL FABRIC

A. Fabric shall be installed between the compacted subgrade and crushed aggregate screenings to prevent weeds from growing up through the crushed stone trail; pre-emergent chemicals are to be used prior to installing fabric. Place fabric across the entire surface to receive aggregate; overlap ends of rolls a minimum of 6 inches.

3.06 SOIL BASE STABILIZER

A. Thoroughly pre-blend stabilizer binder with the 3/8” minus crushed aggregate screenings, at the rate of 16 lbs. of stabilizer binder per ton of aggregate screenings prior to placing of stabilized mix. It is essential that stabilizer binder be mixed thoroughly and uniformly through the crushed aggregate screenings to achieve a successful result. The stabilizer binder locks the fines together, trapping the larger crushed aggregate screenings; stabilizer binder does not act directly on larger aggregate screenings. Blending is best accomplished with a truck-mounted mixer; a portable mechanical mixer may be used. Blend for a minimum of 15 minutes prior to placing on subgrade.

B. Drop spreading of stabilizer binder over raked crushed aggregate screenings and mixing stabilizer binder by rototilling is not acceptable.

C. Soil stabilizer shall not be applied during, just prior to, or immediately following rainfall.

3.07 PLACING CRUSHED AGGREGATE SCREENINGS

A. After pre-blending, place the stabilized crushed aggregate screenings (CAS) on prepared subgrade, and rake smooth using a steel tine rake to desired grade and cross section. Place to avoid segregation, in two layers of 2 inches maximum thickness. Do not apply CAS deeper than 2 inches in one lift. Example: For a 4 inch thickness, apply CAS in two 2 inch lifts.

3.08 WATERING

A. Water heavily to achieve full depth moisture penetration of the mix. Watering is accomplished using a garden hose with spray nozzle set to a coarse spray; pressure should not disturb leveled trail surface. A one-hour application at a rate of 20 gpm per 1,000 sq. ft. of mix surface seems to achieve the desired full depth moisture penetration. Water activates stabilizer binder; consequently, it is essential that the full depth of Stabilized material is saturated. Test for depth of water penetration by random inspection of cores. After inspection, fill core holes with material removed, smooth and hand tamp to match adjoining surface grade. (Let watered mix stand 6-24 hours until surface water is no longer present; the mix should then be moist but not wet).

3.09 BASE COMPACTION

A. While the mix is still thoroughly moist, roll with a heavy lawn roller (minimum 225 pounds and maximum 30 inch width), to achieve finish grade and initial compaction. Hand tamp edges around, signposts, tree stakes, etc. Use a heavy (1 ton minimum) small rider, after having initially used the lawn roller, to obtain the desired final dense, smooth, uniform texture.

B. Do not use wackers or vibratory rollers; the mix will not harden for weeks after vibration.

3.10 TOP STABILIZER APPLICATION.

A. After completion of base decomposed granite, apply a top coat of decomposed granite as follows: Spread 1” (minimum to reach the proper grade) decomposed granite over compacted base. Rake or screed to the desired level. Apply Gator Stone Bond using a watering can or pump sprayer, apply Gator Stone Bond to the surface at a rate of 10 square foot per gallon. Allow Gator Stone Bond to fully penetrate through the material. While the surface is still damp, but not saturated, compact the surface with a vibratory plate compactor, to a compaction of 95% of ASTM D698-12.

3.11 FINISHING

A. After finished compacted surface has been achieved, check surface to assure slope is to required grade and cross section.

3.12 INSPECTION

A. Finished surface of shall be smooth, uniform and solid, with no evidence of chipping or cracking. Dried, compacted material shall be firm all the way through with no spongy areas. Loose material shall not be present on the surface initially. After the first year of use, a minor amount of loose material is expected on the surface.

B. Loose gravel on the surface, or unconsolidated crushed aggregate screenings below the surface, is evidence of improper bonding due to poor mixing or insufficient watering. Test the loose material for adequate stabilizer binder by wetting, then tamping, and allowing it to dry. If the material is still unconsolidated, stabilizer binder did not get mixed adequately throughout the crushed aggregate screenings. If the material now is solid, initial watering was insufficient. Cracking or sponginess is evidence of excess stabilizer binder in the mix.

C. Unconsolidated areas shall be dug out, and be replaced with new crushed aggregate screenings with a high proportion of fines meeting the grading requirements of Section 2.2 above, pre-blended with stabilizer binder per the procedures listed under Section 3.7A above. Patched areas then shall be wetted thoroughly and rolled smooth. Patching shall be completed prior to any trail smoothing required.

D. Any significant irregularities shall be smoothed out prior to final acceptance of work. Smoothing shall be accomplished by rewetting/saturating rough areas thoroughly, and then rolling the trail again with a heavy roller (100-1500 lbs. powered walk-behind or small rider). Wackers are not accepted.

E. Final thickness of completed area shall not vary more than 1/2-inch from dimension indicated. Measurements may be taken by means of test holes taken at random in finished trail surface. Correct any variations in the thickness beyond the allowable 1/2-inch by repeating the procedures listed under Sections 3.7-3.11 above.

H. Edges of weed control fabric shall not be exposed to view.

3.13 WARRANTY

A. Provide a 5-year warranty against failure, cracking, separation, spalling, and weed penetration.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING AND AGGREGATE BASE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Asphaltic concrete paving as indicated on the Drawings and specified herein.

B. Principal items of Work:

1. Preparation of subgrade
2. Soil sterilization
3. Aggregate base course
4. Asphaltic surfacing materials
5. Mixing asphaltic concrete material
6. Placing asphaltic concrete pavement
7. Flood test

C. Related Sections:

1. Utility Storm Water Treatment, Section 33 44 19.

2. Earth subgrade preparation for asphaltic paving: Section 31 20 00 – Earth Moving.

3. Storm Utility Water Drains, Section 33 44 00.

4. Painting and Coating, Section 09 90 00.

1.02 PERFORMANCE REQUIREMENTS

A. Establishment of Grades:

1. The Contractor shall be responsible for finished elevation grade stakes and other surveying necessary for the layout of the Work.

2. Conduct operations in such a manner that the survey stakes shall be protected as long as their need exists. Be responsible for replacement of stakes.

3. Areas having drainage gradients of 2% or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

4. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

1.03 SUBMITTALS:

A. Provide the following:

1. Material Compliance Data Specifications.
2. Material Safety Data Specifications.
3. Copy of Installer's license.
4. Sterilization application data and purchase receipt.
5. Sample of aggregate for testing, if requested by engineer.
6. Data Sheets for seal coat and paint.

1.04 QUALITY CONTROL SUBMITTALS

A. Testing and Control of Materials:

1. Material shall meet the requirements specified herein. Laboratory tests of all of the materials will be required. If such tests meet the specified requirements, the laboratory test fees shall be paid by the Owner. If cost of subsequent tests fail to meet specified requirements, the costs of such tests shall be paid by the Contractor, and the Contractor shall immediately rectify the deficiency. Refer to Section 01 45 23 – Testing and Inspecting Services.

2. The Owner's inspector shall test the temperature of each batch of asphaltic concrete prior to placement. If asphaltic concrete temperature is not within tolerances as set forth in this Section of the Specifications the affected batch shall be rejected. Any and all costs due to the rejected asphaltic concrete shall be the responsibility of the paving contractor.

1.05 PROJECT SITE CONDITIONS

A. Protect existing installations: Such installations, which are shown on the plan or whose location could be reasonably inferred and which become damaged or broken by the operations, shall be repaired or replaced at no cost to Owner.

PART 2 - MATERIALS

2.01 MATERIALS

A. Soil Sterilization: The soils sterilant shall be in accordance with current EPA acceptable standard and the California Department of Pesticide Regulations for soils sterilant. Sterilant shall be selected as appropriate for the environment in which is it to be placed. Contractor shall be licensed with the State of California to apply sterilant.

1. Sterilant shall be commercial grade for commercial application. Contractor may obtain a list of acceptable sterilants from the District prior to bidding project.

B. Base and Aggregate Base:

1. Base and Aggregate base shall conform to the State of California, Department of Transportation (CALTRANS) Standard Specifications, Current Edition. All base, whether called out as aggregate base or base shall be in conformance with CALTRANS Section 26 for Class 2 Aggregate Base, 3/4-inch maximum. The maximum percentage of recycled material allowable shall not exceed 50% of the total volume of aggregate used.

2. Base and Aggregate Base shall be provided by a licensed commercial materials supplier. Certifications shall be submitted with each submittal. Use of on-site asphalt materials in aggregate base or base is strictly prohibited. The use of Crushed Miscellaneous Base is strictly prohibited.

3. Base depth shall be in accordance with plans and specifications. If no depth is specified, the minimum depth shall be 4".

C. Asphalt Concrete: Shall be produced by a commercial asphalt paving plant. Mineral aggregate and asphalt concrete production shall be in compliance with the State of California, Department of Transportation (CALTRANS) Standard Specifications, Current Edition.

1. Paving asphalt shall be per CALTRANS Section 39 Hot Mix Asphalt.

2. All on site paving shall be PG-64, ½" maximum Medium Grade asphalt per CALTRANS, Section 92, unless otherwise specified by the geotechnical engineer.

D. Asphalt Sealer: Sealer shall be LAS-320 by Enviroseal Corporation, 800-775-9474, or equal. Sealer cannot be installed for a minimum of 30 to 45 days after asphalt has been completed. Contractor shall account for this in his schedule. If asphalt must be striped prior to sealer, contractor shall account for sealer application and a subsequent restripe of any striping obscured by sealer.

E. All stripes and markings shall be painted with two (2) coats of pavement parking paint, v.o.c. compliant, lead free, base acrylic copolymer TSP, TT-P-115F, Type I and TT-P-85E for parking lots (yellow and white); and regular dry waterborne traffic paint (red, yellow and blue), TT-P-1952B for curbs, fire lanes, accessible striping, etc. Paint curb red at fire lanes - refer to the Fire Access Site Plan. Asphaltic concrete seal coat shall be in place a minimum of 10 days before applying paint.

1. Apply parking stall lines as indicated on the Drawings. Parking stall lines shall be 3 inches wide and white in color. Edges shall be clean and sharp.

2. Accessible Parking Stalls: Parking Spaces for persons with disabilities to be marked according to CBC Sections 11B-208, and 11B-502.

3. Loading and unloading access aisle shall be marked by a border painted blue. Within the blue border, hatched lines a maximum of 36" on center shall be painted white to contrast with the parking surface. CBC Figures 11B-502.2, 11B-502.3, 11B-502.3.3, and 11B-503.3, Blue color shall conform to Color No. 15092 per Federal Standard 595B. Paint to be slip resistant and provide a minimum 0.6 static coefficient of friction. Refer to drawings for width of painted lines and markings on pavement (3" minimum).

F. Application of Tack Coat

1. Apply tack coat at a rate of 0.05 to 0.15 gallon per square foot to cleaned contact surfaces of previously placed asphaltic concrete, abutting or projecting into asphaltic concrete paving and face of concrete curbs and walks. Protect exposed concrete.

G. Detectable Warning Area Tile: Terra Paving, ADA-3 Truncated Domes, 12 inch by 12 inch, or Armor-Tile, truncated vitrified polymer dome tiles, as distributed by White-Cap Construction Supply, CBC, 2016, Title 24, Part 2, Section 11B-705.1.2.5

1. Detectable Warnings, CBC, 2016, Title 24, Part 2, Section 11B-705.1.2.5:

a. Square grid, in-line pattern:

b. Diameter of nominal 0.9 inch (22.9mm) at base tapering to 0.45 inch (11.4) at top.

c. Nominal height of 0.2 (5.08 mm) inch.

d. Nominal center to center spacing of 2.35 (59.7 mm).

e. Color “yellow” conforming to Federal Color No. 33538 per Standard No. 595B. CBC Sections 11B-705.1.2.5 and 11B-810.5.2.

2. Provide a written five (5) year product warranty provided by the manufacturer of detectable warnings and directional surface products as equivalent to the evaluation and product approval program. Such warranty shall indicate compliance with architectural standards as published in the current edition of the California Building Standards Code, and also include durability criteria which indicates that the shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly for at least five (5) years after initial installation. Warranty will certify that the produce will not degrade significantly, meaning that the product maintains at least 90 percent of its approved design characteristics, as determined by the enforcing agency.

H. Concrete Wheel Stops

1. Provide concrete wheel stops by San Diego Precast, or equal. Concrete shall be 4000 psi in 28 days. Provide two be galvanized dowels as anchorage, and glue wheel stop to asphalt surface. Dowels shall be hot dipped galvanized, 16-inch long, #4 reinforcing. Recess head of dowel beneath the top of the wheel stop. Wheel Stop shall be a minimum length of 6-feet.

PART 3 - EXECUTION

3.01 FINAL PREPARATION OF SUBGRADE

A. Immediately prior to placing base or aggregate base, the subgrade shall be scarified to a depth of at least 12 inches, moistened, and the entire area thoroughly compacted by rolling to obtain a smooth, hard, even surface of 95 percent compaction at bus drop off and fire lane and 90 percent compaction elsewhere to receive the base or aggregate base. The subgrade shall be finished to the required grades with due allowance being made for the thickness of base course and finished surfacing to be placed thereon.

B. Subgrade for the pavement structures shall not vary more than $\pm$ 0.04 feet from the specified grade and cross section.

C. Areas inaccessible to power rolling or areas that cannot be compacted properly with power rollers shall be compacted with vibrating compactors or other suitable mechanical means which shall produce a firm foundation for the paving structure.

3.02 SOIL STERILIZATION

A. The Contractor shall take whatever precautions are necessary to prevent contamination of adjacent soil areas with sterilant and for the protection of personnel. Sterilant shall not be applied within two feet of planting areas.

B. Certification shall be furnished to the Architect, showing the purchase receipt and rate of application of the material. Payment for soil sterilization will include full compensation for application and all materials and incidental work required.

3.03 AGGREGATE BASE OR BASE

A. The base material shall be placed upon the finished subgrade after the subgrade has been properly prepared as herein specified. The base shall be placed in accordance with CALTRANS, Section 26.

3.04 DEFINITIONS

A. For the purpose of compacting procedures the following definitions are used:

1. Initial or Breakdown Rolling: The first coverage of a roller on asphalt concrete after the material has been placed to line and grade.

2. Intermediate Rolling: The rolling performed immediately after the initial rolling. When completed, the pavement should meet job density requirements.

3. Compaction Rolling: Including initial and intermediate rolling.

4. Finish Rolling: The final rolling necessary to obtain the desired surface texture and eliminate roller marks. No further densification is anticipated in this operation.

5. Coverage: The number of movements of a roller required to cover the entire width being paved at least once.

6. Steel-Wheel Roller: A 2-wheel steel tandem roller weighing 8 to 10 tons.

7. Pneumatic-tired Roller: A rubber-tired roller equipped with tires a minimum 7.50 x 15 in size, capable of being ballasted up to 12 tons.

8. Vibratory Roller: A vibratory roller capable of imparting a dynamic force of at least 21,000 pounds.

9. Maximum Laboratory Density: Density achieved on a sample of a material taken from a specific location at the job site under working conditions. This density can be obtained using the California Kneading Compactor per Test Method No. Cal. 304.

B. Prior to paving, furnish manufacturer's certificates or literature demonstrating that rollers meet requirements specified above. Prior to paving, state which procedure will be used and do not change that procedure without the Engineer's approval.

3.05 PRIMARY LIFT SPREADING AND COMPACTION

A. Asphalt concrete in excess of 2 inches in thickness, shall be placed in two (2) lifts, a primary lift, and a surface course. Surface Course shall be a minimum of 1 inch thick.

B. Asphalt concrete shall be delivered to the project site at a temperature of not less than 260 degrees F. nor more than 320 degrees F.

C. The depositing, distributing , and spreading of asphalt concrete shall be accomplished in a single, continuous operation by means of a self-propelled paving machine, motor grader, spreader box, rock spreader, or similar equipment.

D. Prior to spreading, a tack coat shall be applied to the vertical face of all curbs, gutters, and structures which will butt against the new pavement. A tack coat is required between courses if surface has been contaminated by dirt or oxidized by extended exposure. A diluted SS-type emulsion shall be used for tack coat and shall meet the requirements set forth in CALTRANS, Section 39 and Section 94.

E. Certification: Provide certification that the asphalt aggregate mixture has at least 80 percent of compacted density values equal to or greater than 96 percent - and 100 percent equal to or greater than 95 percent - of a laboratory specimen prepared by the appropriate test method from a sample taken from a truck delivering mixture to the job site. Field density of compacted asphalt concrete shall be determined by:

1. A properly calibrated nuclear asphalt testing device in the field, or

2. ASTM D1188 when slabs or cores are taken for laboratory testing. Zinc stearate may be substituted for paraffin.

3. In case of dispute, the procedure described under Sub-Item E (2.) above shall be used. Combination of rollers shall be allowed under this procedure.

F. Steel-Wheel and Pneumatic: Apply a breakdown (initial) coverage with a steel-wheel roller loaded to 10 tons. Follow by intermediate rolling consisting of a minimum of 6 coverages of a pneumatic-tired roller, the tires being inflated a minimum of 60 psi cold and a maximum of 90 psi when hot. Finish rolling may consist of one coverage of an 8-ton tandem steel-wheel roller.

G. Steel Wheel: Apply a minimum of eight coverages with a steel-wheel roller loaded to 10 tons.

H. Vibratory: Compaction shall consist of at least six coverages with a vibratory roller. Rolling from the center to the edge shall be permitted, and all compaction rolling shall be accomplished before the mix temperature falls below 185 degrees F. Rolling shall commence at least one foot from edge of the mat after which the roller shall be gradually advanced to the edges. Within one foot of edge, the roller on its initial coverage shall advance to the edge in 4-inch increments. The roller shall be advanced to a supported edge first, if applicable. Rolling within one foot of an unsupported edge should be delayed to minimize possible distortion but completed at such time that proper densities are obtained after the completion of rolling. No roller shall be permitted to stand motionless on portion of the work before it has been properly compacted.

3.06 SURFACE COURSE SPREADING AND COMPACTION

A. Surface course shall be 1-inch thick.

B. At the time of delivery to the site of work, the temperature of mixture shall not be lower than 260 degrees F., or higher than 320 degrees F. Asphalt concrete shall not be placed when the atmospheric temperature is below 40 degrees F. or during unsuitable weather.

C. The asphalt concrete shall be evenly spread upon the subgrade or base to such a depth that after rolling, it shall be of the specified cross section and grade of the course being constructed.

D. The depositing, distributing, and spreading of the asphalt concrete shall be accomplished in a single, continuous operation by means of a self-propelled mechanical spreading and finishing machine designed especially for that purpose and equipped with a screed or strike-off assembly capable of being accurately regulated and adjusted to distribute a layer of the material to a definite predetermined thickness.

E. Spreading, once commenced, must be continued without interruption. No greater amount of the mixture shall be delivered in one day than can be properly distributed and rolled during that day.

F. Compaction is the same as outlined in Paragraph 3.05, except as noted below:

1. Steel-Wheel and Pneumatic: Apply a breakdown (initial) coverage with a steel-wheel roller loaded to 10 tons. Follow by intermediate rolling consisting of a minimum of four coverages of a pneumatic-tired roller, the tires being inflated a minimum of 60 psi cold and maximum of 90 psi when hot. Finish rolling may consist of one coverage of an 8-ton tandem steel-wheel roller.

2. Steel-Wheel: Apply a minimum of six coverages with a steel-wheel roller loaded to 10 tons.

3. Vibratory: Compaction shall consist of at least four coverages with a vibratory roller.

G. As soon as the layer of asphalt concrete has been placed, it shall be thoroughly compacted by rolling. Rolling shall be commenced along the lower edge of the area to be rolled and shall be continued until the edge is thoroughly compacted, after which the roller shall be gradually advanced to the crown point, both sides being rolled in a like manner. Rolling shall be continued until the layer has become thoroughly compacted throughout and is true to grade and cross-section.

H. Maintain rollers in good mechanical condition, and those that cannot be operated without jerking, or driven along a straight path, shall not be used. No leakage of petroleum products from roller shall be allowed to come in contact with the pavements being constructed, nor shall roller be permitted to stand motionless on portion of the work before it has been properly compacted.

Rolling surfaces shall be treated with water to prevent the adherence of the asphalt concrete, but the quantity used must not be such as to be detrimental to the surface being rolled.

3.07 FLOOD TESTING

A. Flood Test: Before seal coat is applied, a water flood test shall be done in the presence of the Inspector. The flooding shall be done by water tank truck. Depressions where the water ponds to a depth of more than 1/8-inch shall be filled, or the slope corrected to provide proper drainage. The edges of the fill shall be feathered and smoothed so that the joint between the fill and the original surface is invisible.

B. Seal Coat: After completing the flood test and the pavement has cured for 30 days, all new A.C. pavement shall receive a slurry sealer applied in accordance with the manufacturer's specifications.

1. Areas to receive sealer shall be swept clean, and, before application, lightly sprayed with water, leaving it cool and damp but free of excess water.

2. Make two or more applications using a total of at least 80 square foot/gallon, min.

3. Each coat of sealer shall dry 24 hours before the succeeding coat is applied.

4. The finished surface seal, when dry and thoroughly set, shall be smooth, tough, waterproof, resilient, of uniform black color, and free from coarse textured areas, lap marks, ridges, and other surface irregularities. Should defect appear in the finished surface, apply as many additional coats of sealer as may be required to produce the specified finished surface at no additional cost. Protect from traffic during all operations and until the sealer is thoroughly set and cured and does not pick up under foot or wheeled traffic – min. of 24 hours. When cured and set, thoroughly wash off with water to remove excess residue before applying painted markings.

5. Application shall be by spray method is possible. Brush method may be used when sealer is covering existing pavement and the pavement is in poor condition. Skid-slip resistance applications using sand are not acceptable.

6. Repair any damage caused by construction traffic.

3.08 STRIPING

A. Pavement Marking Paint: Vinyl acrylic type for use on asphaltic concrete and Portland cement concrete. Pavement Marking Paint: Vinyl acrylic type for use on asphaltic concrete and Portland cement concrete. Painted lines and markings on pavement shall be 3" minimum wide and blue in color equal to Color No 15092 per Federal Standard 595B. Refer to Paragraph 2.01 D., for additional paint striping information.

B. Provide International Symbol of Accessibility for each accessible parking stall at location indicated in the Drawings. Symbol shall be 36 inches square, white on standard blue background, and ADA Accessibility Guidelines for Buildings and Facilities.

1. Parking spaces for the disabled shall be marked according to CBC Sections 11B-208, and 11B-502.

2. Refer to paragraph 2.01 D., for additional paint striping information.

C. Preparation:

1. Immediately before applying the paint, thoroughly clean the pavement surface of dust, dirt, sand, scale, water, oil, grease or other objectionable matter. Do not use solvent materials that will damage pavements as cleaning agent. Immediately before paint, give pavement surface a final cleaning by means of a power broom. Following the power brooming, use power blower containing compressed air.

2. Provide warning devices required to protect the painting operations and the finished work.

D. Application: Immediately following other preparation of the pavement surface, apply the striping at the rate of 100 to 110 square feet, per gallon of paint. Apply lines 4 inches wide unless otherwise indicated. Apply the stripe of the indicated or specified width with clean true edges and without sharp breaks. Repaint to the applicable specification portions of the stripe damaged by any type of traffic within 24 hours after the stripe has been applied.

E. Provide temporary striping where parking must be occupied prior to installation of seal coat.

3.09 CLEANUP

A. Clean up the paved areas prior to acceptance of the work. Dirt, spoil, and debris of nature shall be removed, and the entire site shall present a clean, workmanlike appearance.

B. Damage to paint work from paving or seal-coating operations shall be corrected.

END OF SECTION

SECTION 32 16 00

CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Concrete curbs, gutters, walks and pavements as indicated on the Drawings and specified herein.

B. Related Sections:

1. Preparation of Finish Grade, Section 31 22 19.

2. For testing requirements refer to Section 01 45 23 - Testing and Inspecting Services.

3. Reinforcing, Section 03 20 00.

4. Concrete, Section 03 30 00.

1.02 QUALITY ASSURANCE

A. The curbs and gutters shall be staked by a Land Surveyor licensed to practice in the State of California. See Section 01 71 23 - Field Engineering.

1.03 SUBMITTALS

A. Reinforcing bars certification and concrete mix design.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C150, Type I; Type II, or Type V, in accordance with the geotechnical report.

B. Aggregates: ASTM C33. 3/4-inch maximum for 4 inch thick slabs, conforming to CBC, 2016, Title 24, Part 2. Obtain from an approved source to insure uniform quality and grading; deliver so that moisture content variations will not decrease production of reasonably uniform concrete. Do not use aggregates that are reactive with alkalies.

1. 3/4” for Curb and Gutter

2. 3/4” for Broom Finish

3. 3/8” for sandblasted on other exposed aggregates

C. Reinforcing Steel: Bars, ASTM A615-09b, grade 60. Reinforcing steel shall be minimum of #3's at 18" o.c. each way. WWM is not acceptable. If plans are vague, or if rebar is shown at a lesser on-center or size, at a minimum the field reinforcing shall be #3's at 18" o.c. More stringent requirements may be shown on the plans and details, however, if no field rebar is specifically shown, then the contractor shall assume #3's at 18" o.c. **IN ALL CASES THE MINIMUM OR LARGER/CLOSER SPACED FIELD REBAR MUST BE PROVIDED.**

D. Dowels - "Speed Dowel" by Greenstreak 1/2" x 12" unless otherwise required by Architect. Use smooth steel dowels.

E. Curb and Gutter Expansion Joint Filler: Celotex "Flexcell," ½-inch thick or Homex 300, 1/2-inch thick.

F. Walk and Slab Expansion Joint Filler: ASTM D1751. Equal must be certified by the Green Building Council.

1. Walks and Back of Curb: 1/4" Fiberboard, W.R. Meadows or 1/4" Polyethylene, closed cell expansion joint filler by Deck-O-Foam, or Equal. *Designer to specify either fiberboard or polyethylene depending on application and location.*

G. Backer Rod - Closed Cell Polyethylene.

H. Expansion Joint Sealer: Refer to Section 07 92 00, Joint Sealants. Match color of pavement equal to Pecora Dyna Tred.

I. Water: Clean, fresh and potable.

J. Truncated Domes – Use Pre-cast Concrete Pavers by Wausau, Style ADA-3, or equal.

2.02 DESIGN REQUIREMENTS

A. Concrete Design Strength: Concrete for curbs, gutters, walks and pavement shall develop a minimum ultimate compressive strength of 3000 psi and have a water to cement ratio of 0.5 minimum, unless otherwise specified in the geotechnical report. Refer to Section 03 30 00 for all concrete requirements.

2.03 ACCEPTABLE MANUFACTURER

A. L.M. SCOFIELD COMPANY, Douglasville, Georgia and Los Angeles, California (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9051; Western Division – 323-720-3055; Central Division Office – 630-377-5959.

B. W.R. Meadows, Pomona, CA (800) 342-5976.

C. Sinak Corporation, San Diego, CA (800) 523-3147.

D. Greenstreak, St. Louis, Missouri (800) 325-9504.

E. Other equal manufacturer.

2.04 SEALING COMPOUNDS

A. Sealing Compound: For food courts: L.M. Scofield Repello; For Site Concrete: Sinak HLQ-125. Repello penetrating sealer - sealing compound shall comply with ASTM C309.

2.05 COLORS – NOT ACCEPTABLE

PART 3 - EXECUTION

3.01 PREPARATION

A. Base Course: Subgrade shall be smooth, true to line and grade, and shall be tested for required compaction prior to start of placing concrete. Dampen subgrade 24 hours before placing. Reroll as required to smooth, hard, even surface of 90 percent compaction. Wet forms to tighten cracks.

3.02 INSTALLATION

A. Formwork:

1. Stake rigidly at 4 feet on centers and secure against displacement. Formwork shall not deviate more than 1/2-inch from required vertical positions and 1 inch from required horizontal positions.

2. Carefully set forms to alignment, grade, and required dimensions. Hold forms rigidly in place by stakes, clamps, spreaders, and braces where required to insure rigidity.

3. Apply form release to form lumber in accordance with manufacturer's recommendations.

4. Place joint filler on vertical surfaces in contact with concrete paving.

B. Reinforcement: Upon completion of base course and formwork, install reinforcement where shown on the Contract Drawings.

1. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

2. Position, support, and secure reinforcement against displacement by concrete placement operations.

3. Place reinforcement to obtain the required coverages for concrete protection.

3.03 APPLICATION

A. Concrete:

1. Mixing: Transit mix the concrete in accordance with provisions of ASTM C94.

2. Conveying and Placing: Place concrete in accordance with pertinent recommendations contained in ACI 304 and with the following;

a. Deposit concrete continuously in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or places of weakness within the section.

b. Deposit and consolidate concrete in a continuous operation within the limits of construction joints until the placing of a panel or section is completed.

1) Bring surfaces to the correct level with a straight-edge, and then strike off.

2) Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows.

c. Do not sprinkle water on the plastic surface. Do not disturb the surfaces prior to start of finishing operations.

d. Do not use concrete which has become non-plastic and unworkable, which does not meet required quality control limits, or which has been contaminated by foreign materials.

3.04 CONTROL JOINTS

A. Tops of joint shall be installed flush with the concrete surface. Depth of joint shall be a minimum of 1/4 the thickness of slab. Use control joints on curbs, curbs and gutters, and cross gutters at maximum intervals of 20 feet on center. Sawed joints may be used in lieu of the above upon Architect's written approval providing they are at least 1-inch deep.

3.05 FINISHES

A. Paved areas between buildings will consist of various different finishes such as medium and heavy broom, steel trowel exposed aggregate and rock salt. See architectural drawings for specific type of finish for these areas.

B. Portland cement concrete paving shall be stable, firm, and slip resistant, and shall comply with **CBC Sections 11B-302 and 11B-403**.

C. Walks, Pavements, Stairs and Ramps: Portland cement concrete paving and concrete finishes shall have the following broom finishes:

1. Walks (Portland Cement Concrete paving and concrete finishes):

a. Slopes Less than 6%: Surfaces with a slope of less than 6 percent gradient shall be at least as slip-resistant as that described as medium broom finish, perpendicular to the direction of travel. (CBC Sections 11B-403.1, 11B-403.2, 11B-403.5.1 Exception 3, 11B-403.5.3, 11B-302.1.)

b. Slopes 6% or Greater: Surfaces with a slope of 6 percent gradient shall be slip-resistant as that described as heavy broom finish, perpendicular to the direction of travel . (CBC Sections 11B-403.1, 11B-403.2, 11B-403.5.1 Exception 3, 11B-403.5.3, 11B-302.1.)

c. Surface slopes of accessible parking spaces and access aisles shall be the minimum possible and shall not exceed 2% slope in any direction. CBC 2016 11B-502.4

2. Pavement Markings per plans and as specified below:

   a. Accessible parking spaces shall be located as near as practical to a primary entrance and shall be marked according to CBC 2016 Sections 11B-502.3.3 and 11B-502.6.

   b. Loading and unloading access aisle shall be marked by a border painted blue. Within the blue border, hatched lines a maximum of 36" on center shall be painted a color contrasting with the parking surface, preferably blue or white. CBC Figures 11B-502.2, 11B-502.3, 11B-502.3.3, and 11B-503.3.

   c. When blue color is used, it shall conform to Color No. 15092 per Federal Standard 595B.

   d. Painted lines and markings on pavement are recommended to be 3" wide minimum.

D. Gutters: Light broom finish with 3 inch wide steel trowel finish at flowlines.

E. Curbs: Steel trowel finish.

F. Stair Treads and Nosings: Provide a 2 inch wide, scored and painted line of 70% minimum contrasting color, 1-inch maximum from the edge of the nosing and extending the entire width of each tread.

G. On-Site Drive Aprons: Heavy broom finish.

3.06 CURING

A. Comply with 2016, California Building Code, Title 24, Part 2, Section 1905A.9.

   1. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing as herein specified.

   1. Provide moisture-curing by the following methods:

      a. Keep concrete surface continuously wet by covering with water.

      b. Continuous water-fog spray.

      c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.

2. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs, as follows:

   a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

   b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid, floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

C. Concrete slabs and paving shall be properly cured and protected against damage and defacement of nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water starting not later than two hours after final troweling. Surface of finish shall be kept continuously wet for at least ten days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.

D. In lieu of water curing, within 24 hours after finishing, the concrete may be cured with a clear liquid curing compound such as "Sealtight 1100-Clear" by W.R. Meadows or equal applied in accordance with manufacturer's recommendations.

3.07 OFF-SITE CONCRETE WORK

A. Concrete driveway aprons, street sidewalks, curbs and gutters, etc., indicated to be constructed outside of property lines shall conform to the standards and specifications of the public agency having jurisdiction and shall be subject to inspection by its representative. Obtain and pay for necessary permits. The Owner will pay for inspection fees.

3.08 FIELD QUALITY CONTROL

F. Flood Tests: Concrete gutters and concrete pavement shall be given a flood test in the presence of the Inspector. Concrete work where water ponds and does not run off in a reasonable amount of time, shall be removed to the nearest score or joint line and replaced to provide proper drainage.

END OF SECTION

SECTION 32 16 10

MOWCURBS AND HEADERBOARDS

PART 1 - GENERAL

1.1 Section Includes

A. Concrete mowcurbs.

B. Redwood headerboards.

1.2 Related Sections

A. Section 32 80 00 - Irrigation System

B. Section 32 90 00 – Landscaping

1.3 Submittals

A. Mix Design/Materials List:

1. Submit concrete mix design prepared by a certified batch plant or laboratory, selected by Contractor and acceptable to Owner, for review and approval.

2. Accompanying mix design, submit materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

B. Mock-up

1. Prior to installing any concrete mowcurb, construct, at an approved location on-site, an individual mock-up showing each concrete mowcurb type specified and shown on drawings. Mock-up shall include tooled joint preparation. Each mock-up shall be 4 feet long. Obtain Architect's approval of mock-up.

2. All concrete mowcurb shall match approved mock-up(s).

3. Remove mock-up after completion of work and dispose off-site.

PART 2 - PRODUCTS

2.1 Concrete Mowcurbs and Headers

A. Concrete

1. All concrete shall be transit mixed, complying with ATSM C94.

2. All concrete shall be supplied from a single source, using a single cement supplier.

3. All cement shall be Portland cement, Type II, low alkali per ASTM C150, and produced within the United States.

4. Compressive Strength: 2,800psi. Concrete is non-structural, and does not require special inspection.

5. Combined Aggregate Grading:

   a. Class C per Standard Specification Section 201-1.3.2
   b. Aggregate shall be non-reactive per ASTM C 289, and shall comply with ASTM C33, Table 3, Class 4M.

6. Cement Content: 520 pounds per cubic yard concrete

7. Slump: 4 inch maximum

8. Finish: See 3.2 below

9. Water-Cement Ratio: .58 - .60 maximum range.

10. Integral Color Admixture: None.

B. Reinforcing Steel

1. Preformed, billet steel bars, conforming to ASTM A 615-84A, Grade 40. Deliver bars new and free form rust and mill scale in original bundles with mill tags intact.

2. Reinforcing steel shall be #4 reinforcing bar.

C. Forming stakes shall be at least 1 inch by 2 inches actual dimensions, of length necessary to extend into solid earth a minimum of 12 inches.

2.2 Redwood Headerboard

A. Wood shall be 2 x 4 and 1 x 4 rough construction heart redwood, free from knots and splits.

B. Wood stakes shall be 2 x 4 x 18 inches long construction heart redwood, secured to header with 12d common galvanized nails.

2.3 Expansion Joint Material

A. Expansion joint material: W. R. Meadows or equal, Ceramar flexible foam resilient filler, full depth of header, 3/8 inch thickness or as shown on drawings.

B. Doweling shall be #4 reinforcing bar, with polyethylene closed-end sleeve at expansion joints.

2.4 Weakened Plane Joints and Scorelines

A. Saw-cut, Sof-Cut, or tooled joint technique, with maximum tooled radius edge of 1/4 inch.

B. No "zip-strip joint" products and technique permitted.

2.5 Sealant

A. Provide sealants complying with Section 07900, at locations specified or as shown on drawings.

2.6 Other Materials

A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 Surface Conditions

A. Inspection / General Instructions

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that concrete pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3. In the event of discrepancy, immediately notify the Architect.

4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

5. Whether or not shown on drawings, all turf areas shall be separated from shrub and mulch areas by a continuous concrete mowcurb or redwood headerboard, whichever is the more prevalent system used.

3.2 Concrete Mowcurb / Header Installation

A. Preparation

1. Verify sub-grade, base material, conduit, and all other embedded items are properly located in relation to concrete paving. Secure all embedded items against displacement during pour.

2. Verify all grades for pitch and fall prior to pouring pavements.

3. Verify compaction of existing subgrade complies with specifications and drawings.

4. Notify Architect 48 hours prior to placing concrete. Obtain Architect's approval of subgrade, forming, and embedded items prior to placing.

B. Forming

1. Install forms in accordance with specified tolerances.

2. Stake rigidly in place at maximum intervals of 4 feet on center. Secure so as to prevent displacement during pouring and finishing process.

3. Thoroughly clean forms, removing debris, coatings, and foreign matter. Coat forms with approved bond breaker, suitable for use on integral colored concrete without staining or discoloration.

4. Mowcurbs may be extruded if such methods are approved in advance by the Architect.

C. Placement

1. Proof roll existing sub-grade prior to installing base. Where shown on drawings, place specified base material over compacted sub-grade. Compact with hand roller or suitable alternate to minimum 95%.

2. Dampen sub-grade 24 hours prior to placing concrete.

3. Dampen forms as required to tighten joints and cracks in forming material.

D. Install per Section 303-5 of the "Standard Specifications", as specified, and as shown on drawings. Where machine formed (extruded) curbing is provided, tolerances and joint control specified for fixed form construction shall be met.

E. Provide reinforcing in accordance with detail drawings and as specified. Install deformed bar reinforcing on approved concrete or plastic supports.

F. Broom Finish:

1. Float and steel trowel surface to forming.

2. Apply broom texture, parallel to direction of curbing, and using a stiff wire or nylon bristle broom.

3. Provide light broom texture.

G. Joint Treatment

1. Provide expansion joints at locations shown on drawings, and as follows:

   a. Beginning and end of curves and large radii.
   b. Where curbing abuts walls, bollard or column penetrations, or footings.
   c. At 30 feet on center in linear measurement.
   d. Tool all edges adjacent to expansion material with maximum 1/4 inch radius tool.
   e. Provide construction joints only at expansion joints.

2. Provide control (weakened plane) joints at locations shown on drawings, and as follows:

   a. At 6 feet on center maximum.
   b. Provide control (weakened plane) joints by saw cutting method, hand-held jointing tools, or by use of Sof-Cut equipment. Use of zip-strip not acceptable.
   c. Provide maximum 1/4 inch edge radius at all joints.
   d. Extend control joints a minimum of 1-1/4 inches below surface, or 1/4 the thickness of the curbing , whichever is greatest. Provide hand-cutters, tooled joints or other approved tools for conditions where equipment cannot continue cutting to outside edge.
   e. Schedule cutting control joints as necessary to avoid raveling edge, but as necessary to avoid shrinkage cracking.

H. Sealing

1. Seal concrete with specified sealer. Do not permit overspray onto adjacent concrete paving or buildings.

3.3 Redwood Headerboard Installation

A. Wood header shall be installed according to the respective details and in strict adherence to the drawings.

B. Use 2 x 4's for straight sections and doubled 1 x 4's for curved sections. Use saw cut kerfs, evenly spaced, if required to form tight radii.

C. When applicable, header shall be taped at 5 feet maximum intervals.

3.4 Field Quality Control

A. Tolerances

1. Level: 3/16 inch plus or minus, at any point, measured along a 10 foot straight edge.

2. Adjacent surfaces: 1/8 inch maximum difference at any point between adjacent concrete pours or between curbing and adjacent paving materials.

3. Line: 1/4 inch, plus or minus, deviation from a straight line in any 10 foot length, non-cumulative.

4. Final elevations shall comply with grades as shown on drawings, to a tolerance of plus or minus 0.25 inch.

5. Tolerances do not permit violation of dimensions or grade and slopes relationships required by code or jurisdictional authority. Adjust work as required to comply with such requirements.

B. Appearance

1. Remove and replace concrete not matching approved mock-up, concrete not complying with specified tolerances, and concrete with the following defects.

a. Inconsistent texture.
b. Irregular or misaligned direction of texture.
c. Concrete with spalled or raveled control or expansion joints.
d. Concrete exhibiting splotching or discoloration in surface including discoloration due to "carbonation".
e. Concrete exhibiting cracking, including shrinkage cracking, where cracks are located between joint pattern.

2. Use of patching mortar for repair of edge defects is subject to acceptance of final color and texture by Architect. Use of patching mortar not acceptable for repair of defective integral colored concrete.

PART 4 - PAYMENT

4.1 Payment for the work of this section shall be included in the price bid for "Mowcurbs and Headerboards - Complete", and no additional compensation will be considered.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Chain link fencing, including gates, and hardware and as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete.

1.02 REFERENCE STANDARDS

Work of the section shall conform to the following 2010 California Code of Regulations:

A. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A121 – Metallic-Coated Carbon Steel Barbed Wire.

C. ASTM A123 – Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.

D. ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.

F. ASTM A491 – Aluminum-Coated Steel Chain-Link Fence Fabric.

G. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

I. ASTM B117 – Operating Salt Spray (Fog) Apparatus.

J. ASTM C94 – Ready-Mixed Concrete.

K. ASTM F567 – Installation of Chain-Link Fence.

L. FS RR-F-191 - Fencing, Wire and Post, Metal.

1.03 SUBMITTALS

A. Submit shop drawings showing application to project, including gates. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.

B. Submit manufacturer's product data with printed specifications and installation instructions.

C. Submit samples.

D. Manufacturer's certifications of compliance for chain link fabric, posts and rail.

1.04 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition. Carefully store material off the ground to provide proper protection against oxidation caused by ground moisture.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Materials shall be new and products of recognized, reputable manufacturers. Used, re-rolled or re-galvanized materials are unacceptable. Like products shall be supplied by a single source.

2.02 MATERIALS

A. Fabric: Steel fabric shall be hot-dipped galvanized before weaving with 1.2 ounces of zinc per square foot of surface conforming to ASTM A392, Class I, or aluminum coated in accordance with ASTM A491. Wire shall be 9 gauge, 2 inch diamond mesh, with selvage edges knuckled. Provide 1-3/4 inch diamond mesh at tennis courts and athletic areas. Height as indicated on drawings.

B. Tension Wire: 7 gauge galvanized spring steel with same galvanizing as fabric.

C. Framework: Shall conform to FS RR-F-191/3E Class 1, Grade A or B, or Class 3, except as herein modified.

1. Class 1, Grade A pipe shall conform to ASTM A53, except the hydrostatic test shall be waived. Galvanizing shall be in accordance with ASTM A123.

2. Grade B pipe, shall be made from steel complying with ASTM A653 Grade D or ASTM A1011. The exterior surface shall have a hot dipped zinc coating of 1.0 $\pm$ .1oz/ft^2 followed by 15 micrograms/in^2 min. chromate conversion coating and .5 $\pm$ .2 mils of clear acrylic. The interior surface shall be hot dipped zinc coated with a minimum of 1.0 $\pm$ .1 oz/ft^2, or shall be a minimum of .5 mils of zinc rich organic coating with a minimum zinc loading of 91%.

3. Class 2 Roll-Formed C-Sections shall be made from steel conforming to ASTM A1011, Grade 45 and shall be galvanized with 1.8 oz. hot dipped zinc in accordance with ASTM A123. The product of the yield strength and the section modulus of framework material shall not be less than that of pipe conforming to ASTM A53.

D. Top Rail: Steel pipe, 1.660” O.D. weighing 2.27 lb/ft; pass through intermediate post tops and form a continuous compression member from terminal to terminal of each stretch of fence. The pipe shall be in approximately 20 foot lengths and shall be joined with couplings of the outside sleeve type at least seven inches long. Top rail shall be fastened to terminal posts by heavy pressed steel connections stretched along the fence bottom and secured to terminal posts.

2.03 COMPONENTS

A. 6 Foot High Fence or Less:

1. Line Posts: 1.9" o.d. steel pipe, Class 1 Grade A or B; or 1.875" x 1.625" x 1.85 lbs/ft. Class 3.

2. Corner and Terminal Posts: 2.375" o.d. steel pipe, Class 1 Grade A or B.

3. Provide posts at 10'-0" maximum o.c. Provide top rail and bottom tension wire, as specified herein. Provide bottom rail at athletic areas.

B. 6 to 8 Foot High Fence:

1. Line Posts: 2.375" o.d. steel pipe, Class 1 Grade A or B;

2. Corner and Terminal Posts: 2.875 o.d. steel pipe, Class 1 Grade A or B.

3. Provide posts at 10'-0" maximum o.c. Provide top rail and bottom tension wire, as specified herein.

C. For Fence Heights Over 8 Feet:

1. Line Posts: 2.875" o.d. steel pipe, Class 1 Grade A or B; or 1.875" x 1.625" x 2.28 lbs/ft Class 3.

2. Corner and Terminal Posts: 4.0" o.d. steel pipe, Class 1 Grade A or B.

3. Rails and Bracing: 1.66" o.d., plain end steel pipe, Class 1, Grade A or B; or 1.625" x 1.25" x 1.35 lbs/ft Class 3. Use manufacturer's longest lengths. Join using 6" sleeves.

4. Provide posts @ 10'-0" maximum o.c. Provide top rail and bottom tension wire, as specified herein. Provide mid-rail at 12 feet high fence.

2.04 ACCESSORIES

A. Gates:

1. Gate Frame: 1.90" O.D. steel pipe Class 1, Grade A or B for welded fabrication. Welded or damaged areas shall be cleaned and coated with two coats of zinc rich paint. Provide same fabric as for fence. Install diagonal cross-bracing using 3/8" truss rods.

2. Gate Posts for Swing Gates shall be as follows:

Gate Leaf Width	Gate Post Dimensions
6' or less	2.875" O.D. - 4.64 lbs/ft
over 6' to 12'	4.000" O.D. - 6.56 lbs/ft
over 12' to 18'	6.625" O.D. - 18.02 lbs/ft
over 18' to 24'	8.625" O.D. - 27.12 lbs/ft

3. Gate Hardware: See Plans for special hardware requirements of Fire Access and Panic hardware per CBC Section 1008.2, 11B-206.5 and 11B-404.1.

   a. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC Section 11B-404.

   b. The levers of lever actuated latches or locks for accessible gates shall be curved with a return to within ½" of the gate surfaces to prevent catching on the clothing or persons. California Reference Standards Code. T-24 Part 12, Section 12-10-202, Item (F).

   c. Swing doors and gate surfaces within 10" of the finish floor or ground shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within 1/16" of the same plane as the other and be free of sharp or abrasive edges. Cavities created by added kickplates shall be capped. CBC 11B-404.2.10

4. Fittings and accessories shall be galvanized in accordance with ASTM A153, Table I.

5. Post Caps: Weathertight caps shall be supplied for each post. Shall be cast steel or malleable iron, galvanized. Caps shall have a loop to receive top rail.

B. Rolling Gates: When rolling gates are indicated, they shall be fabricated and installed complete with tracks, track wheels, double front wheel assembly, locking devices, gate bumpers, etc. Double wheels shall roll on and be supported by a continuous concrete track. Concrete shall be 8 inches thick with two #4 continuous steel reinforcing bars.

1. Rolling gate posts shall be 2.875" o.d. steel pipe weighing 5.79lb/ft. Guide posts of 2.375" o.d. steel pipe, weighing 3.65lb/ft. shall be installed in line with the gate posts. Line posts to support the tracks shall be spaced not over 5'-0" on center.

C. Provide 12" wide x 4" deep continuous flush concrete mow strips at all fencing locations.

2.05 FINISHES

A. Hot Dipped Galvanized. ASTM A153-09 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567, follow the lines, grades, and details as indicated.

B. Posts shall be set in concrete with the diameter to be four times the largest cross section of the post. The depth shall be a minimum of 24 inches plus an additional 3 inches for each 1 foot increase in fence height over 4 feet. Terminal posts shall be braced on fences 7 feet or above in height, and on fences without top rail, regardless of height.

1. Provide concrete for setting posts. Refer to paragraph 2.01A. Specification

Section 03 30 00, Cast-in-Place Concrete. Portland Cement shall be Type I, II, or V concrete per paragraph 2.01A. Specification Section 03 30 00, Cast-in-Place Concrete, and shall conform to ASTM C150. Concrete aggregates shall conform to ASTM C33. The maximum size aggregate shall be 1-1/2 inch. Mix shall be 1 part cement and 6 parts well-graded aggregate. Dig holes 3 inches deeper than bottom of post. Make slight crown at top of concrete, 2 inches minimum above finish grade, to shed water.

2. Terminal posts must not have gates hung on them.

3. Erect fencing straight and plumb, following the finish grade. Place no post in ditches, dips, or mounds.

C. Remove all excess materials, debris, rocks, dirt, concrete, etc., and rake grade to within 2 inches of the bottom of the fabric. Dispose of all debris and other refuse off-site in a legal manner.

END OF SECTION

SECTION 32 31 19

DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Steel tube fencing and gates as detailed on the Drawings and specified herein. All steel produced for this section shall be produced in the EAF method.

B. Related Sections:

1. Metal Fabrications, Section 05 50 00.
3. Concrete for post foundations: Section 03 30 00 – Cast-In-Place Concrete.

1.02 REFERENCE STANDARDS

A. In addition to mandatory compliance with governing bodies and codes having jurisdiction over the project, provide materials complying with the following standards and industry recommendations: ASTM A36, A47, A48, A53, A108, A283, A312, A314, A325, A475, A500, A554, A569, A653, A663, A743, A1008, A1011, B108, B209, B221, SSPC, NAAMM, AND AA.

B. Materials shall conform to CBC 2016, Title 24, Part 2, Chapter 22A (Steel).

1.03 SUBMITTALS

A. Submit fabrication shop drawings on items to be provided.

B. Where other than mill finishes are specified, provide samples of required finish which will be reviewed for color, texture, style, and finish.

C. Submit mill test reports and chemical analyses of materials bearing heat numbers not required to be tested, in accordance with other sections of these specifications.

D. Submit testing results in accordance with other sections of these specifications.

1. The Owner reserves the right to reject materials, installed or not, which exhibit defects or do not pass inspections or tests.

E. Submit EAF, Electric Arc Furnace certification for steel manufacturer.

1.04 SOURCE QUALITY CONTROL

A. Inspection and Testing: At the option of the District

1. Testing and Inspection for steel, welding and fabrication shall be in accordance with CBC 2016, Title 24, Part 2, Volume 2, Chapter 17A (Structural Tests and Special Inspections).

2. Shop Welding: Ensure that shop welding is performed in an approved, licensed shop. Continuous inspection shall be required.

3. Field Welding: Stress-carrying welds are to be inspected by a qualified welding inspector. Inspections will be paid for by Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Structural steel shall comply with ASTM A36 and requirements of CBC 2016, Title 24, Part 2, Chapter 22A (Steel).

B. Steel Plates, Shapes and Bars: ASTM A36

C. Steel Plates to be Bent or Cold-Formed: ASTM A283, Grade C.

D. Steel Bars and Bar-Sized Shapes: ASTM A36

E. Steel Tubing (Cold-Formed, Welded or Seamless): ASTM A500, Grade B.

F. Cold-Finished Steel Bars: ASTM A108, grade selected by fabricator.

G. Hot-Roller-Carbon Sheets: ASTM A1008.

H. Cold-Rolled Carbon Steel Sheets: ASTM A569.

I. Galvanized Carbon Steel Sheets: ASTM A526, with ASTM A653, G90 zinc coating.

J. Gray Iron Castings: ASTM A48, Class 30.

K. Malleable Iron Castings: ASTM A47, grade as selected.

L. Steel Pipe: ASTM A53, type as selected, Grade B, black finish, standard weight schedule 40.

M. Shop Primer: Tnemec Series 10, or other approved.

N. Arc Welding Electrodes: ISO 2560-B

O. Galvanizing Repair Compound: ZRC Galvilite, or equal. High zinc dust content galvanizing repair paint conforming to ASTM A780, SSPC-Paint 20 and DOD-P-21035A or hot applied zinc rich material.

2.02 FABRICATION

A. Verify actual field dimensions prior to fabrication.

B. Fabricate items with joints neatly fitted and properly secured.

C. Fit and shop assemble in largest practical sections for delivery to site.

D. Welding: welding shall comply with CBC 2016, Title 24, Part 2, Section 2210. Employ certified welders in accordance with AWS QC7-93. Grind exposed welds smooth and flush with adjacent finished surfaces. Defective welds must be cut out and replaced. All welds shall be continuous. Spot and tack welds will be rejected.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts unobtrusively located, consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints flush butt type hair-line joints where mechanically fastened.

G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified or shown.

H. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to galvanizing.

I. Galvanize ferrous metal fabrications. Do not shop prime surfaces in direct contact with concrete or other cementitious materials, or requiring field welding. Shop prime in two coats. Provide minimum G90 galvanized coating where galvanizing is required.

J. Provide all welded fabrication for mounting hardware and signage as indicated on Drawings. Coordinate with section 08 71 00, Door Hardware and section 10 14 00, Signage.

1. Include all hardware for a complete installation.

2. For Gate finish hardware, refer to details on Drawings and chain link fencing in specifications section 32 31 13, Part 2, subsection 2.04A, paragraphs 3.a. and 3.b.

2.03 FINISH-BASED ON FRAZEE PAINTS

A. <u>New Galvanized Metal</u>

Pretreatment	GLL Clean & Etch
1st coat	SW ProCryl Acrylic Metal Primer
2nd coat	SW ProIndustrial WB Alkyd Urethane Gloss
3rd coat (to cover*)	SW ProIndustrial WB Alkyd Urethane Gloss

2.04 ACCESSORIES

A. Provide 12” wide x 4” deep continuous flush concrete mow strips at all fencing locations.

2.05 ACCESSIBILITY

A. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with **CBC Section 11B-404**

B. The lever of lever actuated latches or locks for an accessible gate shall be curved with a return to within ½” of the (face of) gate to prevent catching on the clothing or persons, per **California Referenced Standards code, Title 24 Part 12, Section 12-10-202, Item (F)**.

C. Swing doors and gate surfaces within 10” of the finish floor or ground shall have a smooth surface on the push-side, extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within 1/16” of the same plane as the other, and be free of sharp or abrasive edges. Cavities created by added kick plates shall be capped, in accordance with **CBC Section 11B-404.2.10**.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Surface Conditions: Inspect surfaces and work in place by others, and verify that such work is in a condition appropriate to receive work of this section. Do not apply or install work of this section until unsatisfactory work of others is in a condition which will ensure the correct installation of materials and products of this section.

3.02 INSTALLATION

A. Obtain approval of Architect prior to site cutting or making adjustments which are not part of intended work, or are not shown on Shop Drawings.

B. Install items square and level, accurately fitted and free from distortion and defects.

C. Make provisions for erection stresses by temporary bracing. Keep work in alignment.

D. Replace items damaged during installation.

E. Perform field welding in accordance with AWS D1.1.

F. Touch up all galvanized finish damaged due to installation, welding, threading or other work with galvanizing repair compound. Prepare surfaces to receive compound by grinding to bare metal or by chemically etching. Compound shall be applied in multiple coats to achieve a minimum dry film thickness of 8 mils.

G. Supply and assist with setting items requiring to be cast into concrete, or embedded in masonry, complete with necessary setting templates.

3.03 CLEANING

A. Clean site after work of this section.

B. Remove weld splatters.

C. Use galvanizing repair coating specified, then re-prime areas of materials damaged during installation and other construction activities.

END OF SECTION

SECTION 32 84 00

PLANTING IRRIGATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section covers the furnishings of all materials and performing all operations to provide a complete operable Landscape Irrigation System as directed on the drawings including the following:

1. Trenching, stockpiling excavated material and refilling trenches.

2. Irrigation System components including but not limited to: piping, valves, fittings, rotors, spray heads, wiring and final adjustments as determined by the Owner or Owner's Representative to insure efficient and uniform distribution.

3. Testing and inspection of Irrigation System.

4. Clean up and maintenance.

B. Related Sections include the following:

1. Division 33 Section "Water Distribution" for water supply piping, water meters, and backflow preventers.

2. Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3. Division 31 Section "Site Clearing."

4. Division 32 Section "Tree Protection."

5. Division 32 Section "Landscape Planting" for landscaping.

6. Division 32 Section "Asphalt Paving" for cutting and patching asphalt paving.

7. Division 32 Section "Curbs Gutters Sidewalks & Driveways" for cutting and patching concrete paving.

1.03 DEFINITIONS

A. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Pressure Piping: Downstream from point of connection to water distribution piping to and including control valves. Piping is under water distribution system pressure.

C. The following are industry abbreviations for plastic materials.

1. ABS: Acrylonitrile-butadiene-styrene plastic
2. NP: Nylon plastic
3. PE: Polyethylene plastic
4. PP: Polypropylene plastic
5. PTEF: Polytetrafluoroethylene plastic
6. PVC: Polyvinyl chloride plastic

1.04 GENERAL REQUIREMENTS

A. Code Requirements shall be those of State and Municipal Codes and Regulations locally governing this work, providing that any requirements of the Drawings and Specifications, not conflicting therewith but exceeding the Code Requirements shall govern, unless written permission to the contrary is granted by the Architect.

B. Conform to the requirements of the reference information listed below except where more stringent requirements are shown or specified in the most current set of construction documents:

1. American Society for Testing Material (ASTM), for test methods specifically referenced in this section.

2. Underwriter's Laboratories (UL), for UL wires and cables.

3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

4. Comply with requirements the City of San Diego Water Utilities Department for preventing backflow and back siphonage.

5. Comply with ASTM F645, "Guide for Selection, Design, and Installation of Thermoplastic Water- Pressure Piping Systems."

6. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.

7. Furnish plastic pipe and fittings permanently marked with size, class, and type of pipe, working pressure at 73.4 degrees F, and National Sanitation Foundation (NSF) rating.

C. A licensed and bonded plumbing contractor shall execute work involving substantial plumbing for installation of copper piping, backflow prevention devices and other related work. Obtain any necessary permits prior to beginning work.

D. Specified depths of pressure supply lines, laterals and pitch of pipes as stated in this section are minimums. Settlement of trenches lower than grades specified on the final grading plans is cause for removal of finish grade treatment, refilling trenches, recompacting and repairing of finish grade treatment.

E. Follow current printed manufacturer's specifications and drawings for items or information not specified or graphically indicated in the most current set of construction drawings.

F. Dimensions indicated are approximate. It is not possible to indicate all required offsets, fittings and other related equipment graphically on the construction drawings. Contractor shall be responsible for minor changes caused by actual site conditions. Before proceeding with any work, Contractor shall carefully check and verify all dimensions of related architectural elements, utilities and landscaping; and furnish and install required fittings.

G. Do not install the irrigation system as shown on the construction drawings when it is obvious that actual field conditions such as physical obstructions, grading discrepancies and field dimensions vary from those recorded on the construction drawings. Immediately bring any such discrepancies to the attention of the Owner or Owner's Representative prior to proceeding with work. If immediate notification is not given and such discrepancies exist, Contractor shall assume full responsibility for necessary revisions, as determined by the Owner or Owner's Representative.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Exercise caution in handling, loading and storing of plastic pipe and fittings to avoid damage.

B. Transport pipe in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undue bending or concentrated external load at any point. Support pipe during storage from sagging and bending. Store plastic piping protected from direct sunlight.

C. Discard pipe that has been dented or damaged unless such dent or damaged section is cut and rejoined with a coupling.

D. Protect valves, fittings, and specialties from moisture, dirt, and other possible contaminants.

1.06 SEQUENCING AND SCHEDULING

A. Install landscape headers, sidewalks, and mowing strips before installation of sprinkler system. Sleeves and mainlines under paving shall be in place before paving construction.

B. Specimen trees (24 inches box and larger) shall be installed before the location of the irrigation system.

C. Coordinate lawn sprinkler piping with utility work.

D. Obtain permission, in writing, from the Owner at least 2 working days before shutting off existing in-use water lines. Contractor shall receive instructions from the Owner as to the exact length of time of each shut-off. Notify the Owner's Landscape Inspector of said intent.

1.07 EXISTING FIELD CONDITIONS

A. Preserve and protect all existing trees, plants, monuments, structures, hardscape and architectural elements from damage due to work in this section. In the event that damage does occur to inanimate object and structures, Contractor shall repair or replace such damage to the satisfaction of the Owner or Owner's Representative. Contractor at Contractor's expense shall replace damaged or injured living plant material.

B. Trenching or other work required in this section under the limb spread of existing trees shall be done by hand or by other methods so as to prevent damage or harm to limbs, branches and roots.

C. Trenching in areas where root diameter exceeds 2 inches shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in proximity to roots that are less than 2 inches, the wall of the trench shall be hand trimmed, making clean cuts through roots.

D. Trenches adjacent to or under existing trees shall be closed within 24 hours. When this is not possible, the side of trench closest to the tree or trees affected shall be covered with moistened burlap.

E. Protect, maintain and coordinate work with other contracts, specifications, trades, and utilities. Exercise extreme care in excavating and working in areas where utilities exist. Contractor shall be responsible for damages caused by its operations. In the event that damage does occur, Contractor shall pay the costs of such repairs.

F. Use caution where trenches and piping cross existing roadways, sidewalks, hardscape, paths or curbs. Contractor shall be responsible for damages caused by its operations.

1.08 REQUIRED DOCUMENTS

A. Service Manuals

1. Submit, prior to beginning construction, a list of irrigation equipment to be used, accompanied by manufacturer's catalog data, specifications, or other literature clearly indicating compliance with specification requirements for each item.

2. Furnish (4) four service manuals to the Owner prior to scheduling a walk through for Substantial Completion. Submit manuals in bound form complete with a table of contents, copy of contractor's warranty, and workmanship form on company letterhead. Manuals shall contain complete large-scale drawings of all installed equipment showing component warranties and catalog numbers together with the manufacturer's name and address. Manuals shall include operation instructions. Manuals shall be subject to approval by the Owner or Owner's Representative as to completeness.

B. Record Drawings

1. Prior to beginning work in the field, secure a complete set of irrigation plans, details, and specifications on reproducible drawings at the original scale. Contractor shall be responsible for making a set of blueline prints for every week on the project. At the end of each working day, Contractor shall record all work accomplished for that day on the set of blueline prints in red ink. These record drawings shall be brought up to date at the end of each workweek by a qualified draftsperson. The drawings should indicate the following:

    a. Any zoning changes.

    b. Dimension from two permanent points of reference (building corners, fixed hardscape corners, road intersections, permanent existing utilities) the location of the following items:

        1) Connection to existing water lines

        2) Routing of pressure supply lines at every 100 feet along routing.

        3) Isolation ball valves

        4) Quick coupling devices

        5) Air release valves

        6) Electric control valves

        7) Check valves

        8) Control wire routing (if routed separately from pressure supply line)

        9) Other equipment as directed by Owner.

2. Prior to scheduling a walk through for Substantial Completion, provide a record set of field drawings as described above to the Owner for review. After review, the Owner will return the set to the field foreman requesting further information or will notify that the record set of field drawings are complete. After approval from the owner, a walk through for Substantial Completion may be scheduled.

3. Prior to scheduling the final walk through, the final set of irrigation record drawings shall be professionally drafted.

4. Contractor is responsible for delivering the final set of record drawings to the Owner or Owner's Representative prior to initiating the maintenance period.

C. Controller Charts

1. Provide drawings for each controller unit installed on the project. The controller drawings shall be an actual blue print reduction of the area covered by that controller unit and shall be at the maximum allowable scale that will fit inside the controller door without folding the drawing. The chart shall be a plot plan, entire or partial, showing building(s), walks, roads and walls. Drawings shall show valves and sprinkler heads serviced by that particular controller identifying each station by separate color. Number valves shall match the operation schedule and the drawings. All zones controlled by a controller shall be included on a

single sheet. Only those areas controlled by that controller shall be shown. District's Landscape Inspector shall review this print prior to submittal. It shall be hermetically sealed by plastic, and then be secured to the inside door of the controller enclosure.

2. Prepare and submit additional copies of color coded controller drawings as follows: two –11 inches x 17 inches laminated copies, one - 8 inches x 11 inches laminated copy, and one - 11 inches x 17 inches non-laminated copy.

3. Submit controller charts to the Owner or Owner's representative prior to requesting a walk-thru for substantial completion.

1.09 WARRANTY

A. Contractor shall warrant materials against defects and guarantee workmanship for the period of one year. Contractor shall be responsible for coordinating warranty items with manufacturer/distributor and Owner.

B. Settlement of trenches, which may occur during the one-year warranty period, shall be repaired by Contractor at no expense to the Owner.

1.10 EXTRA STOCK AND EQUIPMENT CERTIFICATIONS

A. Prior to a release of responsibility, schedule a walk through with the Owner or Owner's representative and disclose and provide the following:

1. Five (5) bubblers and pop-up spray heads with nozzles and screens of each type used, for every 100 pop-up spray heads installed on the project. Five (5) pup-up spray heads with nozzles and screens, minimum. One bubbler with screen, minimum.

2. Five (5) rotor heads with nozzles of each type used, for every 100 rotors installed on the project. Five (5) rotor heads with nozzles, minimum.

3. Two (2) Quick Coupler keys with 90 degree swivel and hose bib attachment, for type and size of quick coupling valve used on project.

4. Two (2) sets of the required equipment specific specialty tools for removing, disassembling and adjusting each type of rotor or sprinkler head, isolation valve, and electric control valve used on the project.

5. All manufacturers' rebate certificates (bonus dollars).

6. One (1) nickel-chrome plated 16-gauge steel 36 inches tube sampler soil probe, as manufactured by Oakfield or approved equal.

7. All manufacturer's warranty information stating length of warranty and how to exercise warranty on all valves, irrigation controllers and sprinkler heads.

8. One (1) operation key for cross handle isolation valves.

9. One (1) operation key for 2" square nut isolation gate valves.

10. Five (5) spare keys matching equipment enclosure locks used.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The design of the irrigation system is based on the manufacturers and products specified herein or indicated on the Drawings. Substitutions will be permitted only with the Architect or District Landscape Inspector's approval. Where such substitution will change the coverage or flow rates of the sprinkler heads, the request for substitution shall include layout plans showing revised sprinkler head locations. Such revised layout plans shall provide coverages and watering rates equivalent to those indicated. The District's Landscape Inspector shall be notified of any design changes or substitutions.

2.02 PIPING – SCHEDULE 1

A. General Piping:

1. Pipe sizes shown are nominal inside diameter unless otherwise noted.
2. Pipe shall be identified with the following indelible markings:

a. Manufacturer's name
b. Nominal pipe size
c. Schedule or class
d. Pressure rating
e. NSF (National Sanitation Foundation) seal of approval
f. Date of extrusion

2.03 Solvent Weld Pressure Supply Line – PROJECT DATA SHEET 1

A. Solvent Weld Pressure Supply Line: (downstream of Backflow prevention device) shall be PVC schedule 40 conforming to ASTM D1785-12 for pipe sizes 3/4" through 1 1/2", and PVC Class 315 BE (SDR 13.5) conforming to ASTM D2241 for pipe sizes 2" and larger.

1. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B.

2. Type 1, Grade 1.

B. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.

1. Threads- Injection molded type (where required)
2. Tees and Ells- side gated
3. Expansive couplings are not allowed by the District.

C. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads

D. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings

2.04 Non-pressure Lateral Lines – PROJECT DATA SHEET 2

A. Non-Pressure Lateral Lines: (downstream of electric remote control valve) PVC Schedule 40, conforming to ASTM D1785-12.

B. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.

1. Threads- Injection molded type (where required)

2. Tees and Ells-side gated

3. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

C. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings

2.05 Sleeving and Conduit – PRODUCT DATA SHEET 3

A. All sleeving for pressure supply line and non-pressure supply lines shall be twice the nominal size of the pipe within, minimum.

B. Sleeving and Conduit Material:

1. PVC SCH 40 for 1" to 2½" pressure supply line.

2. PVC SCH 40 for non-pressure lines.

3. (1) one ¾" PVC SCH 40 conduit for up to 5 wires.

4. (1) one 1" PVC SCH 40 conduit for up to 8 wires.

5. (1) one 1¼" PVC SCH 40 conduit for up to 15 wires.

2.06 Copper Pipe and Fittings – PRODUCT DATA SHEET 4

A. Pressure supply line or Non-Pressure lateral line in structure (per mechanical, structural or mechanical engineers plans): Type K Copper hard tempered, in accordance with ASTM B42-10.

B. Fittings: Wrought copper, solder joint type.

C. Joints: Solder shall be made up of 45% silver, 15% copper, 16% zinc and 24% cadmium and solids at 1125° F and liquids at 1145° F.

2.07 Brass Pipe and Fittings – PRODUCT DATA SHEET 5

A. Pressure Supply line (from point of connection through Backflow Prevention Device) Brass pipe shall be regular weight, 85% red brass, ANSI Schedule 40 screwed pipe.

B. Fittings: Medium brass, screwed at 125 pound class.

2.08 ISOLATION VALVES – SCHEDULE 7

A. Isolation Gate Valve – PRODUCT DATA SHEET 1: Bronze, screw-in-bonnet, non-rising stem, cross handle, solid wedge, threaded valve as manufactured by Nibco model T-113-K, or approved equal. Ball type isolation valves shall not be considered by the District.

B. Isolation Gate Valve – PRODUCT DATA SHEET 2: Iron bolted bonnet with 2" square operating nut, non-rising stem, resilient wedge type, soft seat, flanged end epoxy coated, bronze trimmed iron body. (Use on pipe 3" and greater) as manufactured by Nibco model F-619-RW flanged, or approved equal.

C. All isolation valves shall be set in a valve box in accordance with Section 3.15 and SCHEDULE 11 – VALVE BOXES. Mark all isolation valves with "GV" on lid.

2.09 QUICK COUPLING VALVES – SCHEDULE 8

A. Quick Coupler Assembly – PRODUCT DATA SHEET 1: Two-piece unit consisting of a coupler water seal valve assembly and a removable quick connecting coupler key designed to allow spring and key track to be serviced without shutdown of main. A positive, watertight connection shall be made between coupler key and valve.

1. Coupler Valve: Double lugged type, 1 inch size, designed to withstand a working pressure of 150 psi. Bodies of valves shall be red brass. Provide valves with lockable hinged covers with springs for positive closure on key removal. Covers shall be red brass with a permanently bonded rubber-like vinyl cover, yellow in color. Manufactured by Rain Bird Manufacturing Corporation, model 44-LRC.

2. Quick Coupler Key: Brass or bronze with a hose bib assembly.

2.10 ELECTRIC CONTROL VALVES – SCHEDULE 9

A. Remote Control Valves – PRODUCT DATA SHEET 1: Valve shall be as manufactured by Rainbird Manufacturing Corporation, GB Series, brass (without pressure regulator option), no substitutions. Control Valves shall be set in a valve box per Section 3.15 and SCHEDULE 11 – VALVE BOXES in this specification. Mark all control valve boxes with station number.

B. Valve identification tags – PRODUCT DATA SHEET 2: Shall be pre-printed, double sided standard yellow tags as manufactured by Christy's or approved equal.

2.11 CHECK VALVES – SCHEDULE 10

A. Swing Check Valves – PRODUCT DATA SHEET 1: Brass or bronze 100 pound class for non-pressurized lines.

B. Spring Check Valves – PRODUCT DATA SHEET 2: King Brothers KC-XXX-S, PVC, Thread x Thread, stainless steel internal parts and adjustable spring tension from 4 to 15 psi, to prevent low sprinkler head drainage.

2.12 VALVE BOXES – SCHEDULE 11 – PRODUCT DATA SHEET 1

A. Valve Boxes: Boxes adjacent to paved areas subject to vehicular traffic shall be precast concrete with cast iron lids designed to resist vehicular traffic. Concrete valve boxes shall have lockable covers. Boxes in all other areas shall be plastic valve boxes as follows:

B. Quick Couplers, Isolation Gate Valves, Manifold Ball Valves, Spare Wire Boxes and Pull Boxes: Round 10" diameter valve box, green in color, with stainless steel hex bolt, including washer, size and type to secure lid. Carson L Series 910 with "T" cover manufactured by Oldcastle Precast, Inc. or approved equal.

C. Electric Control Valves, Flow sensors, and Master Valves: Rectangular 12" valve box, green in color, with stainless steel hex bolt, including washer, size and type to secure lid. As manufactured by Carson-Brooks Series 1419-12-2B hinged cover or approved equal.

2.13 SPRAY HEADS AND ROTORS – SCHEDULE 12

A. Pop-up Spray Type – PRODUCT DATA SHEET 1: Full or part circle pop-up spray type sprinkler body, stem, nozzle and screen constructed of heavy-duty plastic. The sprinkler shall have a soft wiper seal for cleaning debris from pop-up stem as it retracts into case

to prevent sprinkler from sticking up. The sprinkler shall have a matched precipitation rate plastic nozzle with an adjusting screw capable of regulating the radius and flow. The sprinkler shall have a strong stainless steel retract spring for positive pop down. Pop-up height shall be as indicated on plans. The sprinkler head shall have a screen under the nozzle to protect it from clogging and for easy removal for cleaning and flushing system. The sprinkler head shall have a bottom inlet and may have a side inlet for ease of installation. Use only the bottom inlet for sprinkler heads equipped with anti-drain devices. Manufactured by Rainbird 1800-SAM series (without the PRS option), or approved equal.

B. Fixed Shrub Spray Type – PRODUCT DATA SHEET 2: Full or part circle fixed shrub spray type sprinkler, three-piece design including a screen. The sprinkler body and nozzle shall be molded of plastic. The sprinkler nozzle shall be of same type as described above.

C. Pop-up Rotary Type – PRODUCT DATA SHEET 3: Rotary sprinkler of the gear driven type. Nozzles shall be available for true matched precipitation rates.

1. The sprinkler shall be available in adjustable arc or in full or part circle configuration. The adjustable arc sprinkler shall be adjustable from 40 degrees to 360 degrees in 1-degree increments. Adjustments shall be made from the top of the riser assembly in either the up or down position. The part circle unit shall be a fixed arc type available in 90 degree and 180 degree arcs.

2. The pop-up sprinkler shall be of height as indicated on plans. Nozzle shall be integrally molded multiple orifice type that can be changed with tools included. Radius shall be adjustable by means of a movable diffuser pin. Nozzle turret shall be molded with a service indentation to accept a tool for raising nozzle piston for service.

3. The sprinkler shall have a 3/4 or 1 inch NPT inlet and shall be accessible by a threaded cap for easy service.

4. The body of the sprinkler shall be constructed of non-corrosive heavy duty ABS. The sprinkler shall be equipped with a filter screen for debris stoppage. The sprinkler shall be equipped with a stainless steel riser. The sprinkler shall also be available in shrub model with the same nozzle package. The sprinkler shall carry a 2-year unconditional warranty.

5. All sprinkler heads with similar functions shall be of common manufacture and, with the exception of shrubbery heads, shall be marked with the manufacturer's name and identification in a position where they may be identified without being removed from the system.

6. Anti-Vandal Apparatus shall be as follows or equal approved in accordance with Section 01 25 00 Substitution Procedures: Hunter 120.

7. Swing Joints for 3/4” and larger sprinkler inlet size shall be pre-assembled, schedule 40 with ACME O-ring sealed threads, with 8” minimum lay length, as manufactured by Lasco or approved equal. Swing joints assemblies for 1/2” sprinkler inlets shall use three marlex street ells with schedule 80 nipple, minimum length of 6”.

2.14 SAND BEDDING – SCHEDULE 17 – PRODUCT DATA SHEET 1

A. Sand bedding on all pipe shall be clean construction grade type.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine field conditions prior to beginning the work of this section. Grading operations shall be completed and approved prior to beginning work.

B. Verify all sleeve locations prior to beginning work in this section. Flag all existing sleeves and conduits installed by other trades. Report any conflicts and discrepancies to the Owner's Representative immediately.

C. Verify location of existing underground utilities, valves, manholes, catch basins, and other appurtenances that will affect the layout of the sprinkler system. Verify location of existing trees, new specimen trees, and other obstructions that will affect the layout of the sprinkler system. Verify location of stub outs and points of connection to the water supply system.

3.02 PREPARATION

A. Locations of piping and equipment indicated on plans are diagrammatic and approximate and shall be adjusted as necessary and as directed to meet existing conditions and obtain complete water coverage. Contractor is responsible for irrigation system operation and complete coverage of the system. Report any conflicts and discrepancies to the Architect and District Landscape Inspector immediately.

B. Sprinkler lines shall have a minimum clearance of 6 inches from each other and from other utility lines. Do not install parallel lines directly over one another.

C. Construct irrigation system to the sizes and grades at the locations indicated. Mark with powdered lime or marking paint routing of pressure supply line and stake the location of each spray head, rotor, drip valve assembly, flush valve assembly, electric control valve and other related equipment for the first three zones. Owner's Representative shall review staking and direct any necessary changes with Contractor prior to proceeding to other zones. This review does not in any way alleviate Contractor from the responsibilities associated with proper uniformity and distribution of head placement after staking.

D. Install sleeves to accommodate pipes and wires under paving, hardscape areas, sidewalks, and paths prior to asphalt and concrete operations. Compact backfill around sleeves to 95% Modified Proctor Density within 2% of optimum moisture content in accordance with ASTM D1557. Where not yet utilized, close sleeve ends with cloth duct tape.

3.03 EXCAVATION AND BACKFILLING OF TRENCHES

A. Follow layout indicated on drawings as closely as possible in excavating trenches. Trenches shall be straight in alignment and support pipe continuously on bottom of trench. Remove rocks and debris greater than 1" in diameter. Over excavate as required for bedding material.

B. Depth of Trench (in landscape areas):

1. Pressure Supply Line: 18" from top of pipe to finish grade.

2. Non-Pressure Line (for all rotor sprinkler heads and 12” popup heads): 18" from top of pipe to finish grade.

3. Non-Pressure Line (for all non-rotor sprinkler heads and 6” popup heads): 12" from top of pipe to finish grade.

4. Control Wiring: directly at side and bottom of pressure supply line.

5. Pressure Supply line Locator Tape: above pipe, 6" below finish grade, (at a maximum depth of 12”).

C. Depth of Trench (under asphalt paving or concrete, pipe and wires to be in sleeving):

1. Pressure Supply Line: 36” from top of finish grade to top of sleeve.

2. Non-Pressure Line: 24” from top of finish grade to top of sleeve.

3. Control Wiring: Directly at side and bottom of pressure supply line.

4. Pressure Supply Line Locater Tape: Above pipe, 6” below finish grade, at a maximum depth of 12”.

5. Piping located under asphalt paving or concrete shall be installed with the appropriate sized sleeve. Backfilled with sand bedding (6" below pipe and 6" above pipe).

D. Width of Trench:

1. Pipe greater than 3”: 14” minimum.
2. Pipe less than 3”: 7” minimum.

E. Width Between Trenches:

1. Irrigation trench to irrigation trench: 6” minimum.
2. Irrigation trench to other trade trenches: 12” minimum.

F. Sleeves: Provide appropriate sized sleeves for piping located under asphalt paving or concrete.

G. Backfilling: Backfilling of trenches shall not be done until all required testing for the irrigation system has been completed.

1. Material: Excavated material is generally considered to be adequate for backfilling operations. Before beginning the backfilling operation, insure that backfill material is free from debris and rocks greater than 1" in diameter, and is not mixed with topsoil. These materials after separated from backfill, shall be legally disposed of at Contractor's expense.

2. Bed pressure supply line with construction grade sand 6" above and 6" below pipe. Remaining backfill shall be as described above.

3. Bed all electrical control wire and communication cable wire, trenched separate from pressure supply line, with construction grade sand 6" above and 6" below wires.

4. Bed all sleeves with sand bedding with construction grade sand 6” above and 6” below pipe sleeves.

5. Set in place, cap and pressure test piping in the presence of the Owner’s Representative prior to backfilling.

6. Compact backfill to a 90% maximum density in accordance with ASTM D1557 with a mechanical tamper. Do not leave trenches open for a period greater than 48 hours. Open trenches shall be protected in accordance with current OSHA regulations. Slightly mound filled trenches for settlement after backfilling is compacted.

7. Smooth trenches to match surrounding finish grade prior to requesting walk through for Substantial Completion.

3.04 POINT(S) OF CONNECTION

A. Point of connection shall be approximately as indicated on drawings. Connect new underground piping and valves, and provide all flanges, adapters, or other necessary fittings.

3.05 INSTALLATION OF SOLVENT WELD POLYVINYL CHLORIDE PIPE (PVC)

A. Polyvinyl chloride pipe shall be cut with an approved PVC pipe cutter designed only for that purpose.

B. All plastic-to-plastic solvent weld joints shall use solvent recommended by the pipe manufacturer. Do not install solvent weld pipe when temperature is below 40° F.

C. Pipe ends and fittings shall be wiped with MEK, or approved equal, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.

D. Snake pipe from side-to-side on trench bottom to allow for expansion and contraction.

E. All changes of direction over 15 degrees shall be made with appropriate fittings.

F. When pipe laying is not completed by the end of the workday, close pipe ends with tight plug or cap.

G. Install pressure supply line locating tape along the entire length of pressure supply line.

H. Coordinate pressure supply line with sand bedding operations.

I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.

J. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

3.06 INSTALLATION OF COPPER PIPE

A. Copper piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. No piping shall be cut with a metallic wheel cutter of any description. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Owner's Representative.

C. Apply emery cloth to pipe ends and wipe with clean cloth prior to solder welding pipe end to fitting. Apply an even layer of flux along area to be soldered. Apply solder uniformly around joint and let cool. After cooling lightly apply emery cloth along soldered area until smooth.

D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot (10') intervals in black permanent ink lettering, 3/4" minimum high.

3.07 INSTALLATION OF BRASS PIPE

A. Brass piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Owner's Representative.

C. Carefully and smoothly place joint compound on the male thread only. All screwed joints shall be tightened with tongs or wrenches. Caulking of any kind is not permitted.

D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot (10') intervals in black permanent ink lettering, 3/4" minimum high

3.08 INSTALLATION OF GATE VALVES

A. Install gate valves in separate round valve boxes as specified on District Standard Detail drawings. All plastic valve boxes shall be secured with a stainless steel locking bolt mechanism, and set over ¾" gravel with filter fabric.

3.09 INSTALLATION OF QUICK COUPLING VALVES

A. Install quick coupling valves with brass riser set in concrete footing. Set plumb and true in center of box with QCV top 3" below box lid. Ensure that proper quick coupling key operation is provided with each installation.

B. Install in separate round valve box secured with a stainless steel locking bolt mechanism. Set over ¾" gravel with filter fabric.

3.10 INSTALLATION OF ELECTRONIC CONTROL VALVES

A. Install each electric control valve in a separate valve box so that cross handle is 3" minimum below valve box cover. Install with union type connection. All plastic valve boxes shall be secured with a stainless steel locking bolt mechanism, and set over ¾" gravel with filter fabric.

B. Group electric control valves together with no more than 3 per cluster. Allow a maximum of 12" between each valve boxes. Install valve boxes in the same direction and parallel with one another and perpendicular to paving, hardscape, sidewalks and paths. Install each manifold group with a ball valve sized equal to the largest non pressure lateral line in the manifold.

3.11 INSTALLATION OF CHECK VALVES

A. Install check valves in a separate round valve boxes at a maximum of 10” below valve box cover. Plastic valve boxes shall be secured with a stainless steel locking bolt mechanism, and set over ¾” gravel with filter fabric.

3.12 INSTALLATION OF VALVE BOXES

A. Install valve boxes with each type of irrigation equipment so that top of valve box is above finish grade as specified on the District Standard Detail drawings. Valve box extensions are not acceptable except for mainline isolation gate valves.

B. Place gravel sump below and around each valve box prior to installing valve box as specified on the detail drawings. Place remaining portion of gravel inside valve box, allowing full access in and around all fittings. Valve box shall be fully supported by gravel sump. No brick or wood supports are allowed.

C. Brand the valve box lid of associated equipment as follows:

1. Electric control valve box lid with "Controller Letter and Station Number."
2. Quick coupling valve box lid with the letters "QC."
3. Isolation gate valve box lid with the letters “GV.”
4. Spare Wire box lids with the letters “SW.”
5. Wire Splice box lid with the letters "WS."
6. Check valve box lid with the letters “CV.”

D. Letter and number size of brands shall be no less than 1" and no greater than 1 1/2" in height and shall be 1/8" maximum in depth. Provide sample branding to the Owner or Owner's Representative prior to commencement of work. Coordinate with Owner or Owner’s Representative any non-listed equipment box identification required.

C. Walk through for Substantial Completion shall not be allowed until all branding is complete and approved by Owner or Owner’s Representative.

3.13 INSTALLATION OF SPRAY HEADS AND ROTORS

A. Flush circuit piping with full water pressure and install sprinklers after hydrostatic test is completed.

B. Locate part circle sprinklers to maintain a minimum distance of 2” to a maximum of 4” between paving, hardscape, sidewalks, and paths and a minimum distance of 12” from walls.

C. Spray heads and rotors shall not exceed the maximum head and row spacing specified on the drawings or staked in the field unless approved by the Owner’s Representative. In no case may spray heads or rotors be installed at a distance between heads that exceeds the manufacturer's recommended distance.

D. Angled nipples on swing joints below spray heads and rotors or any sprinkler type, where applies, shall not exceed 45° nor be less than 10°.

E. After installation adjust nozzle sizes, arcs and radius of throw to allow head to head uniform distribution. Adjust all spray heads and rotors to correct height above sod as detailed. No overspray will be allowed on paving, hardscape, sidewalks, and paths.

F. Adjust adjacent new plant material placement or trim existing plants so that it does not interfere with uniform distribution of each spray head or rotor.

G. Architect or District's Landscape Inspector may request nozzle changes and/or adjustments without additional cost to the Owner.

3.14 INSTALLATION OF ELECTRICAL WIRE

A. Low Voltage Wiring:

1. Bury control wiring in same trench as pressure supply line as specified.

2. Bundle all 24 volt wires at 20' intervals with electrical tape.

3. Provide expansion loops at every pressure supply line angle fitting, inside each electric remote control valve box, and at 250' length intervals along routing. Form expansion loop by wrapping wire a minimum of 10 times around a 3/4" pipe and withdrawing pipe.

4. Limit splicing of electrical wiring. Provide each splice made at intervals or in electric control valve assembly valve boxes with approved connectors.

5. Wire splices occurring at intervals outside electric control valve box shall be installed in a separate valve box.

6. Provide (1) one electrical control wire for every electric remote control valve. Piggy backing like zones on the same electrical control wire or into the same station terminal is not allowed.

7. Install (2) two spare #14-1 electrical control wires (with common wire) from the automatic controller unit pedestal to the last electric control valve on each leg of pressure supply line. Locate the spare wires in their own valve box as specified. Provide (1) one additional spare electrical control wire at every electric remote control valve manifold (valve grouping). In addition to these spare wires, check the drawings for additional wires that are required and locate them in the same valve box as the spare wires. Length of spare wires at each end enclosure shall be sufficient for connection into possible fixture equipment or connection point.

B. High Voltage Wiring: Install 120 volt power source to automatic controller unit following local governing codes and ordinances.

3.15 CONTROL EQUIPMENT INSPECTION

A. Contractor shall cause the following warranty tests to be performed by the equipment supplier, on all electrical circuits and system components, and shall submit a written approval from the equipment supplier to the District Landscape Inspector prior to the start of the maintenance period. All tests shall be made to the satisfaction of the District Landscape Inspector:

1. Each circuit shall be tested for continuity.

2. Each circuit shall be tested for leaks to ground with an ohmmeter after each interconnect circuit has been installed and connections have been made. No circuit checking lower than 1 megohm will be acceptable.

3. The grounding system shall be tested with a meter and shall not measure more than 5 ohms.

4. A functional test shall be made in which it is demonstrated that each and every part of the system functions as specified or intended. The test may commence only with the approval of the District Inspector.

5. The functional test for each new or modified electrical system shall consist of not less than five days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the condition shall be corrected and the test shall be repeated until the five days of continuous satisfactory operation are obtained.

6. Shutdown caused by factors beyond the contractors control shall not constitute discontinuity of the functional test.

7. Any material revealed by these tests to be faulty shall be replaced or corrected, and the same test shall be repeated until no fault is evident.

8. Results of circuitry tests shall be recorded and submitted to the District Inspector prior to acceptance of work.

3.16 CONTROL EQUIPMENT SUPPLIER REPORT

A. The equipment supplier shall be responsible for the following system support:

1. Conduct on-site system familiarization meeting for Contractor, Irrigation Consultant, and District's Landscape Inspector to insure that all personnel understand the system installation technique.

2. Provide on-site technical assistance during installation period when requested by Contractor, Irrigation Consultant, or District representative.

3. Test grounding system to verify that equipment is properly grounded.

4. Perform continuity and resistance test on communication wire to insure that proper voltage will be delivered to the equipment on line.

5. Hook up communication and sensor wire to the proper terminals inside the enclosures to insure that good connections are made.

6. Certify that equipment conforms to and is installed in accordance with plans, specifications and manufacturers recommendations.

7. Test system components for proper operation.

8. Verify system flow range and calibrate pulse transmitter.

3.17 QUALITY CONTROL

A. Preconstruction Meeting: Contractor is responsible for contacting the Architect, Owner, and Owner's Representative, prior to beginning construction and/or ordering materials, to establish a meeting to review and discuss project objectives, concerns and to review the construction documents to insure a complete understanding of required installation procedures.

B. General Observation: The District's Inspector will visit the construction site at interim times during the construction process to access construction progress regarding installation of irrigation equipment to be in compliance with the drawings, details, specifications and site conditions. The District's Inspector will prepare a site report after

each visit noting progress of installation, verbal communication with Contractor and identifying any field adjustments necessary which require modifications to the designed irrigation system. A copy of this site report will be delivered to both Contractor and the District's Construction Manager. Contractor shall immediately address each item on the site report before proceeding with further construction.

C. Hydrostatic Pressure Testing the Pressure Supply Line: After backfilling, flushing, and prior to the installation of each electric control valve, drip valve assembly, isolation ball valve, quick coupling valve, and manual drain valve the irrigation system shall be pressure tested.

1. Pressure testing shall be performed in the presence of the Architect and Owner or Owner's Representative utilizing the following procedure:

   a. Pressurize the irrigation system to 40 psi greater than the designated static pressure or 150 psi whichever is greater for a period of no less than 4 hours. The pressure gauge used for the pressure test shall not exceed readings greater than 300psi. Pressure pump and other equipment necessary for the test shall be furnished by Contractor.

   b. Test is acceptable if no leakage occurs within the system for the duration of the testing period.

   c. If leaks occur, repair said leaks and begin pressure test again. Repeat this operation until no leaks occur in the irrigation system.

   d. Before requesting a walk through for Substantial Completion, the entire irrigation system shall remain under pressure for a period of no less than 48 hours.

2. Inspection: In cases where inspection of the sprinkler system construction is required or where portions of the construction are specified to be performed under the direction or inspection of the District's Inspector, Contractor is required to notify the District's Inspector at least 3 working days in advance of the time such inspection or direction is required.

3. Inspection will be required for the following parts of the construction:

   a. Upon installation and testing of main lines and lateral lines; when pipes are laid and are to be submitted to pressure tests. Do not cover lines until they have been inspected and approved.

   b. Upon installation and testing of valves, quick couplers, backflow preventer device, automatic controllers, control valves, and wires.

   c. When the sprinkler system is completed, perform a coverage test, in the presence of the District's Landscape Inspector, to determine if the coverage is complete and adequate for the lawn and planting areas. Furnish materials and perform construction required to correct inadequacies in the coverage.

   d. Final inspection and performance test shall be at the same time as the final inspection of the landscape construction.

D. Flushing: Center load all piping prior to flushing. After all new irrigation piping and risers are in place and connected and all necessary diversion work has been

completed and prior to the installation of sprinkler heads, rotors and quick coupling valves, thoroughly flush piping system under full head of pressure. After the furthermost riser from the point of connection begins to flush, continue flushing for duration of five minutes. After the system is thoroughly flushed, cap all risers.

E. Repairs required due to vandalism before final acceptance will be performed at the contractor's expense.

F. Walk Through for Substantial Completion:

1. Before requesting a walk through for Substantial Completion the following requirements must be entirely satisfied:

a. The entire irrigation system shall be completely installed, flushed and satisfactorily pressure tested. If Contractor fails to notify the Architect and District Inspector for the pressure test and flushing procedures stated above then Contractor assumes full responsibility for any design modifications directed by the District during the walk through for Substantial Completion regarding pressure and flushing issues.

b. All valve boxes shall be branded.

c. All automatic controllers or field satellite units are fully operable, control equipment has been certified by Hunter Industries and operation tested for interface with the District's Irrigation Central Control System (through District's Irrigation Control System Specialist in the Energy / Utilities Management Section).

d. Record drawings shall have been submitted to the Architect and Owner for review as to completeness.

e. (4) Four Services manuals shall have been delivered to the Owner or Owner's Representative.

2. Once the above requirements have been met a walk through for Substantial Completion shall be requested. The following procedures shall be used during the walk through:

a. Contractor shall have (2) two personnel available with radio communication for the entire length of the walk through.

b. All valve box lids shall be removed from valve boxes and placed faced up adjacent to the valve box prior to beginning the walk through.

c. The scheduling of each walk through type will be divided over several days as needed to provide adequate time to complete the review of all zones. The walk through will be divided into (2) two sections and proceed as follows:

1) Visual Walk Through: This will consist of walking through the entire irrigation system and examining all components of the system without turning on zones. A punch list will be established of deficiencies in the construction and workmanship of the irrigation

system as compared to the construction drawings, details, and specifications.

2) Operational Walk Through: This will consist of walking through the entire irrigation system observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric control valves and drip valve assemblies will not be acceptable). A punch list will be established of deficiencies in the operation of each zone in the irrigation system evaluating but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing, and flushing operation of zones as compared to the construction drawings, details, and specifications.

3) Once the Walk Through for Substantial Completion has been completed the Architect will provide a copy of all punch list items to the Owner for review and distribution to Contractor. It is Contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

G. Final Walk Through:

1. Before commencement of a final walk through is requested, the following requirements shall be entirely satisfied:

   a. Each item on the walk through for Substantial Completion shall be thoroughly addressed and resolved by Contractor.

   b. All final record drawings shall have been provided to the Architect and submitted to the Owner.

   c. The maintenance manual for the project shall be completed and submitted to the Owner.

   d. Controller charts for each automatic controller unit shall be completed, installed, and submitted to the Owner.

2. Once the above requirements are met a final walk through shall be requested. The following procedures will be used:

   a. Contractor shall have (2) two personnel available with radio communication for the entire length of the walk through.

   b. Only those valve box lids shall be removed from valve boxes as indicated on the walk through for Substantial Completion punch list. The valve box lids shall be placed faced up adjacent to the valve box prior to beginning the final walk through.

   c. The final walk through shall be divided into (2) two sections and proceed as follows:

      1) Visual Walk Through: This will consist of walking through the punch list items created at the time of the walk through for Substantial Completion, examining all components of the system without turning on zones. Any remaining deficiencies in the construction and workmanship of the irrigation system as compared

to the punch list generated at the time of the walk through for Substantial Completion, construction drawings, details and specifications will be noted.

2) Operational Walk Through: This will consist of walking through the punch list items created at the time of the walk through for Substantial Completion and observing each zone in a fully operable condition. Valves shall be activated from the automatic controller unit (Manual bleeding of individual electric control valves and drip valve assemblies will not be acceptable). Any remaining deficiencies in the operation of each zone in the irrigation system including but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing, and flushing operation of zones as compared to the punch list generated at the time of the walk through for Substantial Completion construction drawings, details, and specifications.

3) Once the Final Walk Through is completed and all items noted on the final punch list have been addressed the maintenance period shall begin. Any additional walk throughs required due to Contractors' inability to address all issues on the punch lists described above will be provided at Contractor's expense.

3.18 MAINTENANCE PERIOD

A. The Maintenance Period shall be as indicated in the Agreement and shall begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the Architect and the Owner.

1. Contractor is responsible for obtaining and following the maintenance manuals created specifically for the project from the Owner at the beginning of the maintenance period.

2. Demonstrate to District's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review maintenance information.

a. Provide seven days' advance written notice of demonstration.

3. At the end of the maintenance period and prior to turning the project over to the Owner, Contractor shall deliver the following to the Owner:

a. All necessary maintenance materials.
b. Extra stock as specified elsewhere in this Section.

4. Once Contractor has fulfilled all maintenance agreement obligations and has provided the above items to the Owner, the maintenance period will end.

END OF SECTION

SECTION 32 91 00

PLANTING PREPARATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Planting and maintenance as indicated on the drawings and specified herein.

1.02 PERFORMANCE REQUIREMENTS

A. Control: The selection of herbicides, application rates and methods are to be performed under the control and guidance of a licensed pest control advisor and applicator in the State of California.

1.03 QUALITY ASSURANCE

A. Provide laboratory soils analysis conforming to the following:

1. Submit the following soils samples to the laboratory at the commencement of work:

a. Two representative samples of native soil to be landscaped.

2. Place each sample in a sturdy container, properly identified, labeled, and dated.

3. Provide report of results to the Owner's Representative, the Architect, and Contractor. The test shall include a fertility and suitability analysis with written recommendations for soil preparation, backfill mix, auger hole requirements, maintenance and post-maintenance fertilizer requirements. The results of this test shall supersede the amendment and fertilizer schedule specified herein and no planting shall be done until the Architect approves the soils test recommendations.

B. Testing services shall be paid for by the Contractor.

1.04 FIELD CONDITIONS

A. Scaled dimensions are approximate. Check and verify site dimensions and receive Owner's Representatives approval prior to proceeding with work under this section.

B. Coordinate installation of plant materials, to avoid interference with other construction.

C. Maintain premises clean and free of excess equipment, materials and debris incidental to work.

D. Protect existing facilities and work of others at times in performance of work.

E. Carefully note all finish grades before commencing work. Restore finish grade changed during course of this work to original or intended grades.

1.05 QUALITY ASSURANCE

A. Inspections: Plants shall be subject to inspection and acceptance at place of growth or upon delivery to the site, for quality, size and variety. Such acceptance shall not impair the right of inspection and rejection at a later time or during progress of work, for size, condition of rootball, and latent defects or injuries. Immediately remove rejected plant from the site. Trees, 24 inch box size and larger, shall be accepted by Owner's representative prior to delivery.

B. Contractor shall supply photographs from place of growth of each plant. Photographs shall be submitted to the Architect for review and approval prior to delivery to the site.

C. Inspections shall be made by Owner's representative. Request inspection in writing at least two working days in advance of the time inspection is required.

D. Inspections will be required for the following parts of work:

1. Attend pre-construction meeting with General Contractor and Inspector.
2. Irrigation Performance/ Soil Preparation/ Fine Grading.
3. Plant material placement prior to installation.
4. Preparation of Punch List prior to maintenance period.
5. Final observation for completion.

E. The Contractor, or his authorized representative, shall be on site at the time of each inspection.

F. If Contractor requests an inspection and the site is not found to be in an acceptable condition to hold the inspection, the hourly fees of the personnel called for the inspection shall be paid by the Contractor. No site visits will be scheduled until these fees have been paid.

1.06 DELIVERY, STORAGE AND HANDLING

A. Submit at time of delivery invoice statements certifying quantities by bulk and/or weight, for all organic amendments and fertilizers. Submit suppliers' certificates of compliance with these specifications. Random samples may be taken by Owner's representative for analysis.

1.07 GUARANTEE AND REPLACEMENT

A. Plantings: Guarantee planting until end of maintenance period and acceptance. Replace trees or plants that die or lose form and size as originally specified even though they have taken root and are growing after the dieback or loss of form or size.

B. Trees: Guarantee 15 gallon trees and larger, in writing, to live in a healthy condition for one year after planting. Replace dead or unhealthy trees immediately. Replacements, including planting, staking, training, etc., shall be as originally specified, without cost to the Owner.

PART 2 - PRODUCT

2.01 GENERAL

A. Provide materials of best quality obtainable, which comply strictly with Drawings and

specifications.

2.02 SOIL AMENDMENTS

A. Organic Amendment: Derived from wood or bark, granular in nature, stabilized with nitrogen and fortified with minerals, and having the following properties:

1. Organic Content: Minimum 90% by weight.

2. Particle Size:

Minimum 95% passing 4 mesh screen.
Minimum 80% passing 8 mesh screen.

3. Nitrogen Content: 0.5% based on dry weight for redwood sawdust. 0.7% based on dry weight for fir sawdust. 1.0% based on dry weight for fir or pine bark. NOTE: Pine sawdust is not acceptable.

4. Mineralized: 0.1% total iron.

5. Salinity: Maximum conductivity 3.5 mm/cm at 25 degrees C.

B. Fertilizer and Minerals:

1. Soil sulfur: Minimum 95% elemental sulfur.

2. Ferric Sulfate: Fe2 (SO4) 3 minimum 20% Fe, as metallic.

3. Commercial Fertilizer:

38-0-0 Urea formaldehyde (Soil preparation)
12-12-12 (Soil preparation)
Ammonium sulfate 21-0-0 (Weed abatement)
16-6-8 (Maintenance)

4. Planting Tablets: Gro-Power 12-8-8 slow release tablets.

5. Gro-Power Plus: 5:3:1, 50% humus, 2% soil penetrant PH 4.5 - 4.7

2.03 PLANT MATERIALS

A. Quantity and size of plants as stated on the Plans and Plant List. No root bound materials allowed. Plants shall be fresh and vigorous, of normal growth, and free of diseases, weeds, harmful insects, or their insect eggs and larvae.

B. Plants are subject to inspection for approval or rejection at place of growth and/or on project site at any time before or during progress of work for size, variety, condition, latent defects and injuries. Remove rejected plants from site immediately and replace with approved plants.

1. Protection: Protect plants from damaging sun and wind. Damage will be cause for rejection even after initial approval.

2. Substitutes: Not permitted unless specifically approved in writing.

3. Nomenclature: Conforms to customary nursery usage.

4. Quantities: Provide materials as needed to complete indicated work.

2.04 STAKING AND GUYING MATERIALS

A. Tree Stakes: Sound treated pine and uniform size, dimension and diameter, pointed at one end. Stake as detailed.

B. Ties: 10 gauge zinc-coated iron wire, solid core with 3/8-inch diameter minimum new reinforced garden hose in a 6-inch diameter loop around tree. Secure to tree as detailed.

C. GUYING MATERIALS: 1/8" diameter galvanized cable, with turnbuckle and 3/8: diameter minimum new reinforced garden hose covering at tree. Guy as detailed. Flag all guys with 1/2" diameter PVC tubing. Cover 90% of the wire length.

D. ANCHORS: 2" x 4" x 18" Redwood Deadman, 18" below finish grade.

2.05 ROOT BARRIER

A. Refer to section 32 91 20 for material specification.

2.06 ARBOR-GUARD

A. Available from Deep Root Green Infrastructure. Install at base of all trees planted in turf. For multi-trunk trees, use multiple guards, one for each major trunk.

PART 3 - EXECUTION

3.01 PRELIMINARY GRADING

A. General: Do not work soil when the moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form or that clods will not break readily. Apply water if necessary to provide ideal moisture content for tilling and planting. Perform preliminary grading in such a way as to anticipate the finish grade after the installation of soil conditioners.
Remove or redistribute excess soil before application of soil amendments.

B. Slope Scarification: Scarify slope surface 1 inch to relieve surface compaction and aid seed germination. Repair rivulets caused by erosion prior to seeding.

C. Finish: Grade planting areas to a level of 2 inches below the adjacent pavement surface. Where no grades are shown, grade between existing or fixed controls (such as walks, curbs, catch basins) and elevations shown to provide a smooth and continual plane. Rake and level as necessary to obtain true and even surfaces. Verify all swales on Engineer's Plan, and grade to drain.

D. Remove and dispose of rocks over 1 inch diameter within top 12 inches of soil, construction debris, weeds, etc. within the limits of the project prior to applying soil amendments.

3.02 SOIL PREPARATION FOR LEVEL GROUND COVER AREAS

A. Quantities: Uniformly apply to each 1,000 square feet of planting area:

Note: The following amendments are for Bidding purposes only. Actual quantities and mixes shall be determined in accordance with the soils report obtained per Item 1.03

above.

50 pounds 'Gro-Power Plus'
6 cubic yards on-site soil
15 pounds soil sulfur
8 pounds 12-12-12

B. Distribution: Distribute the organic amendment and fertilizer over the planting area to a uniform depth of 2 inches. Secure approval from Owner's representative prior to working amendments into soil. No credit for organic amendment will be given if this procedure is not used.

C. Cultivation: Work into soil by cultivation, spading or rototilling to a depth of at least 6 inches. Finish grades to smooth finish 2 inches below adjacent paving and curbs. Remove debris and weeds from site.

3.03 SOIL PREPARATION FOR SLOPE AREAS

A. Quantities: Uniformly apply to each 1,000 square feet of slope area to be planted:

Note: The following amendments are for Bidding purposes only. Actual quantities and mixes shall be determined in accordance with the Soils Report obtained per Item 1.03 above.

8 lbs.	12-12-12
8 lbs.	Urea formaldehyde
4 lbs.	Soil Sulfur
50 lbs.	'Grow-Power Plus'

B. Distribution: Distribute amendments over the planting area and scarify into top 1 inch of the soil surface.

3.04 BACKFILL MIX

A. Stockpile a sufficient quantity of approved soil found on site, free of weeds and debris, for mixing as backfill material.

Supplement on-site soil with approved import soil, as required. Mix amount for 10 cubic yards as follows:

Note: The following amendments are for Bidding purposes only. Actual quantities and mixes shall be determined in accordance with the Soils Report obtained per Item 1.03 above.

6 cubic yards on-site soil
4 cubic yards organic amendment
20 pounds ferric sulfate
10 pounds 12-12-12
180 pounds 'Grow-Power Plus'

Use care not to stain concrete with ferric sulfate. Cleaning of stained concrete is responsibility of Contractor.

3.05 WEED ERADICATION

A. Perform the following procedures for irrigated planting areas:

1. Spot spray perennial weeds with a non-selective systemic contact herbicide. "Round-Up' or equivalent.

2. Manually remove remaining covers and weeds, and dispose off-site.

3. Fertilize planting areas with Ammonium Sulfate at 4 lbs./1000 s.f. or equivalent fertilizer to promote re-growth.

4. Apply irrigation at a rate sufficient to promote weed growth for a period of 2 to 3 weeks.

5. When weed seeds have germinated and grown to a height of 2 inches, discontinue irrigation for a period of three (3) days to prepare the areas for access.

6. Spray weeds with a non-selective contact herbicide, and spray Bermuda Grass and Morning Glory with a non-selective systemic herbicide. Apply no water for a minimum of four (4) days following application of contact weed killer.

7. Allow a sufficient period of time to ensure that weeds are dead. Follow herbicide manufacturer's directions.

8. Lightly irrigate planting areas for a period of 2 to 3 weeks, without causing erosion of soils.

9. Spot spray weed re-growth with non-selective contact herbicide.

10. Plant container stock (no rooted cuttings).

11. Evenly distribute specified soil amendments to areas.

12. Water planting areas for three (3) consecutive days to moisten upper layers of soil prior to hand seeding operation without causing erosion to the soils.

13. Allow planting area soil surface to dry out for one day only prior to the hand seeding application. Do not allow the soil surface to be super saturated with water or excessively dry prior to hand seeding. Verify that residual moisture lies within the first 1/2-inch of the soil surface.

3.06 PLANTING

A. Pre-Plant Approvals: Obtain approval of planting holes, pre-mixed backfill, plants, and locations prior to planting.

1. Trees and shrubs shall not be planted until construction work in the area has been completed, final grades established, and the planting areas properly graded and prepared.

2. Stake plant locations or place approved quantities of plants in containers on locations. Secure approval before excavating pits, making necessary adjustments as directed.

3.07 INSTALLATION

A. Plant materials as soon as site is available and weather conditions are suitable. Do not plant when weather conditions are unfavorable to do good work, or if soil is excessively wet. Protect plants from sun, wind and rain at all times prior to and during planting.

1. Excavate pits with scarified vertical sides and bottom, no smaller than the following sizes:

1 Gallon plants - 8" deep, 12" in diameter
5 Gallon plants - 12" deep, 24" in diameter
15 Gallon plants - 18" in diameter
Boxed Trees - depth of rootball 24" wider than rootball

2. Partially refill hole to a height that when a plant is placed, the crown is slightly above the finished grade. Use friable unamended soil for all boxed trees, specified backfill mix for other container plants, and tamp to compact.

3. Fill hole with water prior to installing plant.

4. Deposit Gro-Power 12-8-8 tablets in plant pits as described in planting notes.

5. Set plants in center of pits in vertical position so that the crown of plant is slightly above the finished grade, and backfill with prepared backfill mix.

6. Form shallow basin around edge of plant ball by depressing soil slightly below finished grade. Form basin rims. Keep basin within outer edges of plant ball.

7. Individually hand water each plant to saturate rootball and adjacent soil immediately after planting.

8. Adjust for settlement and grade areas around plants to finish grades and dispose of excess soil.

9. Guy or stake trees designated with stake or stakes on windward side of tree as detailed.

B. Irrigation: A sprinkler system is provided in areas for maintaining general moisture requirements. Hand watering of newly planted trees and shrubs will; however, be required once every week for three weeks. Check plants for adequate moisture at the roots. Water as required throughout the maintenance period.

3.08 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted, and shall continue for at least **90** days after acceptance of complete of landscaping and irrigation and as much longer as is necessary to establish thriving plants.

B. Responsibilities: The complete maintenance of the landscape installation on site including, but not limited to, the following:

1. Irrigation:

    a. Review existing system with District personnel for satisfactory operation and coverage.

    b. Properly and completely maintain irrigation systems, clean lines, valves, heads and other portions of such systems to assure their continual proper operations. Lubricate as needed.

    c. Make adjustments necessary to avoid overspray onto buildings and pavements.

    d. Program controller on a weekly basis considering weather, the water requirements of each sectional valve, and the application rate each area is capable of receiving, without runoff.

    e. Coordinate irrigation activities with District personnel. Specify programming and shut down for repairs.

C. Planting

1. Fertilization: Apply 6 pounds per 1,000 square feet of 16-6-8 commercial fertilizer to planting areas 20 and 50 days after planting.

2. Cultivation and Weeding: After period of more or less continuous watering, during which soil moisture is maintained at near saturation point, cultivate all ground cover areas by scarifying the surface 1 inch. Do not change grade, remove basins or berms in the process of such cultivation. Follow the cultivating by a period of non-irrigation, to aid the killing off of weeds, and soil aeration.

3. Pruning and Staking: Unless otherwise directed, prune only to remove dead or broken branches of trees or shrubs. Re-stake, re-align and re-tie all trees as necessary.

4. Insect Management: Examine all plants frequently, especially any which are subject to common insect depredation such as aphids, meanly bugs, ants, etc., to establish need for counter measures. Wash foliage with strong streams of water. Notify the Owner's representative if further measures seem warranted.

5. Replacement: Immediately replace and plant materials which for reason are damaged or die during the maintenance period. Replace as originally specified.

6. Protection: Protect planting against damage, including erosion, rodents, and trespass, providing proper safeguards as needed. Repair damage to the work made by pedestrians, animals, vehicular traffic, or other cause until acceptance.

3.09 CLEANING

A. Upon completion of construction, and before final acceptance, broom-clean the entire area within the contract limits. Remove tools, surplus materials, equipment, debris, etc. and leave the site in a neat and acceptable condition.

B. Paved Areas: Clean paved areas of debris or silt by sweeping and hosing.

3.10 SITE REVIEW

A. Final review (to insure that fire department appliances are not obstructed) of all planting will be made at the conclusion of the maintenance period. Submit written notice to Owner's Representative at least 7 days before acceptance date.

END OF SECTION

SECTION 32 91 20

ROOT CONTROL BARRIER

PART 1 - GENERAL

1.01 SCOPE:

A. This is a materials specification covering root control barrier in trenches, alongside hardscape structures such as sidewalks, curbing, pavements, concrete and building foundations to prevent structural damage due to root penetration. The product functions to provide both a physical and chemical barrier zone to restrict vegetative root encroachment.

B. This is a material purchasing specification and design review of its use is recommended.

1.02 REFERENCED STANDARDS:

A. *ASTM Standards

D4355 Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

D4491 Test Method for Water Permeability of Geotextiles by Permittivity

D4533 Test Method for Trapezoid Tearing Strength of Geotextiles

D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles

D4751 Test Method for Determining the Apparent Opening Size of a Geotextile

D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products

D5261 Test Method for Measuring Mass per Unit Area of Geotextiles

B. *EPA Standards (Reference EPA Label)
Registration No. 59823-1 (Attached Exhibit B)
EPA CG 1500 Water Solubility
EPA CG 1600 Vapor Pressure

PART 2 - MATERIALS

2.01 PHYSICAL AND CHEMICAL REQUIREMENTS

A. Fibers used in the manufacture of root control barrier substrate fabric shall consist of long chain synthetic polyolefins (at least 95% by weight) and a UV stabilizer. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other.

B. Nodules consisting of trifluralin, carbon black, and polyethylene compounded in a patented method utilizing time-released characteristics are permanently attached to the substrate fabric on 1-1/2" centers by a through injection molding process.

C. All substrate property values, with the exception of apparent opening size (AOS), in these specifications represent minimum average roll values (MARV) in the weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS represent maximum average roll values.

D. Property values for the trifluralin are average run values.

PART 3 - INSTALLATION

3.01 CERIFICATION

A. The Manufacturer shall provide to the Engineer a certificate stating the name, product name, style number, chemical composition and other pertinent information to fully describe the product. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

B. The Manufacturer's certificate shall state that the root control product meets requirements of the specification as evaluated under the Manufacturer's quality control program. The certificate shall be attested to by a person having legal authority to bind the Manufacturer.

C. Either mislabeling or misrepresentation of materials shall be reason to reject those products.

3.02 SAMPLING, TESTING, AND ACCEPTANCE

A. Root control substrate product shall be subject to sampling and testing to verify conformance with this specification. Acceptance shall be based on manufacturer's certifications.

B. Testing shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method.

3.03 SHIPMENTS AND STORAGE:

A. Product labels shall clearly show the manufacturer or supplier name, style number, and roll number and shall include a compliance statement certifying that all ingredients and inspection standards for this product have been met.

B. Each root control product roll shall be wrapped with a protective EVOH bag and placed in a box that will protect the product from damage due to shipment, water, sunlight, and contaminants and to prevent premature release of herbicide. The protective wrapping shall be maintained during periods of shipment and storage.

C. During storage, root control product shall be elevated off the ground and out of direct sunlight. It shall remain sealed in EVOH protective bag inside shipping box at a temperature of not more than 110°F.

3.04 PRODUCT DESCRIPTION:

A. **Overall Product Major Composition and Ingredients** **Typical**

Active Chemical*:	Trifluralin (a,a,a-Trufluro 2, 6–dinitro–N, N, -Dipropyl-p –toluidine)
17.5%	
Inert Ingredients:	100% Spunbonded Polypropylene, Polyethylene and Carbon
82.5%	

Typical Values			
Trifluralin Characteristics Method*	**English**	**Metric**	**Test**
Vapor pressure (mm Hg @ 25 ° C)	1x10-4	1x10-4	EPA CG 1600
Solubility in Water (ppm @ 25 □□C)	<0.3	<0.3	EPA CG 1500
Minimum Values			
Fabric Properties	**English**	**Metric**	**Test Method***
Unit Weight	3.9 oz/yd[1]	130 g/m[2]	ASTM D5261
Grab Tensile Strength	130 lbs	575 N	ASTM D4632
Elongation at Break	60%	60%	ASTM D4632
Puncture Strength	40 lbs	175 N	ASTM D4833
Trap Tear	60 lbs	265 N	ASTM D4533
Permittivity	0.7 sec	0.7 sec.	ASTM D4491
AOS (Max Value)	0.21 mm	0.21 mm	ASTM D4751
Ultraviolet Stability	70% @ 500 hrs	70% @ 500 hrs	ASTM D4355

* Test methods or revision numbers available on request (17.5% Average trifluranlin in total composite, Min. of 20% trifluralin in nodules

[1] Available from ASTM, 1916 Race Street, Philadelphia, PA

[2] Available from ASTM, 1916 Race Street, Philadelphia, PA

END OF SECTION

33 00 00

UTILITIES

SANTEE SCHOOL DISTRICT

SECTION 33 10 00

WATER UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Site domestic water, and fire water service piping and appurtenances from the source of potable water to a point 5 feet outside the building.

B. Related Work:

1. Site drainage systems
2. Sanitary sewer system
3. Earthwork, trenching and backfilling

C. Perform work on water mains, fittings, appurtenances, fire hydrants, meters, and related items within the easement to be granted to local Water District "General Specifications and Special Conditions" and "Standard Drawings", current edition. Purchase one set of these documents from the District Office to be maintained on the site for the duration of the work.

1.02 REFERENCED STANDARDS

A. Perform work except as noted in accordance with applicable provisions of "California Plumbing Code" (CPC), 2016 Edition, and 2016 California Amendments, International Association of Plumbing and Mechanical Officials (IAPMO), Los Angeles, California.

B. Underground conduit construction shall be in accordance with Section 306 of "Standard Specifications for Public Works Construction" (PWC Spec.), Current Edition, published by Public Works Standards, Inc. (PWSI), Los Angeles, California.

1.03 SUBMITTALS

A. Procedures: Comply with requirements of Section 01 33 00 – Submittal Procedures.

B. Submittals: List of materials proposed for use accompanied by manufacturer's latest printed literature with technical data.

C. Certificates: Submit manufacturer's certification that materials meet specified requirements.

D. Record Drawings: Provide in accordance with Section 01 78 39 – Project Record Documents, and completion of water service installation.

1.04 QUALITY ASSURANCE

A. Prior to final acceptance of the work obtain acceptance of the work from the serving utility and submit copies of the Certificates of Completion to the Inspector for forwarding to the Owner.

1.05 SEQUENCING OF LAND SCHEDULING

A. Install utility mains as soon as conditions permit other facilities and improvements to follow.

B. Make installation of fire hydrants and water service laterals for meters and after construction of Portland cement concrete curbs unless otherwise shown on the drawings. Install water gate valve boxes and covers, and adjust to finished grade following completion of the asphaltic concrete pavement.

C. Install tops of manholes, junction chambers, vaults, boxes, and valve boxes unless otherwise indicated on Drawings, to an elevation 3 inches below rough grade and raise to final elevation after paving.

D. Coordinate with connections to public water main and to interior water distribution piping.

PART 2 - PRODUCTS

2.01 WATER SYSTEMS COMPONENTS

A. Water pipe shall be polyvinylchloride (PVC), ANSI/AWWA C900 or ANSI/AWWA C905, 4” or larger.

B. PVC Schedule 80, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784 for pipes 1” to 3 ½”.

B. Gate Valves:

1. Provide iron body, bronze mounted, parallel seat, double disc, non-rising stem, bottom or side wedging, and complying with AWWA C500-09 Specifications.

2. Provide 12 inch and smaller with a working pressure of 200 p.s.i. The working pressure and the name of the manufacturer shall be cast in plain letters on the body of the valve.

3. Open by turning counterclockwise.

4. Entire wedging mechanism shall be solid bronze and allow the gates to function properly when water pressure is exerted from either or both directions.

5. Equip valves with flanged or threaded ends.

6. Valve stems shall be solid bronze.

7. Stem nuts shall be solid bronze.

8. Cast or rolled bronze used in the manufacture of gate valves shall contain a zinc content of not in excess of 5 percent and an aluminum content not in excess of 2 percent.

D. Meter and Detector Check Assemblies: In accordance with local Water District requirements. Detector check assemblies shall be reduced pressure principal backflows only.

E. Fire Hydrants: Conform to local Water District requirements. Minimum requirements shall be a wet barrel style with a minimum of one 2 ½" and one 4" outlet. The 4" outlet shall face the fire department access road. All outlets shall be provided with National Standard Threads (NST).

F. Post indicators shall be UL listed.

G. The outlets of fire hydrants shall be inspected and approved by the Fire Department. A field coat of paint shall be applied to hydrants after installation.

H. Check Valves: Swing type spring loaded for 200 p.s.i.g. working pressure, set readily and tightly with the face of the closure elements made of a non-corrodible material such as bronze composition conforming to ASTM B62.

I. Valve Boxes: Cast iron, slip adjustment type of appropriate size for valve and shall be Alhambra, No. A-3009 or approved equal. Each valve box cover shall have "Water" cast in the top using sharp-faced letters of 1 inch minimum height.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to Architect conditions which prevent proper execution of this work.

3.02 PREPARATION

A. Excavate and construct trenches and manholes or other structures forming a part of the pipeline. Trench excavation shall conform to the requirements of Section 31 20 00 – Earth Moving, and shall require the approval of the Soils Engineer.

3.03 CONNECTIONS TO EXISTING MAINS

A. Where connections are made between new work and existing mains, the connections shall be made by using special couplings (such as Rockwell Clamp and Coupling-Tapping Sleeves, or approved equal), and other fittings to suit the actual conditions. Methods of connections to existing mains shall be as required by local codes.

3.04 PIPE INSTALLATION

A. Survey Line and Grade: Provide grade controls and survey lines in accordance with Section 01 50 00, Temporary Facilities and Controls.

B. Pipe Installation: Pipe will be inspected in the field by the Inspector before and after laying. Corrective work shall be approved by the Inspector at no cost to the Owner. Installation of pipe shall conform to the requirements of Section 306-1.2 of the Standard

C. Backfill and Compaction: Perform in accordance with Section 306-1.3 of the Standard Specifications. In backfilling the trench take necessary precautions to protect the pipe from damage to shifting. Depth of cover minimum 36 inches.

D. Install concrete thrust blocks against undisturbed soil at bends, tees, crosses, valves, pipe ends and where changes in pipe diameters occur at reducers or in fittings. Also, install thrust blocks at valves 12 inches or larger when installed with rubber gasket joints.

Thrust blocks shall be class 420-C-2000 Portland cement concrete, per drawings.

E. Underground mains and lead-in connections to system risers shall be completely flushed before connection is made to any overhead sprinkler piping. Where underground p9iping is flushed and not immediately connected to the overhead piping, the riser shall be capped or otherwise protected to prevent debris, dirt, or animals from entering into the underground piping. This must be witnessed by the project inspector.

F. Contractor shall provide a completed signed copy of the “Contractor’s Materials and Test Certificate for Underground Piping”, per NFPA 13, Figure 10.10.1.

G. All piping and attached appurtenances subjected to a system working pressure shall be hydrostatically tested at 200 psi, or 50 psi in excess of the system working pressure, whichever is greater, and shall maintain that pressure without loss for 2 hours. If a connection is being made to the an existing system, it is the contractor’s responsibility to locate all shut off valves, PIV’s and any other devise that will inhibit the correct execution of the test or potentially damage any existing systems.

H. A waterflow alarm test shall be conducted and approved the Project Inspector in accordance with NFPA 13, Sec. 24.2.3.1. An alarm must sound within 5 minutes for local alarm bell.

I. Inspections are required prior to pouring thrust blocks, hydrostatic testing and during flushing.

J. Installation, inspection, and testing shall confirm to 2010 NFPA 13, and 2010 NFPA 24.

K. Unless otherwise approved by DSA, all fire piping shall be a minimum of 6” in diameter. The lowest operating nut shall be a minimum of 18” above grade and the hydrant flange shall be a minimum of 2” above grade. Hydrant flange shall not be more than 4” above grade.

L. Fire hydrants shall be a minimum of 40-feet from all structures. A keyed gate valve shall be provided for each hydrant.

M. All ferrous pipe and fittings shall be protected with loose 8 mil polyethylene tube. The ends of the tube and any splices made for T’s or other piping components shall be sealed with 2” tape, approved for underground use. All bolted joints shall be cleaned and thoroughly coated with asphalt or other corrosion retarding material after assembly and prior to poly-tube installation.

N. A 12” bed of clean fill sand shall be provided below and above the pipe (24” total). Sand shall be compacted to 90% of ASTM 1557 modified.

O. All bolts used for underground connections shall be stainless steel.

P. Pipe sections between appurtenances and joints shall be backfilled during hydrostatic testing to prevent movement.

Q. All private hydrants, sprinkler control valves, detector check assemblies, post indicating valves, and fire department connections shall be painted OSIIA Red.

R. All control valves shall be locked in the open position. Valves shall be monitored if they serve 100 or more sprinkler heads.

3.05 FIELD QUALITY CONTROL

A. Testing of Pipelines: Perform tests required by governing agencies. Testing shall be performed in accordance with Section 306-1.4 of Standard Specifications. Furnish water, materials and labor for making the required tests. Tests shall be made in the presence of the Inspector. Notify the Inspector at least 48 hours before performing the required tests.

3.06 CLEANING

A. Upon completion of work, leave the site clean and clear of debris and construction materials, and as specified in Section 01 74 00 – Cleaning and Waste Management.

END OF SECTION

SECTION 33 13 00

DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the furnishing of all labor and materials for disinfection of the potable water system. Potable water systems are those systems which carry domestic water from the supply main without isolation of the branch by a backflow prevention device. Install all plumbing fittings and valves necessary to perform the disinfection.

B. This section also includes the furnishing of all labor and materials to sample water in system following completion of procedure and provide bacteriological analysis of the water.

1.02 QUALIFICATIONS:

A. Disinfection: Disinfection shall be done by a commercial disinfection company approved by the School District. Submit to the School District's Representative the name of the proposed company for approval.

B. Bacteriological Analysis: Water testing shall be done by a laboratory approved by the State Department of Health Services. Submit for approval the name of the proposed laboratory as well as the proposed number and location of samples.

C. Provide a certificate of completion per Part B attached standard chlorination report which denotes the lines disinfected, the concentration applied and the amount and type of disinfection agent used, and that disinfection is in accordance with AWWA C601 and State Health Department requirements.

PART 2 - MATERIALS

2.01 MATERIALS

A. Use an approved chlorine agent, applied in liquid form into the system being disinfected. Chlorine gas or a hypochlorite solution may be used to make up the disinfecting liquid.

PART 3 - EXECUTION

3.01 PRELIMINARY PREPARATION OF THE SYSTEM:

A. Provide within 3 feet of the supply main, an injection port for introducing the chlorine solution and a gate valve upstream from the injection port.

B. There shall be no dead-end sections in the system exceeding 3 feet in length. All branches within the system shall lead to an outlet for bleeding and flushing.

C. After final pressure tests, open each fixture or outlet to maximum flow and run until the discharge water is free from particulates.

3.02 CHLORINATION PROCEDURE:

A. Notify the School District's Representative at least five working days prior to the start date of chlorination per Part A attached chlorination report.

B. Install all fixtures to be served by the potable water system before start of chlorination.

C. Prior to injection, place signs on each fixture being treated, reading "Heavily Chlorinated Water - Do Not Use."

D. Introduce the chlorine into the supply stream at a rate to provide a uniform concentration of chlorine in the entire system. Maintain at least 50 ppm chlorine level at each fixture after a hold period of 24 hours. Do not exceed 150 ppm at any time.

E. Draw the injected chlorine in the system through each outlet and fixture until the specified concentration level is reached. Then close all valves including the service cock and supply valve. Keep the system closed during the 24 hour hold period.

F. The School District will require a test for the residual concentration in the system at the end of 24 hours. Release no water from the system until these required samples are taken. A minimum concentration of 50 ppm of chlorine is required at all chosen sampling points.

G. After approval to proceed, flush the system at a relatively high velocity to remove the injected chlorine to a concentration in the system of no more than 0.5 ppm above that in the normal supply.

H. After approval to proceed, secure the entire system for at least three days prior to taking samples for bacteriological analysis.

3.03 SAMPLING AND NOTIFICATION:

A. At the completion of the three day hold period, take bacteriological water samples with observation by the School District's Representative.

B. Sample bottles must be provided by the approved laboratory. After the samples have been collected, the School District's Representative may allow temporary use of the water system pending results of the bacteriological analysis of the samples. The system cannot be used unless such allowance in writing is given.

C. Upon completion of sampling, submit the certificate of completion to the School District Representative for approval.

3.04 ANALYSIS:

A. Perform qualitative and quantitative bacterial analysis on the water samples and submit a laboratory report. The report must include the presence of any E. Coli bacteria in a 100 ml sample (this must be negative to be acceptable) and a total plate count of bacteria per cc of the sample (this must be less than 100, or equal to the supply).

3.05 FINAL ACCEPTANCE:

A. Upon satisfactory completion of all procedures and receipt of acceptable bacteriological results, written approval of the system will be provided by the School District's Representative per Part C attached standard chlorination report. Failure to fully comply with the above procedures will result in a requirement to repeat the procedure until acceptable results are achieved, at no additional cost to the School District.

END OF SECTION

SECTION 33 41 00

SANITARY SEWER AND STORM DRAINAGE PIPING (12" and below) (THIS SPECIFICATION MUST BE MODIFIED IF PVC PIPE IN EXCESS OF 12" IS SPECIFIED FOR SANITORY OR STORM SEWER)

PART 1 - GENERAL

1.01 DESCRIPTION:

A. These specifications designate the requirements for the furnishing and installing underground PVC gravity pipe for storm drain and sewers.

1.02 REFERENCED STANDARDS:

A. The editions and specifications and standards referenced herein, published by the following organizations apply to the construction only to the extent specified by the reference.

1. Standard Specifications:

a. Standard Specifications for Public Works Construction, The Green Book, Current Edition.

b. Standard Special Provisions of the Regional Standards Committee.

c. City of San Diego Standard Specifications for Public Works Construction.

2. Standard Drawings:

a. City of San Diego Standard Drawings, Current Edition.

3. American Water Works Association (AWWA).

4. UNI-BELL PVC Pipe Association (UNI).

1.03 SUBMITTALS:

A. Submit manufacturer's catalog data on pipe to be supplied.

B. Contractor shall provide a video tape to Project Manager after installation.

PART 2 - MATERIALS

2.01 PIPE MATERIALS

A. POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS:

1. Pipe and Fittings: Shall conform to ASTM D3034, shall be SDR 35, with ends suitable for elastomeric gasket joints. Pipe shall meet requirements of UNI-B-15-10. Main Supply lines shall be 4" minimum. Service lines shall be sized for usage.

2. Joints and Jointing Material: Utilize an integral bell and spigot with a solid cross section rubber gasket. Joints shall conform to ASTM D3212. Gaskets shall conform to ASTM F477.

3. Clean outs: Same material as sewer pipe with a PVC threaded fitting and riser. Clean outs are to have concrete collar and be located in easily accessible locations. Clean outs shall be set flush.

4. Pipe Stiffness: Minimum pipe stiffness (@ 5% deflect) shall be 46 for all sizes when tested in accordance with ASTM D2412.

5. Flattening: There shall be no evidence of splitting, cracking, or breaking when the pipe is tested as follows:

   a. Flatten specimen of pipe, six inches long between parallel plates in a suitable press until the distance between the plates is forty percent of the outside diameter of the pipe. The rate of loading +shall be uniform and such that the compression is completed within two to five minutes.

6. Products: Ringtite greenbell PVC sewer pipe, Johns-Manville, Denver, Colorado; Fluidtite PVC sewer pipe, Certainteed Corporation, Anaheim, California; or equal.

C. Bedding – Bedding shall be 12” of sand per the Green Book, current edition.

D. Concrete Manholes – 48 inch or 60” diameter pre-cast concrete manhole with eccentric entrance cone and grade rings as specified in the Standard Specifications of the **local Water District**. Larger manholes may be required as indicated on the Plans. Seal all manholes and water test.

PART 3 - INSTALLATION

3.01 TRENCHING AND BACKFILLING

A. Trenching and backfilling shall be per Section 31 23 00 – Excavation and Backfill.

3.02 STORAGE OF MATERIALS:

A. Inspect all materials delivered to the site for damage. Store materials on site in enclosures or under protective covering out of direct sunlight. Do not store materials directly on ground. Keep inside of pipes and fittings free of dirt and debris.

3.03 INSTALLING JOINTS:

A. Apply the joint manufacturer's lubricant to the pipe spigot to assemble the joint. Follow the manufacturer's instructions. Make joints water tight and root tight.

B. All connections to mainline shall be at a 45 degree angle, or greater.

3.04 INSTALLING THE PIPE:

A. Install pipe in accordance with ASTM D2321, UNI-B-5-89 and the following:

1. Inspect each pipe and fitting before lowering the pipe or fitting into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

2. Use implements, tools, and facilities for the safe and proper protection of the pipe. Handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.

3. When installing piping in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.

4. Grade the bottom of the trench to the line and grade to which the pipe is to be laid, with allowance for pipe thickness. Remove hard spots that would prevent a uniform thickness of bedding. Before laying each section of the pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

5. At the location of each joint, dig bell (joint) holes in the bottom of the trench and at the sides to permit visual inspection of the entire joint.

6. Provide and maintain means and devices at all times to remove and dispose of all water entering the trench during the process of pipelaying. The trench shall be kept dry until the pipelaying and jointing are completed.

7. When the pipelaying is not in progress, including the noon hours, close the open ends of pipe. Do not permit trench water, animals, or foreign material to enter the pipe.

8. Lay pipe without break, upgrade from structure to structure, with the bell ends of the pipe upgrade.

9. Do not use the pipe as a drain for removing water that has infiltrated into the trench.

10. After joint assembly, bring the bedding material up to 1 foot above the top of the pipe. Place and compact the imported sand as directed in Section 31 23 00. The remainder of the backfill shall be native earth backfill, installed per Section 31 23 00.

3.05 TESTING FOR ALIGNMENT:

A. After the pipe has been installed, tested for leakage, backfilled to existing grade, and manholes raised to grade and resurfaced, "ball" the pipe from manhole with a sewer scrubbing ball. After balling the pipe, perform the following.

B. "Mirror" straight sewers and inlet/outlet ends of curvilinear sewers. Perform balling and mirroring in the presence of the School District’s Representative to test for alignment, grade, damage or defective pipe in place, or any other type of faulty installation. Should

balling and mirroring indicate any faulty installation of the pipe, repairs or replacements shall be made at the Contractor's expense.

3.06 LEAKAGE TEST (SEWER ONLY):

A. Test for leakage by means of a water test. Test each section of pipe between manholes, along with the manholes.

B. Even though a section may have previously passed the leakage test, test each section of sewer subsequent to the last backfill compacting operation in which heavy compaction equipment may have damaged or affected the required watertight integrity of the pipe, structure, or appurtenance.

3.07 WATER TEST (SEWER ONLY):

A. Test each section of pipe between two successive structures by closing the lower end of the pipe to be tested and the inlet pipe of the upper structure with plugs or stoppers. Fill the pipe and structure with water to a point 4 feet above the invert of the open pipe in the upper structure, or to a height of 10 feet above the invert of the sewer in the lower structure, whichever gives the less hydrostatic pressure on the lower structure.

B. The total leakage shall be the decrease in volume of water in the upper structure. The leakage shall not exceed 0.025 gpm per inch of nominal diameter of pipe per 1,000 feet of sewer pipe being tested. Do not use the length of lateral connections in computing the length of pipe being tested.

C. If the leakage is greater than allowed, overhaul the pipe and, if necessary, replace and relay until the joints and pipe comply with this test. Complete tests before trench is paved.

END OF SECTION

SECTION 33 44 00

STORM WATER DRAINS (LARGER THAN 12" IN DIAMETER)

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Completion of storm drain lines and related storm drain structures as indicated on the Drawings and specified herein. All items in this specification must be submitted for architect's review and approval:

1. Pipe Materials
2. Trenching-Backfilling-Compaction
3. Laying Pipe
4. Drainage Structures

B. Related Sections:

1. Concrete, Section 32 16 00 – Curbs, Gutters, Sidewalks and Driveways.
2. Compaction for Backfilling, Section 31 23 00 – Excavation and Fill.
3. Reinforcing Steel, Section 03 20 00 – Concrete Reinforcing.
4. Section 03 30 00 – Concrete.

1.02 REFERENCE STANDARDS

A. The work specified in this section shall be performed in accordance with Section 303 and 306, latest edition of the Standard Specifications for Public Works Construction.

B. Construction of storm sewers and appurtenances shall be in accordance with the applicable sections of the Standard Specification for Public Works Construction.

C. Open Trench Operations: Trench excavation and backfill necessary for the installation of the storm sewerage main and appurtenances shall be done in accordance with Section 306, latest edition of the Standard Specifications for Public Works Construction, as noted in the Special Provisions.

1.03 PERFORMANCE REQUIREMENTS

A. Storm drains shall be staked by a Land Surveyor licensed to practice in the State of California.

1.04 QUALITY ASSURANCE

A. All catch basins and manholes and related structures and devices indicated as public agency standards shall be constructed in accordance with the standard plans and specifications of that agency.

B. Where connections are made to existing public drainage systems, they shall be made in accordance with the instructions or specifications of the authority having jurisdiction and in the presence of a representative of that agency.

C. Where drain lines, drainage structures, and appurtenances are constructed in public streets or rights of way, they shall be constructed in accordance with the standard plans and specification of the authority having jurisdiction and in the presence of a representative of that agency.

D. Secure necessary permits for work performed under conditions which exist in Items above. The Owner will pay for inspection fees and permits connected therewith.

E. Upon completion of the work, the Contractor shall provide the Architect with certified proof that the work performed is as described in Section 1.04, Items A, B. and C. above; and has been inspected, approved and accepted by the governing agency having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protection:

1. The Contractor shall be responsible to furnish and maintain temporary barricades, warning lights, and other types of protection and to prevent accidental injury to the general public and personnel employed on the project.

2. Provide adequate cribbing, sheathing, and shoring as necessary to safely retain the earth sides of excavations and trenches from caving and other damage resulting from excavating, together with suitable forms of protection against property damage and bodily injury to personnel employed on the work and the general public. Contractor to be responsible for the design, installation, and maintenance of required cribbing and shoring, and shall meet the approval of the Cal/OSHA and local governing agency requirements.

3. Drain lines, including trenches, shall be protected from damage during the entire construction period. Be responsible to replace or rework damaged portion of the work at no cost to Owner.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS

A. Contractor's Option: The Contractor shall have the option of using reinforced concrete pipe, cast iron pipe, HDPE pipe, or polyvinylchloride pipe for those storm drain lines indicated on the drawings where no specific type is called for. Cast iron pipe shall be used where indicated and also where storm drain lines are within five feet of walls and where lines have less than 12 inches of cover. Reinforced concrete pipe shall also be used where indicated.

1. Reinforced Concrete Pipe: In compliance with the American Concrete Pipe Association. Strength as indicated on the drawings, or as determined by engineer. All pipe shall be gasketed pipe creating a water tight installation.

2. Cast Iron Pipe: Service weight, hubless, coated, cast iron pipe and fittings in compliance with ASTM A74-09, latest revision.

3. HDPE pipe: ADS Pro Link WT with bell/bell non-cleated coupler with O-ring gasket for 12" - 24" and non-cleated integral welded coupler with o-ring gasket for 30" and above, or equal. Joints must meet ASTM D3212 lab test and ASTM F1417 watertight field test. ADS Series 35 couplers must be used when going from HDPE pipe to PVC pipe.

4. Polyvinylchloride Pipe:

   a. Solid Wall P.V.C. – SDR 35 with elastomeric gasket joints.

   b. P.V.C. plastic pipe for storm sewer mains shall be manufactured in accordance with ASTM D2729-11.

B. Pre-Cast Concrete Catch Basin:

1. If catch basin grate is located in walking surfaces, grates to have maximum 1/2" openings perpendicular to path of travel per CBC 1133B.7.2. If grates have elongated openings, the grate shall be placed so the long dimension is perpendicular to the dominant direction of travel.

2. Pre-cast concrete catch basin as manufactured by Brooks Products, Inc., San Diego Precast, or equal. Provide types and sizes as indicated on drawings, with traffic rated gate and frame, or equal. Grate and frame must be designed for HS20 loading.

3. All catch basins must have a cast in place concrete bottom, formed to line and grade of the incoming and outgoing pipes. Absolutely no “wye” connections.

C. Pre-Cast Concrete Manhole: 48 inch diameter pre-cast concrete manhole with eccentric entrance cone and grade rings as specified in the Standard Specifications of the **local Water District**. Larger manholes may be required as indicated on the plans. All manholes shall have cast in place concrete bottoms, formed to line and grade of incoming and outgoing pipes. All manholes shall be sealed in accordance with ASTM 2414.

D. Concrete:

1. Concrete for catch basins, culverts, and other drainage structures shall be 3000 psi concrete at 28 days and conform to the concrete specification 03 30 00.

2. Prefabricated Drainage Structures: In accordance with Drawings.

E. Full Capture Drain Inserts – Install full capture drain inserts in all catch basins. Use Triton, by CONTECH Construction Products, Inc. or equal.

PART 3 - EXECUTION

3.01 TRENCHING

A. Excavate trenches per requirements stated in paragraph 1.03, Protection. Accurately shape and thoroughly compact trench bottom to grade. Excavate joint space when bells are used, so that the lowest 1/3 of pipe has firm bearing for its entire length. Lay pipe to lines and grades indicated with sections close jointed to form a smooth flow line. Keep trenches clean until installed work has been approved.

B. Compaction shall be performed and comply with the related requirements of Section 31 23 00 – Excavation and Fill.

3.02 LAYING PIPE AND JOINTS

A. The installation of pipe for the storm sewerage system shall be as specified in Section 306, latest edition of the Standard Specifications for Public Works Construction, and as shown on the Plans.

B. Lay pipe to lines and grades indicated with sections close jointed to form a smooth flow line. All connections to mainlines shall be made at a 45 degree angle, or greater.

C. Bedding material shall be clean sand as defined by Standard Specifications for Public Works Construction, current Edition (Green Book) Section 200-1.5, extending from 4-inches thick beneath the pipe to 12 inches above top of pipe. Place sand simultaneously on each side of the pipe, and thoroughly compact to provide lateral support for the line. Place remaining backfill in 6-inch layers above top of bedding material, moisten as required and compact with hand or pneumatic tampers. Compacting by flooding is prohibited.

D. Lay bell, hub or groove ends up-grade; accurately center the following spigots in them.

E. Reinforced Concrete Pipe: Lay pipe in accordance with APWA standards. Laser profile all RCP. Laser profiling should be conducted in accordance with NASSCO's Specification Guidelines SG-1.

F. Polyvinylchloride Pipe: Lay and bed in accordance with ASTM D2321.

G. Cast Iron Pipe: MG cast iron couplings with stainless steel bolts.

H. HDPE pipe: Lay and bed in accordance with Green Book specifications, and these specifications.

I. Unless otherwise indicated, lateral connections to main lines and angles in lines shall be made with the use of 45 degree wyes. 90 degree intersections are prohibited.

J. Provide temporary caps, etc., during progress of work to prevent dirt or other debris from blocking lines.

K. Provide running water test of system observed by an Inspector.

3.03 DRAINAGE STRUCTURES

A. Construct reinforced concrete outlet boxes shall be constructed in accordance with Section 03 30 00 of these specifications at the dimensions and at the places shown on the Drawings.

B. Manhole frame and cover, opening frame and anchors, ladder rings shall be as specified in the latest edition of the Standard Specifications for Public Works Construction.

C. Construct to design and elevations indicated. Exposed concrete work shall have a smooth troweled finish with rounded corners and edges finished plumb and true. Provide grates, frames and covers for catch basins as detailed and indicated.

D. Forms for concrete drainage structures shall be rigid and substantial. Plywood or tongue and grooved lumber shall be used for forming the exposed faces of concrete drainage structures. The top surfaces of the concrete shall be finished by bringing mortar to the surface by tamping, troweling smooth, and tooling the edges.

E. Forms shall be kept in place not less than five days after placing unless otherwise directed or approved. Concrete work shall be cured by keeping it continuously wet for not less than seven days after placing.

3.04 INSTALLATION OF PIPE CLEAN-OUTS

A. Install clean-outs at the places and at the sizes shown on the Plans.

B. Clean-outs shall be installed in accordance with standards of the local Water District.

3.05 INSTALLATION OF BOX-TYPE CATCH BASINS

A. Boxes shall be installed true to line and grade. Pipe shall be installed in the knock-out holes and grouted in place.

B. The pipe shall be neatly trimmed to a flush surface with the inside wall of the box and the grout shall be finished flush with the inside wall of the box.

C. A 12 inch wide by 4 inch thick Portland Cement concrete collar shall be placed around each of the inlet and outlet boxes. The collars shall be placed with the finished surface flush with the top of the boxes. Each collar shall receive a broom finish.

3.06 CONSTRUCTION OF OUTLET BOX

A. Construct reinforced concrete outlet box where indicated on the Drawings.

B. Install galvanized frames and grates where specified on the Drawings.

3.07 CLEAN-UP

A. Upon completion of the work, storm drain systems shall be left free from silt, debris and obstructions.

END OF SECTION

SECTION 33 44 19

UTILITY STORM WATER TREATMENT

PART 1 – GENERAL

1.01 SUMMARY

A. This section outlines actions required reduce water quality impacts from all construction activities and to achieve and maintain compliance with the California General NPDES Permit for Discharges Associated with Construction Activities where applicable. The work includes preparation and maintenance of a Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP) and implementation and maintenance of storm water pollution prevention Best Management Practices (BMPs) required to control discharges to the storm water conveyance system. These requirements shall apply to all construction related areas and activities associated with the project, such as staging areas, equipment and material storage sites, waste management areas, and borrow pit operations which may be outside the construction limits.

B. Related Documents

1. Section 31 10 00 – Site Clearing.

1.02 REFERENCES

A. State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES), General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Storm Water Permit) as amended, and/or modified http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo2009_0009_dwq.pdf).

B. City of San Diego Storm Water Ordinance (San Diego Municipal Code §43.03, *Storm Water Management and Discharge Control*). This ordinance prohibits non-storm water discharges into the City's storm water conveyance system, including disposal of construction-related pollutants or sediments into the street gutter or storm drain (http://clerkdoc.sannet.gov/Website/mc/mc.html).

C. California Storm Water Best Management Practices Handbook - Construction, January 2015, published by the California Stormwater Quality Association (www.cabmphandbooks.com).

D. Caltrans Construction Site Best Management Practices Handbook, May 2017 (http://csgcwwwace.dot.ca.gov/hq/construc/stormwater/CSBMP-May-2017-Final.pdf).

E. San Diego Regional M4 Permit .

1.03 SUBMITTALS

A. For projects with total disturbed soil area ≥ one acre:

1. Prior to the start of construction, the Contractor shall submit a SWPPP meeting the requirements of the current General Construction Storm Water Permit for all applicable phases of construction, including but not limited to: clearing, grading,

excavating, filling, construction, paving, finish work and landscaping.

2. Based on the complexity of the project, the District may elect to have the District's architect or design engineer prepare the SWPPP prior to the Contractor bid process. In this event the SWPPP shall be included in the bid specification for the Contractor. The Contractor may elect to make modifications to the SWPPP prior to construction. If the Contractor elects to modify the SWPPP, the modifications shall be submitted for review and approval by the District thirty days prior to construction. Modifications shall be subject to the review and approval of the District Project Manager or Construction Manager.

3. SWPPPs shall be prepared by Contractor personnel or a subcontractor familiar with pollutant identification and storm water BMPs. If the District elects to have the SWPPP prepared prior to the bid process, the District's architect or design engineer may select an independent qualified engineer or qualified subcontractor to prepare the SWPPP. At a minimum, the preparer shall have completed at least 8 hours of training in construction storm water BMPs at courses offered by the Association of General Contractors, the Engineering General Contractors Association, local regulatory agencies, the International Erosion Control Association or other organizations acceptable to the District. Alternatively, the preparer shall be registered as a Certified Professional in Erosion and Sediment Control (CPESC) or a Professional Civil Engineer.

4. The SWPPP shall include, but not be limited to, site information, identification of potential pollutants, and identification of appropriate storm water pollution prevention BMPs to be utilized by the Contractor throughout the duration of the project, designed to prevent unauthorized discharges. The SWPPP shall also include provisions for BMP maintenance, inspection, and repair and employee training. SWPPP BMPs shall include erosion and sediment controls, non-storm water management controls, materials and waste management controls, and post-construction storm water management controls. The SWPPP shall also include site plans with details of appropriate BMPs to be implemented and their locations for each phase of work. As with the SWPPP itself, these site plans must be updated as necessary when changes occur.

5. The SWPPP shall include Sampling and Analysis Plans (SAPs) for non-visible pollutants and sediment (for any sites which discharge directly to water bodies that are 303(d)-listed as water quality impaired for sediment, siltation or turbidity – see the website referenced in Section 31 10 00, Item 1.02, A for more information).

6. The Contractor is responsible for preparing the Notice of Intent, Annual Compliance Certification and Notice of Termination for signature by the District and District submittal to the SWRCB.

7. The Contractor shall provide a complete copy of the SWPPP including all amendments and monitoring data (inspection reports and laboratory analysis reports) to the District upon completion of the project.

B. For projects with total disturbed soil area < one acre or no disturbed soil area:

1. Submit the name, title, work phone number and emergency phone number for the Contractor's designated person responsible for storm water pollution prevention. This person must be at the site throughout the project and will be responsible for ensuring compliance with requirements of this section. This

person is also responsible for notifying the District of any non-compliance.

2. Submit a WPCP that identifies potential construction-related pollutants and BMPs that will be used to prevent pollutants from discharging to the storm drain system. The WPCP shall include a site map identifying the direction of runoff flow, storm drain inlets or other off-site runoff discharge locations, areas of work, staging areas, construction site access points, and location where BMPs will be applied.

C. SWPPP and WPCP Approval - The Contractor shall submit the SWPPP or WPCP at least thirty days prior to the scheduled start of construction to allow time for District review and approval. Work shall not be started until the SWPPP has been acknowledged by the Chief Operating Officer of the District and accepted by the District Project Manager or Construction Manager. Subsequent modifications and amendments to the SWPPP and WPCP are subject to the review and approval of the District Project Manager or Construction Manager.

1. If the District's architect or design engineer prepares the SWPPP, the SWPPP shall be submitted at least thirty days prior to the scheduled Contractor bid process to allow time for District review and approval. The SWPPP shall be approved by the Chief Operating Officer of the District and accepted by the District Project Manager or Construction Manager.

D. Other Submittal procedures and quantities are specified in Section 01 33 00.

1.03 RESPONSIBILITIES OF THE DISTRICT

A. The District shall be responsible for signing and submitting the Notice of Intent, Annual Compliance Certification and Notice of Termination to the SWRCB along with submittal of standard annual permit fees.

B. The District shall be responsible for maintaining a copy of the NOI, SWPPP (provided by the Contractor upon completion of the project), and NOT and other associated documents in accordance with "Retention of Records" provisions of the General Permit.

PART 2 – PRODUCTS

2.01 GENERAL

A. Products shall be as shown in the SWPPP or WPCP and specified in the publications listed in Section 31 10 00, Item 1.02.

B. The Contractor shall have adequate materials on site to quickly deploy BMPs to protect the exposed portions of the site and to prevent sediment and pollutant discharges from the site.

C. Erosion control BMPs may include but are not limited to: scheduling, slope roughening, preservation of existing vegetation, hydraulic mulches, temporary seeding, soil stabilizers and binders, bonded fiber matrix (BFM), erosion control blankets, and plastic covers. Temporary sediment control BMPs may include but are not limited to linear sediment barriers (e.g., silt fence, fiber rolls, gravel bag berms), sediment traps, storm drain inlet protection, tracking controls, and dust control. Non-storm water management BMPs may include but are not limited to: pavement cutting, vehicle and equipment cleaning, vehicle and equipment fueling and maintenance. Materials and Waste Management BMPs may include but are not limited to: material storage, stockpiles, spill prevention and control,

clean up, and concrete waste management.

PART 3 – EXECUTION

3.01 GENERAL

A. Comply with all provisions of the State Water Resources Control Board, National Pollutant Discharge Elimination System (NPDES), General Permit No. CAS000002, including requirements to collecting and analyzing storm water samples for non-visible pollutants and sediment/siltation, as described in the permit and as applicable to the project.

B. Comply with all provisions of the City of San Diego Storm Water Ordinance (San Diego Municipal Code §43.03, *Storm Water Management and Discharge Control*).

C. Allowable Non-Storm Water Discharges: In accordance with the City of San Diego Storm Water Ordinance, the following non-storm water discharges to the storm drain system (including canyons and creeks) are allowable upon the condition that the discharges do not cause or contribute to the violation of any Plan Water Quality objective and are not a significant source of pollutants:

1. Water line flushing and other discharges from potable or raw water supply sources.

2. Landscape irrigation and lawn watering.

3. Rising ground waters or springs.

4. Uncontaminated pumped groundwater not subject to any applicable NPDES permit.

5. Passive foundation and footing drains.

6. Water from crawl space pumps.

7. Air conditioning condensation.

8. Non-commercial and residential washing of vehicles.

9. Flows from riparian habitats and wetlands.

10. Dechlorinated swimming pool discharges.

11. Flows from fire fighting.

To assure that allowable non-stormwater discharges do not become a significant source of pollutants, the SWPPP or WPCP must identify the BMPs that will be implemented to control the discharge. The purpose of such BMPs is to prevent the allowable non-stormwater discharges from picking up and conveying pollutants from sources that may be in the discharge flowpath. Additionally, wherever feasible, alternatives that would not result in discharge of allowable non-stormwater discharges should be implemented.

D. Prohibited Non-Storm Water Discharges: All other discharges to the storm drain system are prohibited including but not limited to: process and wash waters, dust, petroleum products, soil or sediment, litter or debris, paint or other construction-related wastes or materials. The Contractor shall be responsible for clean-up, mitigation, and penalties resulting from failure to implement and maintain appropriate BMPs for pollution prevention.

3.02 IMPLEMENTATION OF STORM WATER BMPS

A. The Contractor shall implement appropriate BMPs to prevent and/or control potential discharges and to protect the storm water conveyance system from any and all activities with the potential to release materials directly or indirectly into the storm water conveyance system.

B. Details and working drawings for BMPs are provided in the references listed in Section 03 10 00, Item 1.02. The Contractor shall provide an effective combination of Erosion and Sediment control BMPs, Non-Storm Water Management BMPs, and Materials and Waste Management BMPs.

C. For projects with total disturbed soil area ≥ one acre:

1. Implement approved SWPPP as submitted per Section 31 10 00, Item 1.03, A.

D. For projects with total disturbed soil area < one acre:

1. Implement approved WPCP as submitted per Section 31 10 00, Item 1.03, B.

3.03 TRAINING

A. Contractor shall ensure that training on this special condition is given to all employees and subcontractors involved in construction activities. This training shall include but not be limited to the location of the storm drains on the job site; the direct link between the storm drain system and the bay; potential pollutants; and BMP installation, inspection, maintenance and repair.

3.04 NOTIFICATION

A. The Contractor shall notify the Project Inspector/Construction Manager immediately of any unauthorized releases to the storm drain. The Contractor shall immediately document all unauthorized releases including but not limited to the time, date and duration, material released, and action taken to stop discharge and prevent future discharges. Documentation shall be provided to the Engineer and included in the SWPPP.

3.05 MAINTENANCE, INSPECTION, AND REPAIR OF BMPS

A. The Contractor shall inspect BMPs before predicted rain events, and after rainfall. For prolonged events, greater than 24 hours, the Contractor shall inspect BMPs during the rain storm.

B. The Contractor shall inspect BMPs in accordance with procedures identified in the references identified in Section 31 10 00, Item 1.02.

C. The Contractor shall closely examine each BMP for 1) structural integrity; 2) sediment accumulation greater than 1/3 total depth; 3) evidence of excessive sediment downstream of BMPs or the site; and 4) evidence of other construction materials washed off-site.

D. If a selected BMP fails or requires maintenance, it shall be maintained, repaired, modified, or replaced with an acceptable alternate as soon as it is safe to do so.

3.06 AUTHORITY OF THE ENGINEER

A. The Engineer of Record/Architect of Record or Storm Water Manager has the authority to limit the surface area of soils exposed by clearing and grubbing, excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary BMPs to minimize pollutant transport. The Engineer has the authority to require BMPs to be installed or maintained by the Contractor at any time and to stop or delay work that could result in pollutant transport, until such time as the Contractor provides adequate BMP protection.

PART 4 - MEASUREMENT AND PAYMENT

4.01 Storm Water Pollution Prevention will be paid for at the Contract lump sum amounts for the below items:

A. Preparation of the SWPPP
B. Construction BMPs
C. Inspection of Construction BMPs
D. Maintenance of Construction BMPs
E. Collection and Analysis of Storm Water Samples

These amounts shall include full compensation for furnishing all labor, materials, equipment, tools, and incidentals and for doing all the work of these items, complete in place, including cleanup, as specified in these Specifications.

END OF SECTION

SECTION 33 46 13

FOUNDATION DRAINAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Prefabricated drainage membrane systems for below-grade vertical applications, as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 04 22 00 – Concrete Unit Masonry.

1.02 WARRANTY

A. Provide two year unconditional guarantee against defects of materials and workmanship which allows water or moisture into areas of the structure which were to be protected by this membrane. Pay for costs of repairing or replacing the defective membrane, as well as costs of exposing and recovering membrane, and consequential damages to persons and property resultant of defective materials or workmanship.

PART 2 - PRODUCTS

2.01 FOUNDATION DRAINAGE SYSTEM: Foundation drainage systems are to be a molded sheet drainage panel system.

A. Acceptable Manufacturers:

1. Amerdrain 500 by American Wick Drain Crop.
2. Hydroduct by W.R. Grace & Co.

B. Use a prefabricated, composite drainage system made with drainage core and filter fabric with a minimum flow rate of 15 gpm/foot at 1 hydraulic gradient and 3,600 psf normal pressure.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install systems using waterproofing installers. Roofing trades will not be acceptable to perform this work.

B. Install systems in strict accordance with manufacturer's specifications. Obtain manufacturer's approval of substrate conditions prior to installing materials.

C. Provide reinforcing strips, and backer rods necessary for joints and cracks.

END OF SECTION