ADDENDUM NO. 01

TO: All Registered Bidders

DATE: April 18, 2024

PROJECT: IRVINE UNIFIED SCHOOL DISTRICT
Bid No. 23/24-04MO, Deferred Maintenance: HVAC Equipment Replacement Project at Rancho San Joaquin Middle School

CONTACT: Maria Ragas, Irvine Unified School District
MariaRagas@iusd.org

This Addendum forms a part of the Contract Documents for the Project described above and shall supersede referenced sections of the original Bidding Documents. This Addendum is an integral part of said Bidding Documents and shall be acknowledged in the Contractor's Bid Proposal form. Failure to acknowledge receipt of this Addendum in the Bid may cause the Bid to be rejected.

This addendum is divided into seven (7) parts: Instructions and Procedures, Public Works Bid Package, Project Specifications, Drawings, Prior Addenda, Other Documents, and Pre-Bid Questions.

I. INSTRUCTIONS AND PROCEDURES

1. The following changes, omissions and/or additions to the Bid Specification shall apply to proposals made for and to the execution of the various parts of the work affected thereby, and all other conditions shall remain the same.

2. Careful note of the Addendum shall be taken by all parties of interest so that the proper allowance may be made in all computations and estimates, and all trades affected shall be fully advised in the performance of the work which will be required of them.

3. In case of conflict between the Drawings, Specifications, and this Addendum, this Addendum shall govern.

4. Upon receipt of this Addendum, please acknowledge receipt on the bid form.

II. PUBLIC WORKS BID PACKET

1. **NOTICE CALLING FOR BIDS**, Revise the following dates;

   - Bid Deadline has been rescheduled from May 2, 2024 at 1:00 p.m. to **May 16, 2024 at 1:00 p.m.**

   - The deadline for receiving Questions regarding the bid shall be extended from April 19, 2024 by 5:00 p.m. to **May 1, 2024 by 5:00 p.m.**

2. **SUPPLEMENTAL CONDITIONS**

1.09 ATTACHMENTS

- Replace Exhibit "A" Contract Document Listing with the new Addendum No. 1 Exhibit "A" Contract Document Listing.

III. PROJECT SPECIFICATIONS

1. Discard project specifications for Rancho San Joaquin Middle School – HVAC Replacement previously issued and replace with the Rancho San Joaquin Middle School – HVAC Replacement DSA approved specifications, DSA approval date 04/09/2024.

IV. DRAWINGS

1. Discard project drawings for Rancho San Joaquin MS: HVAC Replacement previously issued and replace with the Rancho San Joaquin MS: HVAC Replacement DSA approved drawings, DSA approval date 04/09/2024.

V. CHANGES TO PRIOR ADDENDA

None.

VI. OTHER DOCUMENTS

Addendum No. 1 – Ruhnau Clarke Architects Notice to Bidders.

VII. PRE-BID QUESTIONS

1. Question: Are other manufacturers for the mechanical units able to be used on this project?

   Response: There is no proprietary specification for the mechanical units. Any product or equipment model that is not specified within the bid documents will be considered a substitution and is to follow the procedural requirements for proposed substitutions as reflected within SECTION 01 25 00 SUBSTITUTION PROCEDURES of the project Specifications.

2. Question: Does Exhibit E – Base Bid Schedule reflect a required Construction Duration time period if equipment procurement and installation can occur prior to Summer 2025?

   Response: As stated within **I.**5. of Exhibit C Trade Specific Inclusions, "*The Bid Schedule indicates milestones as well as planned start and completion dates for the construction period. Contractor is to prepare and submit a detailed construction schedule to the District…*" Contractor can coordinate work, if approved by the District, to occur during school break periods where staff and

students are not onsite. For the sake of this bid, assume a Summer 2025 Construction Duration time period.

3. Question: Please advise if the units from Seasons 4 are being purchased by the contractor or by IUSD?

   Response: The awarded contractor for this project will be responsible for the furnishing and installing of all equipment and materials related to the project scope reflected within the bid documents, project drawings, and project specifications.

4. Question: Section 23 09 13 Section 1.07B notes “Correct defective work within a five-year period after substantial completion.” Alternatively, under section 23 09 23 1.03.A notes “Components, system software, and parts shall be guaranteed against defects in materials, fabrication, and execution for (1) year from date of system acceptance.” Please confirm warranty duration.

   Response: Manufacturer’s warranty requirements are to be consistent with the requirements specified within the project specifications. The awarded contractor for this project will be held to a (1) year warranty duration as defined in ARTICLE 46. GURANTEE of the General Conditions and Supplemental Conditions.

5. Question: 23 09 23 3.01.B notes “Plenum wire may be used in ceilings where anchored support is provided every 10 feet.” But on drawing M1-1.0, where control wiring installation is required does not list if plenum wire will be acceptable. Please confirm if plenum-rated wire will be acceptable.

   Response: As noted within Specification Section 23 09 23 3.01B “Plenum wire may be used in ceilings where anchored support is provided every 10 feet.” As this Section and drawing sheet M1-1.0 indicates, the requirement for electrical metallic tubing (EMT) and rigid metal conduit (RMC) applications still apply as noted.

6. Question: It has been brought to our attention that Multizone MZ-B1 is equipped with line-side aluminum power feed wiring from the breaker to the unit. Please confirm if the contractor is responsible for its replacement.

   Response: As noted on sheet E0.2 PLAN NOTES 1. “DISCONNECT EXISTING POWER FEEDER FROM EXISTING ROOF TOP MULTI-ZONE HVAC UNIT TO BE REPLACED. INTERCEPT THE EXISTING FEEDER CONDUIT WITH CONDUCTORS AND EXTEND WITH SAME SIZE CONDUIT AND WIRING AS REQUIRED IN ORDER TO TERMINATE AT NEW FUSED DISCONNECT SAFETY SWITCH PROVIDED WITH THE HVAC UNIT.” The scope of this project is for the contractor to disconnect the existing feeder/conduit from the unit that will be replaced and reconnect and terminate existing feeder/conduit to new unit as required.

7. Question: Please confirm if the contractor is responsible for the fire life safety safe-off and subsequent reconnections. If so, who is the preferred vendor?

   Response: Yes. The contractor will be responsible for the scope of the fire life safety improvements which includes the safe-off and subsequent reconnections. Bidders are to refer to Specification Section 28 46 20 Fire Alarm System for the required qualifications for the fire alarm installer.

VIII. ALTERNATES

None.

END OF ADDENDUM

Bid No. 23/24-04MO,
Deferred Maintenance: HVAC Equipment Replacement Project
at Rancho San Joaquin Middle School

IRVINE UNIFIED SCHOOL DISTRICT
IRVINE, CA

EXHIBIT "A" CONTRACT DOCUMENT LISTING

ADDENDUM No. 1

April 18, 2024

EXHIBIT "A"
CONTRACT DOCUMENT LISTING
BID NO. 23/24-04MO, DEFERRED MAINTENANCE: HVAC EQUIPMENT REPLACEMENT PROJECT AT RANCHO SAN JOAQUIN MIDDLE SCHOOL
March 25, 2024
ADDENDUM No. 1 April 18, 2024

The listing below comprises all of the "plan" documents included within the bid documents under this contract. Unless otherwise noted, all documents prepared for the Bid No. 23/24-04MO, Deferred Maintenance: HVAC Equipment Replacement Project at Rancho San Joaquin Middle School are from Ruhnau Clarke Architects.

DRAWINGS

ITEM	SHEET	DESCRIPTION	PREPARED BY	ISSUED DATE	DSA APPROVED DATE
1	G-1	TITLE SHEET & SHEET INDEX	Ruhnau Clarke Architects	4/18/2024	4/09/2024
2	AS-2.0	OVERALL SITE PLAN	Ruhnau Clarke Architects	4/18/2024	4/09/2024
3	A1-3.0	ROOF PLAN	Ruhnau Clarke Architects	4/18/2024	4/09/2024
4	A1-3.1	ROOF PLAN	Ruhnau Clarke Architects	4/18/2024	4/09/2024
5	A1-3.2	ROOF PLAN	Ruhnau Clarke Architects	4/18/2024	4/09/2024
6	A1-3.3	ROOF PLAN	Ruhnau Clarke Architects	4/18/2024	4/09/2024
7	M0-0.1	LEGEND & SYMBOLS, GENERAL NOTES	Zero & Associates	4/18/2024	4/09/2024
8	M0-0.2	MECHANICAL SCHEDULES AND DETAILS	Zero & Associates	4/18/2024	4/09/2024
9	M1-1.0	OVERALL FIRE ACCESS PLAN	Zero & Associates	4/18/2024	4/09/2024
10	M1-1.1	EMS CONTROLS	Zero & Associates	4/18/2024	4/09/2024
11	M1-1.2	EMS CONTROLS	Zero & Associates	4/18/2024	4/09/2024
12	M1-2.0	HVAC DEMOLITION PLAN	Zero & Associates	4/18/2024	4/09/2024
13	M1-3.0	HVAC ROOF PLAN – BLDG. A1, A2, AND B	Zero & Associates	4/18/2024	4/09/2024
14	M1-3.1	HVAC ROOF PLAN – BLDG. G AND H	Zero & Associates	4/18/2024	4/09/2024
15	M1-3.2	HVAC ROOF PLAN – BLDG. E AND F	Zero & Associates	4/18/2024	4/09/2024
16	M1-3.3	HVAC ROOF PLAN – BLDG. C	Zero & Associates	4/18/2024	4/09/2024
17	M2-1.0	AIR BALANCE BLDG. A1 AND A2	Zero & Associates	4/18/2024	4/09/2024
18	M2-1.1	AIR BALANCE BLDG. G AND H	Zero & Associates	4/18/2024	4/09/2024
19	M2-1.2	AIR BALANCE BLDG. E AND F	Zero & Associates	4/18/2024	4/09/2024

20	M2-1.3	AIR BALANCE BLDG. B AND C	Zero & Associates	4/18/2024	4/09/2024
21	MT-0.1	TITLE 24 CALCULATIONS AND MANDATORY MEASURES	Zero & Associates	4/18/2024	4/09/2024
22	MT-0.2	TITLE 24 CALCULATIONS	Zero & Associates	4/18/2024	4/09/2024
23	MT-0.3	TITLE 24 CALCULATIONS	Zero & Associates	4/18/2024	4/09/2024
24	E0.1	SYMBOL LIST GENERAL NOTES	FBA Engineering	4/18/2024	4/09/2024
25	E0.2	SINGLE LINE DIAGRAM	FBA Engineering	4/18/2024	4/09/2024
26	E0.3	ELECTRICAL DETAILS	FBA Engineering	4/18/2024	4/09/2024
27	E0.4	FIRE ALARM SYSTEM DETAILS AND NOTES	FBA Engineering	4/18/2024	4/09/2024
28	E0.5	FIRE ALARM SYSTEM RISER DIAGRAM	FBA Engineering	4/18/2024	4/09/2024
29	ES-1.0	OVERALL SITE ELECTRICAL PLAN	FBA Engineering	4/18/2024	4/09/2024
30	ES-1.1	ENLARGED SITE ELECTRICAL PLAN	FBA Engineering	4/18/2024	4/09/2024
31	E1-2.1	FIRE ALARM PLANS – BLDGS A1 AND B	FBA Engineering	4/18/2024	4/09/2024
32	E1-2.2	FIRE ALARM PLAN- BLDG C	FBA Engineering	4/18/2024	4/09/2024
33	E1-2.3	FIRE ALARM PLANS – BLDGS E,G AND H1	FBA Engineering	4/18/2024	4/09/2024
34	E1-3.1	ROOF ELECTRICAL PLAN BUILDING A1,A2 & B	FBA Engineering	4/18/2024	4/09/2024
35	E1-3.2	ROOF ELECTRICAL PLAN BUILDING H1, G & F	FBA Engineering	4/18/2024	4/09/2024
36	E1-3.3	ROOF ELECTRICAL PLAN BUILDING E	FBA Engineering	4/18/2024	4/09/2024
37	E1-3.4	ROOF ELECTRICAL PLAN BUILDING C	FBA Engineering	4/18/2024	4/09/2024

SPECIFICATION MANUALS

DIVISION	SECTION TITLE	AUTHOR	ISSUED DATE	DSA APPROVED DATE
00 01 01	PROJECT TITLE PAGE	Ruhnau Clarke Architects	4/18/2024	4/09/2024
00 01 02	PROJECT INFORMATION	Ruhnau Clarke Architects	4/18/2024	4/09/2024
00 01 07	SEALS PAGE	Ruhnau Clarke Architects	4/18/2024	4/09/2024
00 01 10	TABLE OF CONTENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
00 40 25	REQUEST FOR INFORMATION	Ruhnau Clarke Architects	4/18/2024	4/09/2024

00 43 25	SUBSTITUTION REQUEST FORM – DURING PROCUREMENT	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 10 00	SUMMARY	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 20 00	PRICE AND PAYMENT PROCEDURES	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 30 00	ADMINISTRATIVE REQUIREMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 30 00.01	REQUEST FOR INTERPRETATION	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 32 16	CONSTRUCTION PROGRESS SCHEDULE	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 35 50	REQUESTS FOR ELECTRONIC FILES	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 35 53	SECURITY PROCEDURES	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 40 00	QUALITY REQUIREMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 41 00	REGULATORY REQUIREMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 42 19	REFERENCE STANDARDS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 45 33	CODE-REQUIRED SPECIAL INSPECTIONS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 50 00	TEMPORARY FACILITIES AND CONTROLS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 55 00	VEHICULAR ACCESS AND PARKING	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 60 00	PRODUCT REQUIREMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 61 16	VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 61 16.01	ACCESSORY MATERIAL VOC CONTENT CERTIFICATION FORM	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 70 00	EXECUTION AND CLOSEOUT REQUIREMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 71 23	FIELD ENGINEERING	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 78 00	CLOSEOUT SUBMITTALS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 78 00.01	WARRANTY FORM LETTER	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 78 39	PROJECT RECORD DOCUMENTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
01 79 00	DEMONSTRATION AND TRAINING	Ruhnau Clarke Architects	4/18/2024	4/09/2024
02 41 00	DEMOLITION	Ruhnau Clarke Architects	4/18/2024	4/09/2024

06 10 00	ROUGH CARPENTRY	Ruhnau Clarke Architects	4/18/2024	4/09/2024
07 01 50.20	ROOFING, RESTORATION, PATCH, AND REPAIR	Ruhnau Clarke Architects	4/18/2024	4/09/2024
07 62 00	FLASHING AND SHEET METAL	Ruhnau Clarke Architects	4/18/2024	4/09/2024
07 92 00	JOINT SEALANTS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
22 10 05	PLUMBING PIPING	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 05 53	IDENTIFICATION FOR HVAC EQUIPMENT	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 05 93	TESTING, ADJUSTING, AND BALANCING FOR HVAC	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 08 00	COMMISSIONING OF HVAC	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 09 13	INSTRUMENTATION AND CONTROLS DEVICES FOR HVAC	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 09 23	DIRECT DIGITAL CONTROL SYSTEM FOR HVAC	Ruhnau Clarke Architects	4/18/2024	4/09/2024
23 74 50	CUSTOM MULTIZONE UNITS – HVAC EQUIPMENT	Ruhnau Clarke Architects	4/18/2024	4/09/2024
26 01 00	ELECTRICAL GENERAL PROVISION	Ruhnau Clarke Architects	4/18/2024	4/09/2024
26 05 00	BASIC ELECTRICAL MATERIALS AND METHODS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
26 05 33	CONDUIT AND WIRE	Ruhnau Clarke Architects	4/18/2024	4/09/2024
26 24 16	PANELBOARDS AND TERMINAL CABINETS	Ruhnau Clarke Architects	4/18/2024	4/09/2024
28 46 20	FIRE ALARM SYSTEM	Ruhnau Clarke Architects	4/18/2024	4/09/2024

SECTION 00 01 01
PROJECT TITLE PAGE

FOR

RANCHO SAN JOAQUIN MIDDLE SCHOOL – HVAC REPLACEMENT

IRVINE UNIFIED SCHOOL DISTRICT

5050 BARRANCA PARKWAY, IRVINE CA 92604

IUSD.ORG

IRVINE, CA

RANCHO SAN JOAQUIN MIDDLE SCHOOL

4861 MICHELSON DR., IRVINE, CA 92612

IRVINE, CALIFORNIA 92612

PREPARED BY:

ARCHITECT

RUHNAU CLARKE ARCHITECTS

3775 Tenth Street, Riverside CA 92501 - 5751 Palmer Way, Suite C, Carlsbad, CA 92010

951.684.4664 - 760.438.5899

www.ruhnauclarke.com

SECTION 00 01 02
PROJECT INFORMATION

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Project Name: Rancho San Joaquin Middle School – HVAC Replacement, located at: 4861 Michelson Dr., Irvine, CA 92612.

Rancho San Joaquin Middle School.

4861 Michelson Dr.

Irvine, California 92612

B. The Owner, hereinafter referred to as District: Irvine Unified School District

Irvine Unified School District

5050 Barranca Parkway, Irvine CA 92604

iusd.org

(949) 936-5000

1.02 NOTICE TO PROSPECTIVE BIDDERS

A. These documents constitute an Invitation to Bid to and request for qualifications from General Contractors for the construction of the project described below.

1.03 PROJECT DESCRIPTION

A. Summary Project Description: Remove and Replace existing Multi-Zone HVAC units.

B. Contract Scope: Construction, demolition, and renovation.

C. Contract Terms: Lump sum (fixed price, stipulated sum).

1.04 PROJECT CONSULTANTS

A. The Architect, hereinafter referred to as Architect: **Ruhnau Clarke Architects**

3775 Tenth Street, Riverside CA 92501 - 5751 Palmer Way, Suite C, Carlsbad, CA 92010

www.ruhnauclarke.com

951.684.4664 - 760.438.5899

1.05 PROCUREMENT TIMETABLE

A. Last Request for Substitution Due: 14 days prior to due date of bids.

B. Last Request for Information Due: 14 days prior to due date of bids.

C. Contract Time: To be stated in bid documents.

D. The District reserves the right to change the schedule or terminate the entire procurement process at any time.

1.06 PROCUREMENT DOCUMENTS

A. Availability of Documents: Complete sets of procurement documents may be obtained:

1. From District at the Project Manager's address listed above.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

SECTION 00 01 07
SEALS PAGE

ARCHITECT OF RECORD (AOR)

RUHNAU CLARKE ARCHITECTS

3775 Tenth Street, Riverside CA 92501 - 5751 Palmer Way, Suite C, Carlsbad, CA 92010

Roger Clarke, Architect of Record C-21340

David Ruhnau, Architect of Record C-20662

STRUCTURAL ENGINEER OF RECORD (SEOR)

RTM ENGINEERING CONSULTANTS

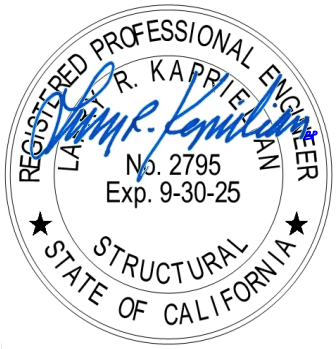
9931 MUIRLANDS BOULEVARD

IRVINE, CA 92618

Larry Kaprielian

larry.kaprielian@rtmec.com

949.462.3200



MECHANICAL ENGINEER OF RECORD (MEOR)

ZERO & ASSOCIATES

711 W 17TH STREET, SUITE D-6

COSTA MESA, CA 92627-4344

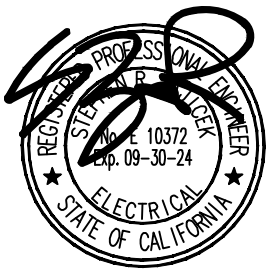
Lawrence Zero

zeroassoc@aol.com

949.515.4333

ELECTRICAL ENGINEER OF RECORD (EEOR)

FBA
150 PAULARINO AVENUE, SUITE A120
COSTA MESA, CA 92626
Steve Zajicek
stevez@fbaengr.com
949.852.9995



END OF SEALS PAGE

SECTION 00 01 10
TABLE OF CONTENTS

END OF SECTION

SECTION 00 40 25
REQUEST FOR INFORMATION

RFI NUMBER: _____ DATE: _____

PROJECT NAME: RANCHO SAN JOAQUIN MS-HVAC REPLACEMENT

PROJECT NO.: 13438

TO: RUHNAU CLARKE ARCHITECTS

. Construction Manager

Attention: _____

Contractor: _____

Address:_____

_____

Request By: _____ Date: _____

BRIEF SUMMARY OF RFI: _____

_____

_____

Drawing No. _____ Detail No. _____

Specification Section _____ Title _____

.Page _____ Paragraph _____

DETAILS OF THIS RFI: _____

_____

_____

_____

_____

_____

_____

_____

_____

Attachments: _____

_____

RESPONSE WILL BE INCLUDED IN AN ADDENDUM

END OF RFI

SECTION 00 43 25
SUBSTITUTION REQUEST FORM - DURING PROCUREMENT

SUBSTITUTION REQUEST NO. _____

DATE: _____

PROJECT NAME: RANCHO SAN JOAQUIN MS – HVAC REPLACEMENT

PROJECT NUMBER: 13438

TO: RUHNAU CLARKE ARCHITECTS

. Construction Manager

From: _____

We hereby submit for your consideration the following product comparisons of the specified product and the proposed substitution. The undersigned fully understands that failure to answer any item below may be cause for rejection of request for substitution.

Request for substitution shall only be made during bidding (not later than 7 days prior to bid opening for inclusion by Addendum) except under conditions beyond control of Contractor.

SPECIFIED PRODUCT: _____

Project Manual Section Title _____ Number ___ Page ____ Paragraph ___.

Drawing No. _____ Detail No. _____

Proposed Substitution: _____

_____

Manufacturer: _____ Tel: _____

A. Is the point-by-point comparative data attached? — REQUIRED BY A/E

B. Reason request for substitution is being submitted: _____

_____

_____

DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED PRODUCT

C. Does proposed substitution affect in any way the Structural Safety, Access Compliance, or Fire & Life Safety portions of the project? No__ Yes__

Explain _____

_____

D. Does proposed substitution affect dimensions, gages, weights, etc. on Drawing? No__ Yes__

Explain _____

_____

E. Does proposed substitution require changes in Drawings or design and installation changes? No___ Yes___ _____
(If yes, cost of these changes is the responsibility of the Contractor.)

F. Does proposed substitution affect product cost, delivery time, or construction schedule? No___Yes___ Explain _____

G. Does proposed substitution comply with specified ICC Number, UL Rating, ASTM Numbers? No___ Yes___ Explain
_____

H. Does proposed substitution affect other trades and systems such as wiring, piping, ductwork, structure, etc.? No ____ Yes ____ (Explain which and how) _____
_____
_____
_____

I. Does proposed substitution product guarantee differ from that of the specified product? No___ Yes___ Explain _____
_____
_____

Attach a listing of 3 similar projects (one in service for at least 3 years) using the proposed substitution.

Substantiating Data: Attach product data/brochures and Vendor qualifications for both specified and substitute product. Provide samples for both specified and substitute products, if applicable.

Certification: Undersigned has examined Construction Documents, is familiar with specified product, understands indicated application of product, and understands design intent of the Architect caused by the requested substitution.

Submitted by: _____ _____ _____
.(Type Name) Signature Date

Signature must be made by person having legal authority to bind his firm to the above terms.

END OF SECTION

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Rancho San Joaquin MS – HVAC Replacement

B. District's Name: Irvine Unified School District.

C. Architect's Name: Ruhnau Clarke Architects.

D. The Project consists of the removal and replacement of existing Multi-Zone HVAC units at Rancho San Joaquin Middle School.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Owner-Contractor Agreement.

B. The Work: Removal and replacement of existing Multi-Zone HVAC units at Rancho San Joaquin Middle School.

1.03 CONTRACT DOCUMENTS

A. Contract Requirements:

1. Conditions of the Contract and other Contract documents have been included in the Project Manual, as indicated in the Table of Contents.
    a. Such documents are not Specifications.
2. Specifications are found in Divisions 01 through 33 of the Project Manual.

B. Contract Drawings: The Drawings provided with and identified in the Project Manual are the Drawings referenced in the Agreement.

1. The location, extent and configuration of the required construction and improvements are shown and noted on Drawings.
    a. The Drawings are referenced in the Agreement.
    b. An index of Drawings is included in the set of Drawings.
2. Drawings are arranged into series according to design discipline. Such organization and all references to trades, subcontractor, specialty contractor or supplier shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of the Work to be performed by any trade.
3. Where the terms "as shown", "as indicated", "as noted", "as detailed", "as scheduled", or terms of like meaning, are used in the Drawings or Specifications, it shall be understood that reference is being made to the Drawings referenced in the Agreement.
4. Where reference to the word "plans" is made anywhere in Drawings, Specifications and related Contract Documents, it shall be understood to mean the Drawings referenced in the Agreement.

C. Contract Specifications: The Specifications provided in the Project Manual are the Specifications referenced in the Agreement.

1. Specifications are organized by Divisions and Sections in accordance with the recommended practices of the Construction Specifications Institute.

a. Such organization shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

2. Specifications are included in the Project Manual, which may also include other Bidding and Contract Documents.

a. Contents of the Project Manual are listed in Document 00 01 10 - Table of Contents, in the Project Manual.

1.04 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.

1. The intent of these drawings and specifications are the work of the alteration, rehabilitation, or reconstruction of this facility shall be submitted and approved by DSA before proceeding with the repair work. CAC Section 4-317.

B. Scope of alterations work is indicated on drawings.

C. Mechanical: Alter existing system and keep existing ductwork in operation.

D. Plumbing: Alter existing system and add new construction, keeping existing in operation.

E. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

1.05 WORK BY OWNER

A. Concurrent Work Under Separate Contracts:

1. Work Under Separate Contracts: District will award separate contracts for products and installation for interior improvements and other work as may be indicated on Drawings as NIC (Not in Contract).

2. Relationship to Work Under the Contract:

a. Work under the Contract shall include all provisions necessary to make such concurrent work under separate contracts complete in every respect and fully functional, including field finishing.

b. Provide necessary backing, supports, piping, conduit, conductors and other such provisions from point of service to point of connection, as shown on Drawings and specified herein.

3. Related Contract Documents:

a. District will make available, in a timely manner, drawings and specifications of work under separate contracts for coordination and further description of that work.

b. Such drawings and other data required for the coordination of the work of separate contracts with the Work of this Contract may be included with the Contract Documents.

c. If so, they are provided for convenience only and are not to be considered Contract Documents produced by Architect or Architect's consultants.

4. Permits, Notices and Fees:

a. Permits, Notices and Fees: Notices required by and approvals required of authorities having jurisdiction for work under separate contracts and related fees will be solely the responsibility of District.

B. Items noted NIC (Not in Contract) will be supplied and installed by District before Substantial Completion.

C. District will supply the following for installation by Contractor:

1. Owner-Furnished Products: District may furnish, for installation by Contractor, products which are identified on the Drawings and in the Specifications as OFCI (Owner-Furnished/Contractor-Installed).

2. Relationship to Work Under the Contract:

a. Work under the Contract shall include all provisions necessary to fully incorporate such products into the Work, including, as necessary.

1) Fasteners.

2) Backing,.

3) Supports.

4) Piping.

5) Conduit.

6) Conductors.

7) Other such provisions from point of service to point of connection.

8) Field finishing, as shown on Drawings and specified herein.

b. See Section 01 30 00 - Administrative Requirements for additional requirements.

1.06 PERMITS, LICENSES AND FEES

A. Permits:

1. For Work included in the Contract, Contractor shall obtain all permits from authorities having jurisdiction and from serving utility companies and agencies.

2. District will reimburse Contractor for amount charged for such permits, without mark-up.

3. For Work performed under design/build basis, plan check and permit fees shall be included in the Contract Sum.

B. Licenses:

1. Contractor shall obtain and pay all licenses associated with construction activities, such as business licenses, contractors' licenses and vehicle and equipment licenses.

2. All costs for licenses shall be included in the Contract Sum.

C. Assessments:

1. District will pay all assessments and utility service connection fees. Costs of assessments shall not be included in the Contract Sum.

D. Test and Inspection Fees:

1. Contractor shall pay all fees charged by authorities having jurisdiction and from serving utility companies and agencies, for tests and inspections conducted by those authorities, companies and agencies.
2. District will reimburse Contractor for actual amount of such fees, without mark-up.
3. Refer to Section 01 40 00 - Quality Requirements for additional information on tests and inspections and responsibility for payment of fees.

1.07 OWNER OCCUPANCY

A. District intends to continue to occupy adjacent portions of the existing site during the entire construction period.

B. District intends to occupy the Project upon Substantial Completion.

C. Cooperate with District to minimize conflict and to facilitate District's operations.

D. Schedule the Work to accommodate District occupancy.

1.08 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Arrange use of site and premises to allow:

1. District occupancy.
2. Work by Others.
3. Work by District.
4. Use of site and premises by the public.

C. Provide access to and from site as required by law and by District:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Site Access:
    a. Limit access to site to indicated routes and access points as indicated.
    b. If routes and access points are not indicated, access shall be as approved by District.
    c. Do not restrict access to adjacent properties and do not restrict access for those performing work under separate contracts for the District.
3. Do not obstruct roadways, sidewalks, or other public ways without permit.
4. Construction Limit:
    a. Limit construction activities to areas indicated on Drawings as Project Area or, if not indicated, to areas within the parcel as described in the legal description on the Drawings.
    b. Refer also to Section 01 50 00 - Temporary Construction Facilities and Controls for additional requirements.

D. Existing building spaces may not be used for storage.

E. Time Restrictions:

1. Limit conduct of especially noisy, malodorous, and dusty exterior work to local ordinances.

F. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the site is unoccupied.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to District and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.09 CONSTRUCTION WASTE MANAGEMENT

A. Construction and waste management, complying with Section 01 74 19 - Construction Waste Management and Disposal, is a requirement for this project.

B. The Contractor, Prime Contractors, and subcontractors all have obligations in meeting the requirements of this specification.

1.10 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, all provisions of the sections listed in Division 01 apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form:

1. Form provided by District.

B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.

1. Submit schedule in a spreadsheet calculated format, such as Excel, based upon the attached Schedule of Values augmented by the Table of Contents of this Project Manual.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification section. Identify site mobilization, bonds and insurance, and record drawings .

D. Where work is separated into phases requiring separately phased payments, provide separate schedule for each phase.

E. Where work involves multiple sites and/or "A" number, provide separate schedules for each site and/or "A" number.

F. Where scope of work involves multiples buildings/structures, provide separate schedule for each building.

G. Include in each line item, the amount of Allowances specified in this section.

H. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

I. Revise schedule to list approved Change Orders, with each Application For Payment.

1. List each authorized Change Order as an extension on the continuation sheet, listing the Change Order number and dollar value as for an original portion of Work.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

1. Substantiating information will normally be required only for those portions of Work whose completion state cannot be readily determined by observation of the completed Work.

B. Use Form Form as provided by District.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Balance to Finish.
   9. Retainage.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
   1. No Change Orders shall be included with Application for Payment until approved in writing by District and Architect. Also approved by DSA when appropriate.

I. Submit one electronic and three hard-copies of each Application for Payment.

J. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Current construction photographs specified in Section 01 30 00.
   4. Partial release of liens from major subcontractors and vendors.
      a. Provide with each Application for Payment lien releases from all subcontractors, workers and materials suppliers employed for the Project covering their portion of Work to date for which payment application is made. Lien release forms will be provided by District and shall be completed in accordance with directions provided.
   5. Project record documents as specified in Section 01 78 00, for review by District which will be returned to the Contractor.
   6. Affidavits attesting to off-site stored products.

K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 ADDENDA

A. Addenda are changes issued prior to the signing of the Contract for Construction. These Addenda shall be signed by the Architect and approved by the Division of the State Architect.

B. These documents may or may not have been approved by the Division of the State Architect prior to the close of Bid.

1. If not approved by DSA prior to close of the bidding period, the contract price shall include the Addenda.
2. No work shall proceed regarding any Addendum until approved by DSA.
3. Revisions to Addenda, when approved by DSA, shall be incorporated by an additional addendum or Change Order as indicated below and as provided for in the Contract for Construction and General Conditions.

1.06 MODIFICATION PROCEDURES

A. Construction Changes, General:

1. The following describe administrative procedures to be followed in compliance with provisions of the Conditions of the Contract for Architect's Supplemental Instructions, Construction Change Directives, Construction Change Documents, and Contract Change Orders.
2. The Architect will prepare and issue: Architect's Supplemental Instructions, a Construction Change Directive or a Request for Proposal to be presented to the Contractor for action.

B. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.

C. Contract Change Order Forms: Form as directed by District.

D. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

1. Architect's Supplemental Instructions:
   a. Minor changes in the Work, not involving an adjustment in either the Contract Sum or Contract Time, as authorized by the Conditions of the Contract, will be presented by the Architect using the Architect's Bulletin form.
   b. Should the Architect's Supplemental Instructions result in disputed costs and time adjustments, such dispute shall be resolved in accordance with the provisions of the Conditions of the Contract.

E. DSA Construction Change Document approval for substitutions and changes to structural, accessibility, or fire-life-safety portions of approved Drawings and Specifications is required from DSA prior to fabrication and installation. DSA IR A-6; CAC Section 4-215, & 4-233(c).

1. The approved Construction Change Document shall be signed by:

a. Architect of Record.

b. When applicable:

1) Structural Engineer of Record.

2) Mechanical Engineer of Record.

3) Electrical Engineer of Record.

4) Civil Engineer of Record.

5) Delegated Professional Engineer.

c. Division of the State Architect for final approval.

F. For other required changes, not involving structural, accessibility, or fire-life-safety portions of approved Drawings and Specifications, Architect will issue a document signed by District instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.

2. Promptly execute the change.

3. Construction Change Directive approval is required from DSA prior to installation.

4. Construction Change Directives: In accordance with provisions of the Conditions of the Contract, the District may direct the Contractor to proceed with a change in the Work prior to formal preparation, review and agreement of a Contract Change Order, in order to not delay construction.

a. The Architect will prepare and issue a change document containing a Construction Change Directive which, when signed by the District and the Architect, shall instruct the Contractor to proceed with a change in the Work, for subsequent inclusion in a Contract Change Order.

b. Should the Construction Change Directive result in disputed costs and time adjustments, such dispute shall be resolved in accordance with the provisions of the Conditions of the Contract.

c. Construction Change Directives shall follow procedures specified below for Contract Change Orders except that Contractor shall immediately proceed with the change upon receipt of the signed Change Directive.

G. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.

1. Such Request for Proposal may include an estimate of additions or deductions in Contract Time and Contract Sum for executing the change and may include stipulations regarding overtime work and the period of time the requested response from the Contractor shall be considered valid.

H. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.

1. After review of the request and with the District's approval, the Architect will prepare a change document containing a Request for Proposal, as described above.
2. Issuance of such a request by the Architect shall not indicate authorization of the Contractor to proceed with the proposed change.
3. Changes will be approved only by an approved Construction Change Directive and Contract Change Order.

I. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

J. Substantiation of Costs: Provide full information required for evaluation.

1. On request, provide the following data:
   a. Quantities of products, labor, and equipment.
   b. Taxes, insurance, and bonds.
   c. Overhead and profit.
   d. Justification for any change in Contract Time.
   e. Credit for deletions from Contract, similarly documented.
2. Support each claim for additional costs with additional information:
   a. Origin and date of claim.
   b. Dates and times work was performed, and by whom.
   c. Time records and wage rates paid.
   d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

a. Cost and Time Resolution: If amounts for changes in Contract Sum and Contract Time cannot be agreed upon by District and Contractor, amounts shall be resolved in accordance with provisions of the Conditions of the Contract for resolution of disputes and the following:

1) Contractor shall keep accurate records of time, both labor and calendar days, and cost of materials and equipment.

2) Contractor shall prepare and submit an itemized account and supporting data after completion of changed Work, within the time limits indicated in the Conditions of the Contract.

3) Contractor shall provide full information as required and requested, for District and Architect to evaluate and substantiate proposed costs and time for the change in the Work.

4) When District and Contractor determine mutually acceptable amounts for changes in Contract Sum and Contract Time, a Contract Change Order shall be executed for these amounts.

5) District shall have the right to audit Contractor's invoices and bid quotations to substantiate costs for Contract Change Orders.

K. Construction Changes Based on Stipulated Sum or Time: Based on the Contractor's response to a Request for Proposal or Construction Change Directive, the District and Architect will review the response.

1. The District and Contractor shall negotiate a mutually acceptable adjustment in Contract Sum and Contract Time, as appropriate, prior to performance of the changed Work.
2. A Contract Change Order for the stipulated amounts shall be prepared based on the stipulated sum and change in time.

L. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1. When agreement is reached on changes, if any, in the Contract Time and the Contract Sum, the Contractor shall prepare a Contract Change Order using a form as directed by the District, with supplementary documents as necessary to describe the change and the associated costs and schedule impacts.
2. Construction Change Document approval is required from DSA prior to fabrication and installation.
3. Submit Contract Change Orders to District through the Architect.
4. Contractor shall prepare and submit five original sets of documents for each Change Order. District, Architect and DSA shall sign the Change Order indicating acceptance and approval of the change.
   a. Structural Engineer shall also sign the Change Order, when applicable.
5. All Change Orders must be approved by DSA prior to fabrication and installation.
6. Upon approval of the Change Order, Contractor shall promptly execute the change in the Work.

M. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

N. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1. Contractor shall submit revised schedules at the next Application for Payment following approval and acceptance of the Contract Change Order.

O. Promptly enter changes in Project Record Documents.

1.07 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Division 00 - Procurement and Contracting Requirements: Restrictions on timing of substitution requests.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

C. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

D. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
    a. Unavailability.
    b. Regulatory changes.
2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Requests by Contractor to deviate from specified requirements for products, materials, equipment, and methods, or to provide products other than those specified, shall be considered requests for substitutions except under the following conditions:

1. Substitutions are requested during the bidding period, and accepted prior to execution of the Contract. Acceptance shall be in the form of written Addendum to the Bidding documents or revision to the Drawings or Specifications for use as Construction Contract Documents.

2. Changes in products, materials, equipment, and methods of construction are directed by the District or Architect.
3. Contractor options for provision of products and construction methods are specifically stated in the Contract Documents.
4. Change in products, materials, equipment, and methods of construction is required for compliance with Codes, ordinances, regulations, orders and standards of authorities having jurisdiction.

B. Substitution Provisions: Refer to substitution provisions of the Conditions of the Contract, in addition to the requirements specified herein. Provisions for consideration and acceptance of substitutions shall be as follows:
1. Documentation:
   a. Substitutions will not be considered if they are indicated or implied on shop drawing, product data or sample submittals.
   b. All requests for substitution shall be made by separate written request from Contractor.
2. Cost and Time Considerations: Substitutions will not be considered unless a net reduction in Contract Sum or Contract Time results to the District's benefit, including redesign costs, life cycle costs, changes in related Work and overall performance of building systems.
3. Design Revision:
   a. Substitutions will not be considered if acceptance will require substantial revision of the Contract Documents or will substantially change the intent of the design, in the opinion of the Architect.
   b. The intent of the design shall include functional performance and aesthetic qualities.
4. Data: It shall be the responsibility of the Contractor to provide adequate data demonstrating the merits of the proposed substitution, including cost data and information regarding changes in related Work.
5. Determination by Architect:
   a. Architect will determine the acceptability of proposed substitutions and will notify Contractor, in writing within a reasonable time, of acceptance or rejection.
   b. The determination by the Architect regarding functional performance and aesthetic quality shall be final.
6. Non-Acceptance: If a proposed substitution is not accepted, provide the specified product.
   a. If, in the opinion of the Architect, the substitution request is incomplete or has insufficient data to enable a full and thorough review of the intended substitution, the substitution may be summarily refused and determined to be unacceptable.
7. Substitution Limitation: Only one request for substitution will be considered for each product.

C. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
    a. Include a signed certification that the Contractor has:
        1) Reviewed the proposed substitution and has determined that the substitution is equivalent or superior in every respect to product requirements indicated or product specified in the Contract Documents.
        2) Certify the proposed substitution is suited for and can perform the purpose or application of the specified product indicated or specified in the Contract Documents.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to District.
5. Waives claims for additional costs or time extension that may subsequently become apparent.
    a. Include a signed waiver by the Contractor for changes in the Contract Time or Contract Sum because of the following:
        1) Substitution failed to perform adequately.
        2) Substitution required changes in on other elements of the Work.
        3) Substitution caused problems in interfacing with other elements of the Work.
        4) Substitution was determined to be unacceptable by authorities having jurisdiction.
6. Agrees to reimburse District and Architect for review or redesign services associated with re-approval by authorities.

D. A Substitution Request for specified installer constitutes a representation that the submitter:
    1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
    1. Note explicitly any non-compliant characteristics.

F. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
    1. Forms indicated and included in the Project Manual are adequate for this purpose, and must be used.
    2. No specific form is required. Contractor's Substitution Request documentation must include the following:
        a. Project Information:
            1) Official project name and number, and any additional required identifiers established in Contract Documents.

2) District's, Architect's, and Contractor's names.

b. Substitution Request Information:

1) Discrete and consecutive Substitution Request number, and descriptive subject/title.

2) Indication of whether the substitution is for cause or convenience.

3) Issue date.

4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).

5) Description of Substitution.

6) Reason why the specified item cannot be provided.

7) Differences between proposed substitution and specified item.

8) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:

1) Physical characteristics.

2) In-service performance.

3) Expected durability.

4) Visual effect.

5) Sustainable design features.

6) Warranties.

7) Other salient features and requirements.

8) Include, as appropriate or requested, the following types of documentation:

(a) Product Data:

(b) Samples.

(c) Certificates, test, reports or similar qualification data.

(d) Drawings, when required to show impact on adjacent construction elements.

9) Include a detailed description, in written or graphic form as appropriate, indicating all changes or modifications needed to other elements of the Work and to construction to be performed by the District and by others under separate Contract with District, that will be necessary if the proposed substitution is accepted.

d. Impact of Substitution:

1) Savings to District for accepting substitution.

(a) Include detailed cost data, including a proposal for the net change, if any, in the Contract Sum.

2) Change to Contract Time due to accepting substitution.

(a) Indicate the substitution's effect on the Construction Schedule. Indicate the effect of the proposed substitution on overall Contract Time and, as applicable, on completion of portions of the Work for use by District or for work under separate contract by District.

G. Limit each request to a single proposed substitution item.

1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

1. District will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

B. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period, and the documents required.

C. Pursuant to Section 3400 of the Public Contract Code, requests for substitution will be considered only if received up to 7 days prior to the bid date. Subsequent requests will be considered only in the case of product unavailability, through no fault of the Contractor , or for reasons of cost reducing value analysis requested by the District .

D. Submittal Form (before award of contract):

1. Submit substitution requests by completing the form in Section 00 43 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):

1. Submit substitution requests by completing the form in Section 00 63 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. After Contract award, requests will be considered for cause only; in the case of product unavailability, through no fault of the Contractor , or for reasons of cost reducing value analysis requested by the District.

1. Substitutions will be considered when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.

2. Product Availability Waiver:

a. Substitutions will be considered after 35 day time limit only when a product becomes unavailable due to no fault of Contractor.

b. Failure to place orders for specified products sufficiently in advance of required date for incorporation into the Work will not be considered as a valid reason for which Contractor may request a substitution or deviation from requirements of the Drawings and Specifications.

3. Waiver: At the discretion of the District, limitations on substitutions may be waived.

C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

D. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

1. In addition to meeting general documentation requirements, document how the requested substitution benefits the District through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:
    a. District's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
    b. Other construction by District.
    c. Other unanticipated project considerations.

E. Substitutions will not be considered under one or more of the following circumstances:

1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to Contract Documents.

3.04 CONTRACT DOCUMENT REVISIONS:

A. Should a Contractor-proposed substitution or alternative sequence or method of construction require revision of the Contract Drawings or Specifications;

1. Including revisions for the purposes of determining feasibility, scope or cost, or revisions for the purpose of obtaining review and approval by authorities having jurisdiction.
2. Revisions will be made by Architect or other consultant of District who is the responsible design professional, as approved in advance by District.

B. Services of Architect or other consultant of the District, including time spent in researching and reporting on proposed substitutions or alternative sequence and method of construction, shall be paid by Contractor when such activities are considered additional services to the design services contracts of the Architect or other responsible design professional with the District.

C. Costs of services by Architect or other responsible design professional of the District shall be paid on a time and materials basis, based on current hourly fee schedules, with reproduction, long distance telephone and shipping costs reimbursable at cost plus usual and customary mark-up for handling and billing.

D. Such fees shall be paid whether or not the proposed substitution or alternative sequence or method of construction is ultimately accepted by District and a Change Order is executed.

E. Such fees shall be paid from Contractor's portion of savings, if a net reduction in Contract Sum results. If fees exceed Contractor's portion of net reduction, Contractor shall pay all remaining fees unless otherwise agreed in advance by the District.

F. Such fees owed shall be deducted from the amount owed Contractor on the Application for Payment next made following completion of revised Contract Drawings and Specifications or completion of research and other services. District will then pay Architect or other consultant of the District.

G. Certain substitutions require approval from DSA.

1. Substitutions affecting DSA-regulated items shall be considered as construction change documents (CCD's) and shall be approved by DSA prior to construction per DSA IR A-6 and Section 338(c) Part 1, Title 24 CCR. See Section 01 20 00 - Price and Payment Procedures.

3.05 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.06 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

3.08 ATTACHMENTS

A. A facsimile of the Substitution Request Form (During Construction) required to be used on the Project is included after this section.

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Contractor's daily reports.

G. Progress photographs.

H. Number of copies of submittals.

I. Requests for Interpretation or Information (RFI) procedures.

J. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: General product requirements.

B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

D. Technical Product Sections: Procedures for specific submittals specified in those Sections to be made at Contract closeout.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information that requires responsive action by Construction Manager and Architect or other responsible design professional.

B. Informational Submittals: Written information that does not require responsive action by Construction Manager and Architect or other responsible design professional.

C. Unsolicited Submittals: Action or informational submittals not required by the Contract Documents or not requested by the reviewer. Unsolicited submittals may be returned with notation "not reviewed."

D. Product Data: Standard published information ("catalog cuts") and specially prepared data for the Work of the Contract, including standard illustrations, schedules, brochures, diagrams, performance charts, instructions and other information to illustrate a portion of the Work.

E. Request for Interpretation or Information (RFI): A document submitted by the Contractor requesting clarification of a portion of the Contract Documents, hereinafter referred to as an RFI.

F. Samples: Physical examples that demonstrate the materials, finishes, features, workmanship and other characteristics of a portion of the Work. Accepted samples shall serve as quality basis for evaluating the Work.

G. Shop Drawings, Product Data and Samples: Instruments prepared and submitted by Contractor, for Contractor's benefit, to communicate to Architect the Contractor's understanding of the design intent, for review and comment by Architect on the conformance of the submitted information to the general intent of the design. Shop drawings, product data and samples are not Contract Documents.

H. Shop Drawings: Drawings, diagrams, schedules and illustrations, with related notes, specially prepared for the Work of the Contract, to illustrate a portion of the Work.

I. Other Submittals: Technical data, test reports, calculations, surveys, certifications, special warranties and guarantees, operation and maintenance data, extra stock and other submitted information and products shall not be considered as Contract Documents but shall be information from Contractor to Architect to illustrate a portion of the Work for confirmation of understanding of design intent.

1.04 PROJECT COORDINATOR

A. Project Coordinator: Construction Manager.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for material delivery access, traffic, and parking facilities.

1. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:

1. Requests for Interpretation or Information.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Correction Punch List and Final Correction Punch List for Substantial Completion.

10. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation or Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
2. Contractor and Architect are required to use this service.
3. It is Contractor's responsibility to submit documents in allowable format.
4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Unless specifically requested, paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.

C. Submittal Service: The selected service is:

1. Bluebeam Software Inc.; Bluebeam Revu Studio: www.bluebeam.com.
2. Other Service acceptable to both District and Architect.
    a. Direct email with PDF copies.

D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

1. Representatives of District are scheduled and included in this training.

E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for District.

3.02 PRECONSTRUCTION MEETING

A. District will schedule a meeting after Notice of Award.

B. Attendance Required:

1. District.
2. Architect.
3. Contractor.
4. Construction Manager.

C. Agenda:

1. Execution of District-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract and Architect.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Scheduling activities of a Geotechnical Engineer.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, District, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

A. Project Coordinator will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:

1. Contractor.
2. District.
3. Architect.
4. Construction Manager.
5. Special consultants.
6. Contractor's superintendent.
7. Major subcontractors.
8. Inspector of Record.
9. DSA Field Representative.

C. Agenda:

1. Designation of Key Personnel: Contractor shall designate key personnel and provide a name and address list which includes the following:
    a. Contractor: Project Manager and Superintendent.

b. Major subcontractors: Principal/Project Manager and Superintendent.

c. Major materials suppliers: Contact person.

2. Distribute and discuss list of subcontractors and suppliers.

3. Project Communication Procedures: Review requirements and administrative requirements for written and oral communications.

   a. Review requirements and administrative procedures Contractor may wish to institute for identification and reporting purposes.

4. Change Procedures: Review requirements and administrative procedures for Change Orders, Construction Change Directives, Architect's supplemental instructions and Contractor's Requests for Interpretation or Information.

5. Use of premises by District and Contractor.

   a. Site access restrictions, if any, and requirements to avoid disruption of operations at adjoining facilities or operations.

   b. Construction Facilities and Temporary Utilities: Designate storage and staging areas, construction office areas; review temporary utility provisions; present District's requirements for use of premises.

6. District's requirements.

7. Construction facilities and controls provided by District.

8. Temporary utilities provided by District.

9. Survey and building layout.

10. Security and housekeeping procedures.

11. Schedules.

    a. Distribute and discuss initial construction schedule and critical work sequencing of major elements of Work;

    b. Include coordination of District Furnished / Contractor Installed (OFCI) products;

    c. Work under separate contracts by serving utility agencies;

    d. Work under separate contracts by companies and District.

12. Review requirements for Contractor's coordination of Work; review sequence and schedule for work being performed for District under separate contracts.

13. Submittals Administration: Review administrative procedures for shop drawings, product data and samples submittals and review of preliminary Submittals Schedule.

14. Materials and Equipment:

    a. Review substitution requirements;

    b. Review schedule for major equipment purchases and deliveries;

    c. Review materials and equipment to be provided by District (OFCI products).

15. Permits and Fees: Review Contract requirements and review schedule and process for obtaining permits and paying fees.

16. Application for payment procedures.

17. Procedures for testing.

a. Review tests and inspections to be performed by the following:
1) Independent testing and inspection agency.
2) Manufacturers and installers.
3) Serving utilities and public agencies.
4) Authorities having jurisdiction.

18. Procedures for maintaining record documents.
19. Requirements for start-up of equipment.
a. Operation and Maintenance Data:
1) Format and content of operation and maintenance manuals; instruction of District's personnel.
20. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, District, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Meeting Time and Location: As mutually agreed by District, Architect, and Contractor, at on-site location.

D. Special Meetings: As necessary, Construction Manager may convene special meetings to discuss specific construction issues in detail and to plan specific activities.
1. See Section 01 70 00 - Execution and Closeout Requirements.

E. Attendance Required:
1. Contractor.
2. District.
3. Architect.
4. Construction Manager.
5. Special consultants.
6. Contractor's superintendent.
7. Major subcontractors.
8. Inspector of Record.

F. Agenda:
1. Review minutes of previous meetings.
a. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.

b. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.

c. Challenge to minutes shall be settled as priority portions of "old business" at the next regularly scheduled meeting.

2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
   a. Develop corrective measures and procedures, including but not necessarily limited to additional personnel loading to regain planned schedule.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Other business relating to work.

G. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, District, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. Contractor's Review: All schedules shall be reviewed and approved by Contractor prior to submission for Architect's and District's review.

C. Reviews by Architect and District will be to ascertain the general status of construction and shall not be interpreted to establish or approve the means, methods, techniques and sequences of construction.

D. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

E. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

F. Within 10 days after joint review, submit complete schedule.

G. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. In addition to transmitting electronically a copy to District and Architect, submit two printed copies at weekly intervals.

1. Submit in format acceptable to District.
2. Submit using required form, a sample of which is appended to this section.

C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
    a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
6. Major equipment at Project site.
7. Material deliveries.
8. Safety, environmental, or industrial relations incidents.
9. Meetings and significant decisions.
10. Unusual events (submit a separate special report).
11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
15. Change Orders received and implemented.
16. Testing and/or inspections performed.
17. List of verbal instruction given by District and/or Architect.
18. Signature of Contractor's authorized representative.

3.07 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.

C. Photography Type: Digital; electronic files.

D. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.

E. In addition to periodic, recurring views, take photographs of each of the following events:

1. Completion of site clearing.
2. Excavations in progress.
3. Foundations in progress and upon completion.
4. Structural framing in progress and upon completion.
5. Enclosure of building, upon completion.
6. Final completion, minimum of ten (10) photos.

F. Take photographs as evidence of existing project conditions as follows:

1. Interior views: each elevation, floor and ceilings prior to demolition.
2. Exterior views: each elevation, roof and areas adjacent to construction limits.

G. Views:

1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with Architect for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
5. Point of View Sketch: Provide sketch identifying point of view of each photograph.

H. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.

1. Delivery Medium: Via email.
2. File Naming: Include project identification, date and time of view, and view identification.
3. Point of View Sketch: Include digital copy of point of view sketch with each electronic submittal; include point of view identification in each photo file name.
4. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
5. Photo CD(s): Provide 1 copy including all photos cumulative to date and PDF file(s), with files organized in separate folders by submittal date.
6. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.08 REQUESTS FOR INTERPRETATION OR INFORMATION (RFI)

A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.
    a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to District.
3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
    a. Submit RFIs from subcontractors and material suppliers through, be reviewed by and be attached to an RFI prepared, signed and submitted by Contractor.
        1) RFIs from subcontractors and material suppliers are to be:
            (a) Reviewed by Contractor.
            (b) Corrected and rewritten to clarify as required by Contractor.
            (c) Placed on the proper form, then signed, and submitted by Contractor.
            (d) RFIs submitted directly by subcontractors or material suppliers will be returned unanswered to the Contractor.
        2) RFIs submitted directly by subcontractors or material suppliers will be returned unanswered to the Contractor.
    b. Review all subcontractor- and supplier-initiated RFIs and take actions to resolve issues of coordination, sequencing and layout of the Work.
        1) RFIs submitted to request clarification of issues related to means, methods, techniques and sequences of construction or for establishing trade jurisdictions and scopes of subcontracts will be returned without response.
            (a) Such issues are solely the Contractor's responsibility.
        2) Contractor is responsible for delays resulting from the necessity to resubmit an RFI due to insufficient or incorrect information presented in the RFI.
2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    a. Approval of submittals (use procedures specified elsewhere in this section).
    b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)

c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).

d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

a. The District reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.

2. District's, Architect's, and Contractor's names.

3. Discrete and consecutive RFI number, and descriptive subject/title.

4. Issue date, and requested reply date.

5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).

6. Annotations: Field dimensions and/or description of conditions which have engendered the request.

a. Inability to determine from the Contract Documents the exact material, process, or system to be installed;

b. Or when the elements of construction are required to occupy the same space (interference);

c. Or when an item of Work is described differently at more than one place in the Contract Documents.

7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

a. In all cases, furnish all information required for the Architect to analyze and/or understand the circumstances causing the RFI and prepare a clarification or direction as to proceed for RFIs issued to request clarification of issues related to:

1) Means, methods, techniques and sequences of construction, for example

2) Pipe and duct routing, clearances;

3) Specific locations of Work shown diagrammatically;

4) Apparent interferences and similar items.

5) If information included with this type RFI by the Contractor is insufficient, the RFI will be returned unanswered.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.

1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.
4. Highlight items for which a timely response has not been received to date.
5. Identify and include improper or frivolous RFIs.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to District.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.09 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.

1. Submit at the same time as the preliminary schedule.
   a. Submit initial Submittals Schedule within 14 days of date of Notice of Award of construction.
   b. After review and return by Architect, resubmit Submittals Schedule within 10 days and thereafter submit updated Submittals Schedules at each Construction Progress Meeting.

c. Submit one copy each to Owner and Architect.

2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
    a. Prepare schedules in Gantt format using software at Contractor's option, providing clear indication of sequencing and scheduling of Work, for determination of "critical path" of construction progress.
        1) Submittals shall be connected to the related construction element by a graphically indicated critical path on the same page.
        2) Present schedules using opaque reproductions on substantial paper, with sheet size a multiple of 8-1/2 by 11 inches and large enough to clearly read characters.
4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.
    b. Allow time for shipping and distribution to involved parties. Minimum 1 day, including those sent by electronic transmission.
6. Posting: Post one copy of most recent Submittals Schedule in Contractor's field office, readily available to District, Construction Manager, and Architect. Update bi-weekly with project schedule.
7. Archive: Preserve a minimum of two copies of all superseded schedules, with one copy available at field office for review by District or Architect.

3.10 SUBMITTALS FOR COMMISSIONING

A. The Commissioning Authority will receive a copy of the standard submittals for equipment to be commissioned.

B. The Commissioning Authority may require additional documentation necessary for the commissioning process. The Contractor will receive a written request from the Commissioning Authority for specific equipment or system information.

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format with renderable text; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Small Size Sheets, Not Larger Than 11 by 17 inch: Submit one copy; the Contractor shall make his own copies from original returned by the Architect after making his own file copy.

C. Extra Copies at Project Closeout: See Section 01 78 00.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.
   3. Quantity:
      a. Submit minimum of four (4) samples of each of color, texture and pattern.
      b. Submit one item only of actual assembly or product.
      c. Unless otherwise noted, full-size and complete samples will be returned and may be incorporated into field mock-ups and the Work.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Transmit using approved form.
   4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
      a. For example:
         1) 09 21 16-1 - First submittal for Section 09 21 16 - Gypsum Board Assemblies.
         2) 09 21 16-2 - Second submittal for Section 09 21 16 - Gypsum Board Assemblies.
      b. Use same number for resubmittals as original submittal, followed by a letter indicating sequential resubmittal. For example:
         1) 09 21 16-2A - Resubmission of second submittal for Section 09 21 16 - Gypsum Board Assemblies.
         2) 09 21 16-2B - Second resubmission of second submittal for Section 09 21 16 - Gypsum Board Assemblies.
   6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
      b. Field measurements have been determined and verified.
      c. Conformance with requirements of Contract Drawings and Specifications is confirmed.
      d. Catalog numbers and similar data are correct.

e. Work being performed by various subcontractors and trades is coordinated.

f. Field construction criteria have been verified, including confirmation that information submitted has been coordinated with the work being performed by others for District and actual site conditions.

g. All deviations from requirements of Drawings and Specifications have been identified and noted.

7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.

   a. Send submittals in electronic format via email to Architect.

   b. Upload submittals in electronic form to Electronic Document Submittal Service website.

8. Schedule submittals to expedite the Project, and coordinate submission of related items.

   a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

   b. For sequential reviews involving Architect's consultants, District, or another affected party, allow an additional 7 days.

   c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.

9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.

   a. Changes in the Work shall not be authorized by submittals review actions.

   b. No review action, implicit or explicit, shall be interpreted to authorized changes in the Work.

   c. Changes shall only be authorized by separate written Contract Change Order or Construction Change Directive, in accordance with the Conditions of the Contract and Section 01 20 00 - Price and Payment Procedures.

10. Provide space for Contractor and Architect review stamps.

11. When revised for resubmission, identify all changes made since previous submission.

12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

14. Submittals not requested will be recognized, but will be returned without comment,

B. Product Data Procedures:

1. Submit only information required by individual specification sections.

2. Collect required information into a single submittal.

3. Submit concurrently with related shop drawing submittal.

4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Use of reproductions of Contract Documents in digital data form to create shop drawings is only permitted as defined in Division 01 and individual product sections.
3. Coordination: Show all field dimensions and relationships to adjacent or critical features of Work.
4. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
1. Transmit related items together as single package.
2. Samples will be reviewed for aesthetic, color, or finish selection.
3. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
4. Color Selection Samples: Architect will review and select colors for Project only after all colors are received, so that colors may be properly coordinated.
5. Copies: Submit actual samples. Photographic or printed reproductions will not be accepted.
6. Review of Field Samples: Review by Architect of field samples will be made for the following example products, as applicable, if not otherwise required and if requested by Contractor.
a. Concrete wall finishes and detailing (edges, corners and reveals).
b. Concrete paving colors and textures.
c. Gypsum board textures and finishes.
d. Field-applied paint colors and finishes.

3.13 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
a. "Approved", "Reviewed", or language with same legal meaning.
b. "Approved as Noted, Resubmission not required", or language with same legal meaning.

1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

c. "Approved as Noted, Resubmit for Record", "Reviewed as Noted, Resubmit for Record", or language with same legal meaning.

1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.

2) Non-responsive resubmittals may be rejected.

2. Not Authorizing fabrication, delivery, and installation:

a. "Revise and Resubmit".

1) Resubmit revised item, with review notations acknowledged and incorporated.

2) Non-responsive resubmittals may be rejected.

b. "Rejected".

1) Submit item complying with requirements of Contract Documents.

E. Architect's and consultants' actions on items submitted for information:

1. Items for which no action was taken:

a. "Received" - to notify the Contractor that the submittal has been received for record only.

2. Items for which action was taken:

a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 30 00.01
REQUEST FOR INTERPRETATION

RFI NUMBER: _____ DATE: _____

PROJECT NAME: RANCHO SAN JOAQUIN MS – HVAC REPLACEMENT PROJECT NO.: 13438

TO: RUHNAU CLARKE ARCHITECTS

3775 Tenth Street, Riverside CA 92501 - 5751 Palmer Way, Suite C, Carlsbad, CA 92010

Attention: _____

Contractor: _____

Address:_____

BRIEF SUMMARY OF RFI: _____

_____

Drawing No. _____ Detail No. _____

Specification Section _____ Title

_____

.Page _____ Paragraph _____

DETAILS OF THIS RFI: _____

_____

_____

_____

SUGGESTED SOLUTION: _____

_____

_____

Response required by: _____ (min. 3 full days) Submitted By:

_____

. Organization: _____

RESPONSE: _____

_____

_____

_____

Attachments: _____

Response By: _____ Date:

_____

Organization: _____

Copies: __ File __ District __ Structural __ Mechanical __ Plumbing __ Electrical
__ Civil __ Landscape _other consultants

END OF RFI

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

C. Summary schedule.

D. Weekly/Short term (Look Ahead) Schedule.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary: Work sequence.

B. Section 01 30 00 - Administrative Requirements: Submittal Schedule.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; O'Brien; 2006.

1.04 SUBMITTALS

A. Within 14 Calendar days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. Submit two copies to Construction Manager and one copy to Architect.

C. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

D. Within 10 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

E. Within 10 days after joint review, submit complete schedule.

F. Submit updated schedule with each Application for Payment.

1. Revise schedule also upon issuance of Change Orders and Construction Change Directives which substantially affect construction sequence or schedule.

G. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.

H. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1. Designate the Scheduler in writing and within ten (10) workdays after Notice of Intent to Award, as the qualified responsible person for preparation, maintenance, updating, and revision of all schedules for the full term of construction.
2. Scheduler:
    a. Dedicated to this project and available on-site as needed to meet the strict requirement of this spec. section.
    b. All scheduling software and hardware located on-site.
    c. Scheduler will attend all project meetings called for as specified in Section 01 30 00.
3. Qualifications of responsible person:
    a. Knowledge of critical path method (CPM) scheduling utilizing Primavera P6 latest release software.
4. References:
    a. Submit written reference of three (3) project Owners who have personal experience with this scheduler on previous projects.
    b. Identify name, address, telephone number, project name, and cost.
5. Construction Manager reserves the right to disapprove Scheduler when submitted by Construction Manager based on his/or her sole discretion. Construction Manager reserves the right to remove Scheduler from the project without cause.

B. Contractor's Administrative Personnel: Three years minimum experience in using and monitoring CPM schedules on comparable projects.

C. Reviews by Architect and Construction Manager: Reviews by Architect and Construction Manager will be to ascertain the general status of construction and shall not be interpreted to establish or approve the means, methods, techniques and sequences of construction.

D. Contractor's Review: All schedules shall be reviewed and approved by Contractor prior to submission for Architect's and Construction Manager's review.

E. Changes and Deviations: Identify all deviations from requirements of Drawings and Specifications.

1. Changes in the Work shall not be authorized by submittals review actions.
2. No review action, implicit or explicit, shall be interpreted to authorized changes in the Work.
3. Changes shall only be authorized by separate written Change Order or Field Change Directive, in accordance with the Conditions of the Contract.

1.06 SCHEDULE FORMAT

A. Format: Prepare schedules in format at Contractor's option, either bar chart, PERT or GANTT format, providing clear indication of sequencing and scheduling of Work, for determination of "critical path" of construction progress.

1. Provide clear indication of sequencing and scheduling of work for determination of "critical path" of construction progress.
2. Present schedule in both electronic and reproducible paper formats with sheet size large enough to clearly read the characters.

B. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

C. Diagram Sheet Size: Maximum 30 x 42 inches or width required.

D. Sheet Size: Multiples of 8-1/2 x 11 inches.

E. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

B. Prescheduling Conference:

1. Construction Manager will conduct a conference within fifteen (15) work days after the Notice of Intent to Award to comply with requirements in Section 01 30 00 - Administrative Requirements.
    a. Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
        1) Review software limitations and content and format for reports.
        2) Verify availability of qualified personnel needed to develop and update schedule.
        3) Discuss constraints, including phasing work stages area separations interim milestones and partial District occupancy.
        4) Review delivery dates for District-furnished products.
        5) Review schedule for work of District's separate contracts.
        6) Review submittal requirements and procedures.
        7) Review time required for review of submittals and resubmittals.
        8) Review requirements for tests and inspections by independent testing and inspecting agencies.
        9) Review District's IT requirements for installation of their Work.
        10) Review time required for Project closeout and District startup procedures, including commissioning activities for MEP, Security Electronics Equipment.
        11) Review and finalize list of construction activities to be included in schedule.
        12) Review procedures for updating schedule.

C. At the meeting, the Construction Manager will review scheduling requirements. These include schedule preparation, reporting requirements, labor and equipment loading, updates, revisions, and schedule delay analysis.

1. The Contractor will present schedule methodology, planned sequence of operations, resource loading methodology, and proposed activity coding structure.

D. Coding structure:

1. Submit proposed coding structure, identifying the code fields and the associated code values it intends to use in the project schedule.
2. A minimum, include code fields for Project Segment or Phase, Area of Work, Type of Work, Submittal/Procurement/Construction and Responsibility/Subcontractor.
    a. Refer to NETWORK DETAILS AND GRAPHICAL OUTPUT for listing of activity categories to be included in the schedule.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

1. Identify Work of separate buildings, phases, units or other logically grouped activities to facilitate review of Application for Payment with completed Work.

D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

E. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

1. Format: Prepare Submittals Schedule in a format comparable to Construction Progress Schedule, specified in Article above.
2. Content: List all items specified to be submitted, indicating submittal number (see instructions specified in Section 01 30 00 - Administrative Requirements, submittal type (i.e., product data, shop drawings, sample, quality control report, maintenance and operating data, etcetera), scheduled date submittal is to be made and date review should be complete in order to maintain construction on schedule.
3. The Contractor shall submit to the Architect a schedule of the shop drawings that lists their required submission and approval dates.
    a. Allow minimum one (1) week for the Architect to review the submittals. Some submittals may require a longer review period. See Section 01 30 00 - Administrative Requirements.
    b. Allow for the possibility that the consultant team will request revisions and resubmittal following the initial submittal.
    c. The schedule shall encompass the entire construction period and will be revised by the Contractor and reviewed by the project team at each project meeting.
4. Changes and Deviations: Identify all deviations from requirements of Drawings and Specifications.
    a. Changes in the Work shall not be authorized by submittals review actions.
    b. No review action, implicit or explicit, shall be interpreted to authorized changes in the Work.

c. Changes shall only be authorized by separate written Change Order or Construction Change Directive, in accordance with the Conditions of the Contract and Section 01 20 00 - Price and Payment Procedures.

5. Administration: Review of Submittals Schedules by Architect, Construction Manager, and District will be to ascertain the general status of submittals review and shall not be interpreted to establish or approve the means, methods, techniques and sequences of construction.
   a. Submit one copy each to Construction Manager and Architect.
   b. Submit initial Submittals Schedule within 14 days of construction start date established in Notice to Proceed.
   c. After review, resubmit Submittals Schedule within 10 days and thereafter submit updated Submittals Schedules at each Construction Progress Meeting.

F. Indicate delivery dates for owner-furnished products.

G. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.

1. Include Submittals Schedule.

H. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 WEATHER DAYS ALLOWANCE- AS ANTICIPATED BY THE CONTRACTOR

A. Based on historical weather in the local area, the Baseline Schedule shall include all non-work days on which the Contractor anticipates Work will not be performed due to adverse weather days that are anticipated to occur within the work day calendar and impact critical activities.

B. The Contractor shall not receive any additional compensation for unavoidable delays due to inclement or unsuitable weather, and no time extension to complete any Contractual Completion Events as defined in General Conditions, will be considered due to inclement or unsuitable weather or conditions resulting there from.

3.05 REVIEW AND EVALUATION OF SCHEDULE

A. All schedules shall be reviewed and approved by Contractor prior to submission for review by Architect and District.

B. Participate in joint review and evaluation of schedule with Architect at each submittal.

C. Evaluate project status to determine work behind schedule and work ahead of schedule.

D. After review, revise as necessary as result of review, and resubmit within 10 days.

E. Review by Architect and District will be to ascertain the general status of construction and shall not be interpreted to establish or approve the means, methods, techniques and sequences of construction.

3.06 SUMMARY SCHEDULE

A. Provide Summary Schedule, upon request, which consolidates groups of activities associated with Major Items of Work shown on Baseline Schedule.

1. Summary Schedule is intended to give an overall indication of the project schedule without a large amount of detail.

2. This schedule shall include the current status of each of the contract Milestones listed in the Agreement, and any significant activities that are critical to the completion of the Milestone work at the required time.

B. Include in the Summary Schedule a separate Gantt Chart depicting only the critical path of the project at the time of the update.

C. Updated and submitted monthly and with each Schedule Update or Schedule Revision.

3.07 WEEKLY (SHORT TERM LOOK-AHEAD) SCHEDULE

A. Submit to Construction Manager, twenty four (24) hours prior to each weekly progress meeting, a short term look ahead schedule showing the activities completed during the previous week and the schedule of activities for the following 4 weeks.

B. Using the same computer software as the progress schedule, use the Activity ID's, Descriptions, and logic of the current progress schedule when producing a Weekly Schedule in CPM schedule or a bar chart format.

1. In the event that the Weekly Schedule no longer conforms to the current schedule, Contractor may be required to revise either or both schedule(s).

C. The activity designations used in the Weekly Schedule must be consistent with those used in the Baseline Schedule and the monthly Schedule Updates.

D. Contractor and Construction Manager must agree on the format of the Weekly Schedule.

E. Weekly Schedule should indicate locations of work, critical activities, early start and early finish dates, actual start and actual finish dates, progress, and remaining durations for each activity in the three-week schedule.

3.08 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

3.09 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, District, and other concerned parties.

B. Posting: Post one copy, minimum, of most recent Construction and Submittals Schedules in the Contractor's jobsite office, readily available to Construction Manager and Architect.

C. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

D. Archive: Preserve a minimum of two copies of all superseded schedules, with a minimum of one copy available at job office for review by Construction Manager or Architect.

3.10 FINAL SCHEDULE SUBMITTAL

A. The final Schedule Update becomes the As-Built Schedule.

1. The As-Built Schedule reflects the exact manner in which the project was constructed by reflecting actual logic, start and completion dates for all activities accomplished on the project.

2. Contractor's Project Manager and Scheduler sign and certify the As-Built Schedule as being an accurate record of the way the project was actually constructed.

B. Retainage will not be released until final Schedule Update is provided.

END OF SECTION

SECTION 01 35 50
REQUESTS FOR ELECTRONIC FILES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements to request electronic construction document files from Architect.

B. Hold Harmless Agreement form.

1.02 RELATED SECTIONS

A. Section 01 30 00 - Administrative Requirements: Shop Drawings, Product Data and Samples.

B. Section 01 70 00 - Execution and Closeout Requirements.

1.03 REQUIREMENTS

A. Electronic files have legal ramifications as information therein can be modified.

B. In order to receive this electronic information, the following Hold Harmless Agreement form must be executed in its entirety, including signature by a company officer.

C. Costs for processing and handling electronic files, however limited, will be $250.00

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SECTION.)

PART 3 - EXECUTION

3.01 ELECTRONIC FILE TRANSFER PROCEDURE

A. Submit a check in the amount of $250.00 along with a list of the requested sheet numbers and an acknowledged copy of this waiver to the office of the Architect, Ruhnau Clarke Architects, 3775 Tenth Street, Riverside CA 92501 - 5751 Palmer Way, Suite C, Carlsbad, CA 92010.

B. In order to expedite the transfer, upon receipt of a PDF copy of this acknowledgement, the requested CAD/Revit/BIM files will be sent in the form of a compact disc, DVD, or thumb drive to the recipient, as requested, by UPS, similar delivery service, or other method of electronic transfer after payment is received.

C. It is expressly understood that any transfer is done as a courtesy and can be revoked at any time by the Architect.

Agreement is on next page

HOLD HARMLESS AGREEMENT

ARCHITECT'S PROJECT: RANCHO SAN JOAQUIN MS – HVAC REPLACEMENT

ARCHITECT'S PROJECT NUMBER: 13438

We, _____, understand that we may be receiving electronic media containing design information, not necessarily intended for construction. We agree to hold Ruhnau Clarke Architects harmless for any defects in this data. We agree that it shall be our responsibility to reconcile this electronic data with the paper plans, and that only the paper plans shall be regarded as legal documents for the referenced project.

Further, the Contractor acknowledges that the Architect's reports, drawings, specifications, field data, field notes, laboratory test data, calculations, estimates and other similar documents are instruments of professional service, not products. In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by the Design Professionals, the Parties listed above covenant and agree that all such drawings and data are instruments of service of the Design Professionals, who shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.

The Parties agree that in accepting and utilizing any drawings and other data, that the Design Professionals waive all responsibility for any subsequent use of these data, the accuracy of dimensions, and the interpretation of information contained herein.

The Parties further agree not to use these drawings and data, in whole or in part, for any purpose or project other than the project which is the subject of this Agreement. The Parties further agree to waive all claims against the Design Professionals resulting in any way from any unauthorized changes of the drawings and data or any other use other than for the project which is the subject of this Agreement.

The Contractor shall indemnify, defend and hold harmless the Design Professionals and its subconsultants and their officers, agents, employees from any claims, damages, losses, liabilities or expenses (including attorneys' fees) arising out of use of such documents without Consultant's prior written authorization.

Under no circumstances shall transfer of the drawings and other data be deemed a sale by the Design Professionals, and the Design Professionals make no warranties, either express or implied of the merchantability and fitness of the data for any particular purpose.

Acknowledged by:

_____ _____ _____

Signature of Company Officer Print or Type Name Date

_____

Company Name

_____ _____

Street Address City, State, Zip Code

_____

E-mail Address

END OF SECTION

SECTION 01 35 53
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: use of premises and occupancy.

B. Section 01 50 00 - Temporary Facilities and Controls: Temporary lighting.

C. Protect Work , existing premises and District's operations from theft, vandalism, and unauthorized entry.

D. Initiate program in coordination with District's existing security system at project mobilization.

E. Maintain program throughout construction period until District acceptance precludes the need for Contractor security.

1.03 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workers and visitors, make available to District on request.

D. District will control entrance of persons and vehicles related to District's operations.

E. Contractor shall control entrance of persons and vehicles related to District's operations.

F. Coordinate access of District's personnel to site in coordination with District's security forces.

1.04 PERSONNEL IDENTIFICATION

A. Shall be worn by Contractor’s superintendent and all sub contractors

B. Provide identification badge to each person authorized to enter premises.

C. Badge To Include: Personal photograph, name, assigned number , expiration date and employer.

D. Maintain a list of accredited persons, submit copy to District on request.

E. Special badges shall be issued to construction personnel when term of construction exceeds six months.

F. Require return of badges at expiration of their employment on the Work.

1.05 RESTRICTIONS

A. Do not allow cameras on site or photographs taken except by written approval of District.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contractor Quality assurance submittals.

B. Quality assurance.

C. Testing and inspection agencies and services.

D. Contractor's construction-related professional design services.

E. Contractor's design-related professional design services.

F. Control of installation.

G. Mock-ups.

H. Tolerances.

I. Manufacturers' field services.

J. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 41 00 - Regulatory Requirements: Compliance with applicable codes, ordinances and standards.

C. Section 01 45 33 - Code-Required Special Inspections: Testing laboratory services and inspections required by Division of the State Architect (DSA), during the course of construction.

D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1. Product options, substitutions, transportation and handling requirements, storage and protection requirements, and system completeness requirements.

1.03 REFERENCE STANDARDS

A. IAS AC89 - Accreditation Criteria for Testing Laboratories.

1.04 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary falsework for support of spanning or arched structures.
5. Temporary stairs or steps required for construction access only.
6. Temporary hoist(s) and rigging.
7. Investigation of soil conditions to support construction equipment.

1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:

1. Structural Design of Formwork: As described in Section 03 10 00 - Concrete Forming and Accessories.
2. Concrete Mix Design: As described in Section 03 30 00 - Cast-in-Place Concrete. No specific designer qualifications are required.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for District's information.

1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
    a. Full name.
    b. Professional licensure information.
    c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Quality Control Submittals Schedule

1. Schedule Format: Include quality control submittals on Submittals Schedule specified in accordance with General Conditions
2. Schedule Content: List all tests, inspections and reports specified to be submitted, indicating submittal number, submittal type (field test, field inspection, fabrication inspection, etcetera), scheduled date of quality control activity and date report should be made.

D. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for District's information.

1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.

2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

E. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.
2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for District's information.

F. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

G. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the District's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

H. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for District.
1. Submit report in duplicate within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

I. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for District.

1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or District.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is approved by Division of the State Architect.
4. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in California.

C. Contractor's Quality Control (CQC) Plan:

1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
   a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
      1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
   b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
      1) Management and control of documents and records relating to quality.
      2) Communications.
      3) Coordination procedures.
      4) Resource management.
      5) Process control.
      6) Inspection and testing procedures and scheduling.
      7) Control of noncomplying work.
      8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
      9) Control of testing and measuring equipment.

10) Project materials certification.

11) Managerial continuity and flexibility.

c. District will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.

d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. District's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. District reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.

D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.09 REGULATORY REQUIREMENTS FOR TESTING AND INSPECTION

A. Inspections, testing and approvals as required by authorities having jurisdiction. Refer to Section 01 41 00 - Regulatory Requirements and Section 01 45 33 - Code-Required Special Inspections.

B. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report requirements in preparing, fabricating, erecting, installing, applying, connecting and finishing Work.

C. Deviations from Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. District will employ and pay for services of an independent testing agency approved by DSA to perform specified testing.

B. As indicated in individual specification sections, District or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:

1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3740, and DSA.

2. Laboratory Qualifications: Accredited by IAS according to IAS AC89.

3. Laboratory: Authorized to operate in California.

4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTRACTOR'S QUALITY ASSURANCE

A. Quality Requirements: Work shall be accomplished in accordance with quality requirements of the Drawings and Specifications, including, by reference, all Codes, laws, rules, regulations and standards. When no quality basis is prescribed, the quality shall be in accordance with the best accepted practices of the construction industry for the locale of the Project, for projects of this type.

B. Quality Control Personnel: Contractor shall employ and assign knowledgeable and skilled personnel as necessary to perform quality control functions to ensure that the Work is provided as required.

3.02 CONTROL OF INSTALLATION

A. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects and fit for the intended use.

B. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

C. Comply with manufacturers' instructions, including each step in sequence.

D. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

E. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Have work performed by persons qualified to produce required and specified quality.

G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

I. Quality of Installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements.

J. Protection of Existing and Completed Work: Take all measures necessary to preserve and protect existing and completed Work free from damage, deterioration, soiling and staining, until Acceptance by the District.

K. Verification of Quality: Work shall be subject to verification of quality by District, or Architect in accordance with provisions of the General Conditions of the Contract.

1. Contractor shall cooperate by making Work available for inspection by District, Architect or their designated representatives.

2. Such verification may include mill, plant, shop, or field inspection as required.
3. Provide access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
4. Provide all information and assistance as required, including that by and from subcontractors, installers, fabricators, materials suppliers and manufacturers, for verification of quality by District, or Architect.
5. Contract modifications, if any, resulting from such verification activities shall be governed by applicable provisions in the General Conditions.

3.03 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Architect's approval is issued.

H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

J. Where possible salvage and recycle the demolished mock-up materials.

3.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.05 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with District's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   7. Inspections and Tests by Authorities Having Jurisdiction:
      a. Contractor shall cause all tests and inspections to be made for Work under this Contract, as required by Building Departments, Department of Public Works, Fire Department, Health Department and similar agencies having jurisdiction.

b. Excepted as specifically noted, scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.

8. Inspections and Tests by Serving Utilities:

a. Contractor shall cause all tests and inspections required by serving utilities to be made for Work under this Contract.

b. Scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.06 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 30 days in advance of required observations.

1. Observer subject to approval of Architect.

2. Observer subject to approval of District.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 FIELD QUALITY CONTROL SUBMITTALS

A. Administration: Make all submittals to the Architect, unless otherwise directed.

B. Submittal Identification: Identify each submittal by Specification Section number followed by a number indicating sequential submittal for that Section. Coordinate submittal numbers with submittals specified in Section 01 30 00 - Administrative Requirements.

1. Resubmittals shall use same number as original submittal, followed by a letter indicating sequential resubmittal.

03 30 00 - 1	First submittal for Section 03 30 00 - Cast in Place Concrete.
03 30 00 - 2	Second submittal for Section 03 30 00 - Cast in Place Concrete.
03 30 00 - 2A	Resubmittal of second submittal for Section 03 30 00 - Cast in Place Concrete.
03 30 00 - 2B	Second resubmittal of second submittal for Section 03 30 00 - Cast in Place Concrete.

C. Project Identification: Title each submittal with Project name, submittal date and Architect's Project number.

D. Copies: Provide PDF copies electronically transmitted or submit 6 copies, minimum, of reports of quality control reports on dry-process xerographic copies only.

E. Contractor's Review:

1. Submittals shall be made in accordance with requirements specified herein and in individual Sections.
2. Indicate clearly on each submittal the specified or referenced values for each quality control activity and the values obtained.
3. Note clearly and sign each submittal certifying that reported quality control activity "Conforms" or "Does Not Conform".

F. Changes and Deviations:

1. Identify all deviations from requirements of Drawings and Specifications.
2. Changes in the Work shall not be authorized by submittals review actions.
3. No review action, implicit or explicit, shall be interpreted to authorized changes in the Work.
4. Changes shall only be authorized by separate written Change Order or Construction Change Directive, in accordance with the General Conditions and 01 20 00 - Price and Payment Procedures.

G. Record Submittals: When record submittals are specified, submit three copies or sets only. Record submittals will not be reviewed but will be retained for historical and maintenance purposes.

H. Unsolicited Submittals: Unsolicited submittals will be returned unreviewed.

3.08 ARCHITECT'S REVIEW

A. General:

1. Submitted Report review by Architect and Architect's consultants shall be only for general conformance with the design concept and requirements based on the information presented.
2. Neither Architect nor Architect's consultants shall verify submitted quality control data.

B. Contract Requirements:

1. Review by Architect and Architect's consultants shall not relieve the Contractor from compliance with requirements of the Drawings and Specifications.
2. Changes shall only be authorized by separate written Change Order or Construction Change Directive, in accordance with the General Conditions and 01 20 00 - Price and Payment Procedures.

C. Observations by Architect and Architect's Consultants: Periodic and occasional observations of Work in progress will be made by Architect and Architect's consultants as deemed necessary to review progress of Work and general conformance with design intent.

3.09 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements, at no change in Contract Sum or Contract Time.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

C. Architect's Acceptance and Rejection of Work: Architect reserves the right to reject all Work not in conformance to the requirements of the Drawings and Specifications.

D. Acceptance of Non-Conforming Work: Acceptance of non-conforming Work, without specific written acknowledgement and approval of the District, shall not relieve the Contractor of the obligation to correct such Work.

   1. Acceptance of structurally related non-conforming work shall be submitted to DSA for review and approval.

E. Contract Adjustment for Non-conforming Work:

   1. Should Architect or District determine that it is not feasible or in District's interest to require non-conforming Work to be repaired or replaced, an equitable reduction in Contract Sum shall be made by agreement between District and Contractor.

   2. If equitable amount cannot be agreed upon, a Construction Change Directive will be issued and the amount in dispute resolved in accordance with applicable provisions of the General Conditions.

F. Non-Responsibility for Non-Conforming Work: Architect and Architect's consultants disclaim any and all responsibility for Work produced not in conformance with the Drawings and Specifications.

END OF SECTION

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 AUTHORITY AND PRECEDENCE OF CODES, ORDINANCES AND STANDARDS

A. Authority: All codes, ordinances and standards referenced in the Drawings and Specifications shall have the full force and effect as though printed in their entirety in the Specifications.

B. Precedence:

1. Where specified requirements differ from the requirements of applicable codes, ordinances and standards, the more stringent requirements take precedence.
2. Where the Drawings or Specifications require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, the Drawings and Specifications take precedence so long as such increase is legal.
3. Where no requirements are identified in the Drawings or Specifications, comply with all requirements of applicable codes, ordinances and standards of authorities having jurisdiction.

C. Applicable Codes, Laws and Ordinances: Refer also to Section 01 10 00 - Summary, regarding permits and licenses.

1. Performance of the Work is be governed by all applicable laws, ordinances, rules and regulations of Federal, State and local governmental agencies and jurisdictions having authority over the Project, including accessibility requirements.
2. Performance of the Work shall be accomplished in conformance with all rules and regulations of public utilities, utility districts and other agencies serving the development.
3. Where such laws, ordinances, rules and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to the Contract Time and Contract Sum, except where changes in laws, ordinances, rules and regulations occur subsequent to the execution date of the Agreement.

D. Applicable Building Codes: References on the Drawings or in the Specifications to "code" or "building code" not otherwise identified shall mean the codes specified below, together with all additions, amendments, changes, and interpretations adopted by code authorities of the jurisdiction having authority over the Project.

E. Performance of the Work shall meet or exceed the minimum regulatory requirements applicable to this project are summarized in this section, as adopted by Division of the State Architect:

1. Part 1, Title 24 CCR - 2022 California Administrative Code.
2. Part 2, Title 24 CCR - 2022 California Building Code (CBC); Volumes 1 and 2.

3. Part 3, Title 24 CCR - 2022 California Electrical Code (CEC, NFPA 70-NEC 2017).
4. Part 4, Title 24 CCR - 2022 California Mechanical Code (CMC).
5. Part 5, Title 24 CCR - 2022 California Plumbing Code (CPC).
6. Part 6, Title 24 CCR - 2022 California Energy Code.
7. Part 9, Title 24 CCR - 2022 California Fire Code (CFC).
8. Part 10, Title 24 CCR - 2022 California Existing Buildings Code.
9. Part 11, Title 24 CCR - 2022 California Green Building Standards Code (CalGreen).
10. Part 12, Title 24 CCR - 2022 California Referenced Standards Code.

F. Erosion and Sedimentation Control Regulations:
   1. California Codes and Regulations; Title 24, California Building Code, Parts 1 & 2.
   2. State of California State Water Resources Control Board Regulations.
   3. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; current edition.
G. Maintain on site during construction, a copy of California Codes and Regulations; Title 24, California Building Code, Parts 1 through 5.

1.02 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:
B. California Referenced Standards Code: Chapter 12-7-4 Fire Resistive Standards, for fire rated doors.
C. National Fire Protection Association (NFPA): (Partial List of Applicable Standards)
   1. Reference CBC for applicable NFPA Standards - 2022 CBC (SFM) Chapter 35.
   2. California Electrical Code:
      a. NFPA 70 - National Electrical Code.
         1) Use 2017 as modified in 2022 CBC Ch.35 Referenced Standards.
   3. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022.
D. 28 CFR 35 - Nondiscrimination on the Basis of Disability in State and Local Government Services; Final Rule; Department of Justice.
E. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice.
F. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
G. ADA Standards - 2010 ADA Standards for Accessible Design.
H. 29 CFR 1910 - Occupational Safety and Health Standards.

1.03 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue specified in the individual specification sections, except where a specific date is established by applicable code.

C. Obtain copies of standards when required by Contract Documents.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.

PART 2 CALIFORNIA DEPARTMENT OF GENERAL SERVICES, DIVISION OF THE STATE ARCHITECT

2.01 INTERPRETATION OF REGULATIONS

A. Document IR A-5 - Acceptance of Products, Materials, and Evaluations Reports .

B. Current listings are on the DGS website: http://www.dgs.ca.gov/dsa/Resources/IRManual.aspx.

PART 3 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

3.01 CFR -- CODE OF FEDERAL REGULATIONS

A. ADA Standards - 2010 ADA Standards for Accessible Design.

B. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content.

C. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

D. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice.

E. 29 CFR 1910 - Occupational Safety and Health Standards.

F. 29 CFR 1910, Subpart D - Walking-Working Surfaces, 1910.21-1910.30.

G. 29 CFR 1910.23 - Ladders.

H. 29 CFR 1910.38 - Emergency action plans.

I. 29 CFR 1910.132-138 - Personal Protective Equipment.

J. 29 CFR 1910.134 - Respiratory protection.

K. 29 CFR 1926.62 - Lead.

L. 29 CFR 1926.1101 - Asbestos.

M. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.

N. 39 CFR 111 - U.S. Postal Service Standard 4C.

O. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

P. 40 CFR 60 - Standards of Performance for New Stationary Sources.

Q. 40 CFR 273 - Standards For Universal Waste Management.

R. 40 CFR 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks.

S. 40 CFR 761 - Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution In Commerce, And Use Prohibitions.

T. 47 CFR 15 - Radio Frequency Devices.

U. 47 CFR 68 - Connection of Terminal Equipment to the Telephone Network.

V. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA).

W. 49 CFR 178 - Specifications for Packaging.

X. 49 CFR 192.285 - Plastic Pipe: Qualifying Persons to Make Joints.

3.02 CPSC -- CONSUMER PRODUCTS SAFETY COMMISSION

A. CPSC Pub. No. 325 - Public Playground Safety Handbook.

3.03 EPA -- ENVIRONMENTAL PROTECTION AGENCY

A. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit.

B. EPA 600/4-90/010 - Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

C. EPA 600-4-790-20 - Methods for Chemical Analysis of Water and Wastes.

D. EPA 625/1-86/021 - Design Manual: Municipal Wastewater Disinfection.

E. EPA 625/R-96/010b - Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.

F. EPA 712-C-02-190 - Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity.

3.04 FDA -- FOOD AND DRUG ADMINISTRATION

A. FDA Food Code - Chapter 6 - Physical Facilities.

3.05 FEMA -- U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY

A. FEMA (MAPS) - FEMA Map Service Center.

B. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment.

C. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

D. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.

E. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage.

3.06 FS -- FEDERAL SPECIFICATIONS AND STANDARDS (GENERAL SERVICES ADMINISTRATION)

A. FED-STD-595C - Colors Used in Government Procurement (Fan Deck)..

B. FS L-F-001641 - Floor Covering Translucent or Transparent Vinyl Surface with Backing; 1971, and Amendment 2, 1982.

C. FS L-S-125 - Screening, Insect, Nonmetallic.

D. FS RR-P-1352 - Partitions, Toilet, Complete; Revision C, 1989.

E. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant.

F. FS RR-W-365 - Wire Fabric (Insect Screening); 1980, Rev. A (Amended 1986).

G. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, and Vinyl Composition; Revision B, 1974, and Amendment 1, 1979.

H. FS TT-B-1325 - Beads (Glass Spheres) Retro-Reflective.

I. FS TT-P-115 - Paint, Traffic (Highway, White and Yellow); Revision F, 1984.

J. FS TT-P-1952 - Paint, Traffic and Airfield Marking, Waterborne.

K. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.

L. FS W-C-596 - Connector, Electrical, Power, General Specification for.

M. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification).

N. STATE STD 01.01 - Certification Standard Forced Entry and Ballistic Resistance of Structural Systems; Physical Security Division, Office of Physical Security Programs, Bureau of Diplomatic Security, United States Department of State.

O. UFC 4-010-01 - DoD Minimum Antiterrorism Standards for Buildings.

P. USPS Handbook AS-503 - Standard Design Criteria; United States Postal Service.

3.07 GSA -- U.S. GENERAL SERVICES ADMINISTRATION

A. GSA PBS-P100 - Facilities Standards for the Public Buildings Service.

3.08 NIJ -- NATIONAL INSTITUTE OF JUSTICE (DEPT. OF JUSTICE)

A. NIJ 0108.01 - Standard for Ballistic Resistant Protective Materials.

3.09 PS -- PRODUCT STANDARDS

A. PS 1 - Structural Plywood.

B. PS 2 - Performance Standard for Wood Structural Panels.

C. PS 20 - American Softwood Lumber Standard.

3.10 USDA -- UNITED STATES DEPARTMENT OF AGRICULTURE

A. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service.

3.11 USGS -- UNITED STATES GEOLOGICAL SURVEY

A. USGS (FMWQ) - National Field Manual for the Collection of Water-Quality Data; United States Geological Survey.

END OF SECTION

SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Division of the State Architect (DSA) Procedures for construction oversight and inspections required during the course of construction.

B. Code-required special inspections.

1. Division of the State Architect (DSA) approved testing laboratory services and inspections required during the course of construction.

C. Testing services incidental to special inspections.

D. Submittals.

E. Manufacturers' field services.

F. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements.

C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

A. Code or Building Code: California Building Code and, more specifically, Chapter 17A - Structural Tests and Special Inspections, of same.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located. AHJ for this Project is Division of the State Architect.

C. Special Inspection:

1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the CBC that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.

2. Special inspections are separate from and independent of tests and inspections conducted by District or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete.

B. AISC 341 - Seismic Provisions for Structural Steel Buildings.

C. AISC 360 - Specification for Structural Steel Buildings.

D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

F. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

G. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

H. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.

I. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

J. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

K. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

L. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

M. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.

N. AWS D1.1/D1.1M - Structural Welding Code - Steel.

O. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:

1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:

1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit certification that Testing Agency is acceptable to AHJ.
3. Testing and inspections will be performed by an independent testing laboratory selected and employed by the District and approved by the Division of the State Architect (DSA).
    a. Qualification of a testing agency or laboratory will be under the jurisdiction of the DSA Structural Safety Section (SSS). Procedural and acceptance criteria are set forth in the California Administrative Code (CBC) Chapter 4.

D. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.

E. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures.

F. Distribution List: The Testing Laboratory will make the following distribution of test and inspection reports:

1 District

2 Architect

1 Structural Engineer

1 Contractor

1 District's Project Inspector

1 Division of the State Architect

G. Each and every test or inspection report shall bear the File Number and Application Number assigned to this project by the DSA.

H. DSA Form 291: From the engineering manager of the laboratory of record.

I. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one each to the distribution list.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of Special Inspector.
    d. Date and time of special inspection.
    e. Identification of product and specifications section.
    f. Location in the Project.
    g. Type of special inspection.
    h. Date of special inspection.
    i. Results of special inspection.
    j. Compliance with Contract Documents.
2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
3. Comply with DSA IR 17-12, revised 04/23/20.

J. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one each to the distribution list.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of Special Inspector.
    d. Date and time of special inspection.

e. Identification of fabricated item and specification section.

f. Location in the Project.

g. Results of special inspection.

h. Verification of fabrication and quality control procedures.

i. Compliance with Contract Documents.

j. Compliance with referenced standard(s).

K. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one each to the distribution list.

1. Include:

a. Date issued.

b. Project title and number.

c. Name of inspector.

d. Date and time of sampling or inspection.

e. Identification of product and specifications section.

f. Location in the Project.

g. Type of test or inspection.

h. Date of test or inspection.

i. Results of test or inspection.

j. Compliance with Contract Documents.

k. Test reports shall be signed by a Civil Engineer licensed in the State of California.

2. Test reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory.

a. Samples taken but not tested shall also be reported.

b. Records of special sampling operations as required shall also be reported.

c. Reports shall show that the material or materials were sampled and tested in accordance with the requirements of the CBC, and with the approved specifications.

d. They shall also state definitely whether or not the material or materials tested comply with requirements.

e. Test reports shall be issued within 14 days of finding being known, to all parties listed above.

3. At the completion of the project, Testing Laboratory shall certify in writing and on all required DSA forms, that all work specified or required to be tested and inspected conforms to drawings, specifications and applicable building codes.

4. Verification of Test Reports:

a. The Testing Laboratory of record shall submit to the Division of the State Architect (DSA) a verified report covering all tests which are required to be made by that agency during the progress of the project.

1) Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project.

2) Specific testing requirements as listed on the Structural Test and Inspections (T&I) Form DSA-103 for this project. These tests may include the following forms:
   (a) DSA-201: Soils Compaction.
   (b) DSA-202: Sieve Analysis.
   (c) DSA-203: Tension/Bend.
   (d) DSA-204: Compression.
   (e) DSA-206: Anchor Load.
   (f) DSA-208: High-Strength Bolt.
   (g) DSA-210: Ultrasonic (NDT).
   (h) DSA-250: Special Inspection(s).
   (i) DSA-291: Laboratory Verified Report.
   (j) DSA-292: Special Inspection(s) Verified Report(s).
3) Other Division of the State Architect (DSA) Certification Documents (Reports) as may be required.

b. DSA Form 292 - Special Inspection Verified Report shall be from all special inspectors contracting directly and individually with the school board.

L. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and AHJ.

M. Manufacturer's Field Reports: Submit reports to Architect.
1. Submit report in duplicate within 7 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

N. Fabricator's Field Reports: Submit reports to Architect and AHJ.
1. Submit report in duplicate within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

1.06 SPECIAL INSPECTION AGENCY

A. District will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

A. District is to employ services of an independent inspection and testing agency to perform observation, testing and sampling associated with special inspections including those not required by the building code. CAC

1. Project Inspector and testing lab are employed by the District and approved by:

a. A/E of Record.

b. Structural Engineer (when applicable).

c. DSA.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:

1. Independent firm specializing in performing testing and inspections of the type specified in this section.

B. Testing Agency Qualifications:

1. Independent firm specializing in performing testing and inspections of the type specified in this section.

2. Testing Agency must possess DSA LEA Program acceptance.

C. Testing and inspection services which are performed shall be in accordance with requirements of the CBC, and as specified herein. Testing and inspection services shall verify that work meets the requirements of the Construction Documents.

D. In general, tests and inspections for structural materials shall include all items enumerated on the Structural Tests and Inspections list for this project as prepared and distributed by the Architect.

E. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

1.09 INSPECTION BY THE DISTRICT

A. The District shall have the right to reject materials and workmanship which are defective, or to require their correction.

1. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the District.

2. If the Contractor does not correct such rejected work within a reasonable time, the District may correct such rejected work and charge the expense to the Contractor.

B. Should it be considered necessary or advisable by the District at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the completed work; the Contractor shall on request promptly furnish necessary facilities, labor and materials.

1. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. .

2. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

1.10 DISTRICT'S INSPECTOR

A. A Project Inspector (IOR) employed by the District and approved by Architect, Structural Engineer and DSA in accordance with the requirements of the California Building Code will be assigned to the work.

1. Project Inspector duties are specifically defined in CCR Title 24 Part 1, Sec. 4-211(b), 4-219, 4-333(b), 4-336 and 4-342.

B. The District's Inspector shall at all times have access for the purpose of inspection to all parts of the work and to the shops where the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.

C. The work of construction in all stages of progress shall be subject to the personal continuous observation of the District's Inspector.

1. 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.

2. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

3. Inspector of Record is required to work a normal 40 hour week on this project only. Any overtime required will be at the expense of the Contractor and sub-contractor requiring the inspection.

1.11 PAYMENTS

A. Costs of initial testing and inspection, except as specifically modified herein, or specified otherwise in technical sections, will be paid for by the District, providing such testing and inspection indicates compliance with Contract Documents. Initial tests and inspections are defined as the first tests and inspections as herein specified.

B. In the event a test or inspection indicates failure of a material or procedure to meet requirements of Contract Documents, costs for retesting and reinspection will be paid by the District and backcharged to the Contractor.

C. Additional tests and inspections not herein specified but requested by District or Architect, will be paid for by District, unless results of such tests and inspections are found to be not in compliance with Contract Documents, in which case the District will pay all costs for initial testing as well as retesting and reinspection and backcharge the Contractor.

D. Costs for additional tests or inspections required because of change in materials being provided or change of source or supply will be paid by District and backcharged to the Contractor.

E. Costs for tests or inspections which are required to correct deficiencies will be paid by the District and backcharged to the Contractor.

F. Cost of testing which is required solely for the convenience of Contractor in his scheduling and performance of work will be paid by the District and backcharged to the Contractor.

G. Overtime costs for testing and inspections performed outside the regular work day hours, including weekends and holidays, will be paid for by the District and backcharged to the Contractor. Such costs include overtime costs for the District's Inspector.

H. Testing Laboratory shall separate and identify on the invoices, the costs covering all testing and inspections which are to be backcharged to the Contractor as specified above.

I. Testing Laboratory shall furnish to District a cost estimate breakdown covering initial tests and inspections required by Contract Documents. Estimate shall include number of tests, man-hours required for tests, field and plant inspections, travel time, and costs.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.

1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

B. Tests and inspections for the following will be required in accordance with the current CBC, unless otherwise specified.

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION (CHAPTER 17A AND 22A)

A. Structural Steel: Comply with quality assurance inspection requirements of CBC.

B. Erection Inspection: Testing Laboratory will visually inspect bolted and field welded connections, perform such additional tests and inspections of field work as are required by the Architect and prepare test reports for the Architect's review.

C. Welding:

1. Testing Laboratory will review welding procedure specifications as prepared by the fabricator.
2. Structural Steel:
   a. Inspect welding per CBC 1705A.2.5.
      1) Comply with DSA IR 17-3: Structural Welding Inspection: 2022 CBC; Revised 09/24/19.
   b. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M and AWS D1.8/D1.8M; continuous.
   c. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M and BHMA A156.31 ; continuous.
   d. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M and BHMA A156.31; periodic.

e. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M and BHMA A156.31; continuous.

f. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M and BHMA A156.31; continuous.

3. Should defects appear in welds tested, repairs shall be similarly inspected at the Contractor's expense and at the direction of the Architect until satisfactory performance is assured.

4. Other methods of inspection, for example, X-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the Architect.

D. Corrections:

1. Correct deficiencies in structural steel work which inspections and test reports indicate to be not in compliance with the specified requirements.

2. Perform additional tests required to reconfirm noncompliance of the original work and to show compliance of corrected work. Costs for all additional tests will be paid for by the District and backcharged to the Contractor.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION (CHAPTER 17A AND 19A)

A. Inspection:

1. Job Site Inspection: CBC 1705A.3, 1705A.3.5 (Conc. Preplacement), 1705A.3.6 (Placing Record), and 1910A.

2. Batch Plant or Weighmaster Inspection: CBC 1705A.3.3.

B. Reinforcing Steel, Including: Verify compliance with approved contract documents and ACI 318, Sections 20.2, 25.2 through 25.7, and 26.6.

1. Reinforcing Bars: CBC 1901A.6; 1910A.2.

a. District's Inspector will inspect all reinforcement for concrete work for size, dimensions, locations and proper placement.

C. Anchors Cast in Concrete: Verify compliance with ACI 318, 17.8.2; periodic.

D. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ICC-ES AC308 approved report prior to and during placement of concrete; continuous.

1. Comply with CBC Section 1910A.5; Table 1705A.3, items 4a & 4b, ASCE 7, Section 13.4.

E. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI 318.

1. Comply with CBC Section 1910A.5; Table 1705A.3, items 4a & 4b, ASCE 7, Section 13.4.

2. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.

3. Other Mechanical and Adhesive Anchors: Verify as per Chapter 17.8.2; periodic.

F. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318; periodic.

G. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with CBC Chapter 19A, ACI 318, Sections 26.4.3, 26.4.4; periodic.

1. Portland Cement Tests: CBC 1705A.3.2, 1910A.1.

2. Concrete Aggregates: CBC 1705A.3.2, 1903A.5.
3. Batch Plant Inspection: CBC 1705A.3.3.
4. Waiver of Continuous Batch Plant Inspection and Tests: CBC 1705A.3.3.1.
5. Admixtures: CBC 1910A.1.
6. Proportions of Concrete: CBC 1904A (Durability) and 1905A (Modifications to ACI 318).

H. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Chapter 26.5, 26.12, and record the following, continuous:
   1. Slump.
   2. Air content.
   3. Temperature of concrete.
   4. Strength Tests of Concrete: CBC 1905A.1.15; Table 1705A.3 Item 6; ACI 318-14 Sec. 26.12.

I. Concrete Placement: Verify application techniques comply with approved Contract Documents and ACI 318, Chapter 26.5; continuous.

J. Specified Curing Temperature and Techniques: Verify compliance with ACI 318, Chapter 26.5.3-26.5.5; continuous.

K. Concrete Strength in Situ: Verify concrete strength complies with approved Contract Documents, CBC Table 1705A.3, 1905A.1.15, and modified ACI 318, Chapter 26.12.2,1(a).

L. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Chapter 26.11.1.2(b); continuous.

M. District Inspector (IOR) will do the following:
   1. Inspect placing of reinforcing steel and concrete at Project.
   2. Obtain weighmaster's certificate and identify mix before accepting each load.
   3. Keep daily record of concrete placement, identifying each truck load, time of receipt, and location of concrete in structure.
   4. Keep record until completion of Project and make available for inspection by DSA Field Engineer or representative.
   5. See also subparagraph on Waiver of Continuous Batch Plant Inspection above.
   6. During progress of work, take an additional number of test cylinders as directed by Architect. Conform to CBC 1905A.1.15 (modified ACI 318). Test cylinders need not be made for concrete used in exterior flatwork.
      a. ACI 318 Section 26.12.2.1 shall be replaced and the Contractor shall comply with the following:
         1) Samples for strength test of each class of concrete placed each day shall not be taken less than once for each 50 cubic yards (38.3m3) of concrete, or not less than once for each 2,000 square feet (186 m2) of surface area of for slabs or walls.

2) Additional samples for seven day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.

7. One set of cylinders shall consist of 4 samples all taken from same batch, one to be tested at age of 7 days and two at 28 days.
8. Make and store cylinders according to ASTM C31/C31M.
9. Deliver cylinders to laboratory or store cylinders in a suitable protected environment for pick up by laboratory personnel.
10. Make slump test of wet concrete according to test for slump of portland cement concrete, ASTM C143/C143M, at least at the same frequency that the cylinders are taken.

3.04 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Design bearing capacity of material below shallow foundations; periodic.
   2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
   3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
   4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.

B. Testing: Classify and test excavated material; periodic.

C. Excavations, Foundations and Retaining Walls (Chapters 17A, 18A,):
   1. Earth Compaction: CBC 1705A.6; Table 1705A.6, continuous; 1804A.6.
   2. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of compacted fill: CBC 1705A.6.1; Table 1705A.6, periodic; 1804A.6.

D. The Geotechnical Engineer of record or a Geotechnical Engineer selected by the District will provide continuous inspection of fill and will field test fill and earth backfill as placed and compacted, and inspect excavations and subgrade before concrete is placed and provide periodic inspection of open excavations, embankments, and other cuts or vertical surfaces of earth.
   1. The Geotechnical Engineer will submit a Verified Report indicating observations, tested fills, and opinion the fills were placed in accordance with the project specifications.

E. Contractor shall remove unsatisfactory material, re-roll, adjust moisture, place new material, or in the case of excavations, provide proper protective measures, perform other operations necessary, as directed by the Geotechnical Engineer whose decisions and directions will be considered final.

F. Soils Test and Inspection Procedure:
   1. Allow sufficient time for testing, and evaluation of results before material is needed. The Geotechnical Engineer shall be sole and final judge of suitability of all materials.
   2. Laboratory compaction tests to be used will be in accordance with ASTM D1557.
   3. Field density tests will be made in accordance with ASTM D1556/D1556M.

4. Number of tests will be determined by Geotechnical Engineer. Materials in question may not be used pending test results.
5. Excavation and embankment inspection procedure. Geotechnical Engineer will visually or otherwise examine such areas for bearing values, cleanliness and suitability.
6. Earthwork Test Reports: In order to avoid misinterpretations by the reviewing agencies, all retest results shall be reported on the same sheet, immediately following the previous failure test to which it is related. Retests shall be clearly noted as such.

3.05 SPECIAL INSPECTIONS FOR CAST-IN-PLACE DEEP FOUNDATIONS

A. Materials, Equipment and Final Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Element length; continuous.
   2. Element diameters and bell diameters; continuous.
   3. Embedment into bedrock; continuous.
   4. End bearing strata capacity; continuous.
   5. Placement locations and plumbness; continuous.
   6. Type and size of hammer; continuous.

B. Drilling Operations: Observe and maintain complete and accurate records for each element; continuous.

C. Material Volume: Record concrete and grout volumes.

D. Concrete Elements Associated with Cast-in-Place Deep Foundations: Perform additional inspections as required by the Special Inspections for Concrete Construction article of this section.

3.06 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. Seismic Force-Resisting Systems: Comply with the quality assurance plan requirements of AISC 341.

B. Inspection: Comply with CBC 1705A.12.

C. Testing: Comply with CBC 1705A.13.

D. Structural Steel: Comply with the quality assurance plan requirements of AISC 341.

E. Mechanical and Electrical Components:
   1. Anchorage of electric equipment required for emergency or standby power systems; periodic.
   2. Installation and anchorage of other electrical equipment; periodic.
   3. Vibration isolation systems where the approved Contract Documents require a nominal clearance of 1/4 inch or less between support frame and seismic restraint; periodic.

F. Designated Seismic System Verification: Verify label, anchorage or mounting complies with certificate of compliance provided by manufacturer or fabricator.

G. Structural Testing for Seismic Resistance:
   1. Concrete reinforcement: Comply with ACI 318, Section 20.2.2.5 and 21.1.52.

a. Materials Obtain mill certificates demonstrating compliance with ASTM A615/A615M; periodic.

b. Welding: Perform chemical tests complying with ACI 318, Section 26.6.4 to determine weldability; periodic.

2. Non-Structural Components:

a. General Design Requirements: Obtain manufacturer certification of compliance with requirements of ASCE 7, Section 13.2.1; periodic.

b. Designated Seismic Force-Resisting Non-Structural System Components: Obtain manufacturer certification of compliance with ASCE 7, Section 13.2.2; periodic.

H. Structural Observations for Seismic Resistance: Visually observe structural system for general compliance with the approved Contract Documents; periodic.

3.07 SPECIAL INSPECTIONS FOR WIND RESISTANCE

A. Cold-Formed Steel Light Frame Construction:

1. Field welding; periodic.

2. Screw attachment, bolting, anchoring and other fastening of components within the main wind force-resisting system; periodic

B. Structural Observations for Wind Resistance: Visually observe structural system for general compliance with the approved Contract Documents; periodic.

3.08 STRUCTURAL OBSERVATIONS FOR STRUCTURES

A. Provide Observations: For structure where one or more of the following conditions exist:

1. Such observation is required by the registered design professional responsible for the structural design.

2. Such observation is specifically required by AHJ.

3.09 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:

1. Verify samples submitted by Contractor comply with the referenced standards and the approved Contract Documents.

2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.

3. Perform specified sampling and testing of products in accordance with specified reference standards.

4. Ascertain compliance of materials and products with requirements of Contract Documents.

5. Promptly notify Architect, SEOR, IOR, DSA, District and Contractor of observed irregularities or non-conformance of work or products.

6. Perform additional tests and inspections required by Architect.

7. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.10 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
1. Test samples submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
6. Perform additional tests and inspections required by Architect.
7. Attend preconstruction meetings and progress meetings.
8. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Immediately upon determination of a test failure, the Laboratory shall telephone the results to the Architect. On the same day, Laboratory shall send test results by email to the Architect and to all relevant responsible parties of the project team, and District's Inspector

D. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

E. Contractor will pay for re-testing required because of non-compliance with specified requirements.

F. At the completion of the project, Testing Laboratory shall certify in writing and on all required DSA forms, that all work specified or required to be tested and inspected conforms to drawings, specifications and applicable building codes.
1. See DSA Procedure PR 13-01.

G. Duties of the Laboratory of Record related to the use of form DSA 152 are as follows:

1. Meet with the Project Inspector, design professionals, and contractor as needed to mutually communicate and understand the testing and inspection program and the methods of communication appropriate for the project.
2. Obtain a copy of the DSA approved construction documents from the design professional in general responsible charge prior to the commencement of construction
3. Obtain a copy of the DSA approved Statement of Structural Tests and Special Inspections (form DSA 103) from the design professional in general responsible charge prior to the commencement of construction.
4. Report all project related activities to the Project Inspector. The Project Inspector is responsible for monitoring the work of the Laboratory of Record and Special Inspectors to ensure the testing and special inspection program is satisfactorily completed
5. Provide material testing as identified in the DSA approved construction documents.
6. Submit test reports to the Project Inspector on the day the tests were performed for any tests performed on-site
7. Submit material test reports in a timely manner such that construction is not delayed and not to exceed 14 days from the date the material tests were performed. Test reports are to be submitted to DSA, the Architect, structural engineer, Project Inspector and school district.
    a. As a convenience, and if agreed upon by involved parties, the test reports may be submitted electronically as identified in Section 4 of this procedure.
8. Immediately submit reports of material tests not conforming to the requirements of the DSA approved construction documents. These reports shall be submitted to the DSA, Architect, structural engineer, Project Inspector and school district.
9. The Engineering Manager shall submit an interim Laboratory of Record Verified Report (form DSA 291) and the Geotechnical Engineer shall submit an interim Geotechnical Verified Report (form DSA 293) to DSA, the project inspector, school district and the Design Professional in General Responsible Charge.
    a. The reports are required to be submitted upon any of the following events occurring:
        1) Within 14 days of the completion of the material testing/special inspection program.
        2) Work on the project is suspended for a period of more than one month.
        3) The services of the laboratory of record are terminated for any reason prior to completion of the project.
        4) The DSA requests a Verified Report. (See interim verified reports below. This is a “DSA request.”)
10. The Engineering Manager shall submit an interim verified report (form DSA 291) and the Geotechnical Engineer shall submit form DSA 293 to DSA and a copy to the project inspector for each of the applicable sections of the form DSA 152, prior to the project inspector signing off that section of the project inspection card, if that section required material testing. The sections are:

a. Initial Site Work
b. Foundation Prep
c. Vertical Framing
d. Horizontal Framing
e. Appurtenances
f. Finish Site Work
g. Other Work
h. Final

H. Duties of Special Inspectors, employed by the Laboratory of Record, related to the use of form DSA 152 are as follows:

1. Meet with the Project Inspector, design professionals, and contractor as needed to mutually communicate and understand the testing and inspection program and the methods of communication appropriate for the project.
2. Report all project related activities to the Project Inspector. The Project Inspector is responsible for monitoring the work of the Laboratory of Record and Special Inspectors to ensure the testing and special inspection program is satisfactorily completed.
3. Perform work under the supervision of the Engineering Manager for the Laboratory of Record
4. Perform inspections in conformance with the DSA approved construction documents, applicable codes and code reference standards
5. Prepare detailed daily inspection reports outlining the work inspected and provide the Project Inspector a copy of the reports on the same day the inspections were performed.
6. Prepare detailed daily inspection reports outlining the work inspected and provide the Project Inspector a copy of the reports on the same day the inspections were performed.
7. Immediately submit reports of materials or work not conforming to the requirements of the DSA approved construction documents. These reports shall be submitted to the DSA, Architect, structural engineer, Project Inspector and school district.
8. Submit daily special inspection reports in a timely manner such that construction is not delayed and not to exceed 14 days from the date the special inspections were performed. The reports are to be submitted to the Architect, structural engineer, Project Inspector and school district.
9. Submit Verified Report forms DSA 292 to the DSA, Project Inspector, district and design professional in responsible charge.
10. The reports are required to be submitted upon any of the following events occurring:
11. Within 14 days of the completion of the special inspection work.
12. Work on the project is suspended for a period of more than one month.
13. The services of the special inspector are terminated for any reason prior to completion of the project.
14. The DSA requests a Verified Report. (See interim verified reports below. This is a “DSA request”)

15. Submit an interim Verified Report (form DSA 292) to the DSA and a copy to the Project Inspector for each of the applicable sections of the form DSA 152, prior to the Project Inspector signing off that section of the project inspection card, if that section required special inspections. The sections are:
    a. Initial Site Work
    b. Foundation
    c. Vertical Framing
    d. Horizontal Framing
    e. Appurtenances
    f. Non-Building Site Structures
    g. Finish Site Work
    h. Other Work
    i. Final
16. The Verified Reports shall be sent electronically to the DSA.

I. Duties of Special Inspectors, not employed by the Laboratory of Record, related to the use of form DSA 152 are as follows:
    1. Meet with the project inspector, Laboratory of Record, the design professionals, and the contractors as needed to mutually communicate and understand the testing and inspection program, and the methods of communication appropriate for the project.
    2. Report all project related activities to the project inspector. The project inspector is responsible for monitoring the work of the Laboratory of Record and special inspectors to ensure the testing and special inspection program is satisfactorily completed.
    3. Perform work under the direction of the design professional in general responsible charge, as defined in Section 4-335(f)1B of the California Administrative Code (Title 24, Part 1).
    4. Perform inspections in conformance with the DSA approved construction documents, applicable codes and code reference standards.
    5. Prepare detailed daily inspection reports outlining the work inspected and provide the project inspector a copy of the reports on the same day the inspections were performed.
    6. Immediately submit reports of materials or work not conforming to the requirements of the DSA approved construction documents. These reports shall be submitted to DSA, the Architect, structural engineer, project inspector and the school district.
    7. Submit daily special inspection reports in a timely manner such that construction is not delayed and not to exceed 14 days from the date the special inspections were performed. The reports are to be submitted to DSA, the Architect, structural engineer, project inspector and the school district.
    8. Submit Special Inspection Verified Report forms DSA 292 to DSA, the project inspector, the school district and the Design Professional in General Responsible Charge.
        a. The reports are required to be submitted upon any of the following events occurring:
            1) Within 14 days of the completion of the special inspection work.

2) Work on the project is suspended for a period of more than one month.

3) The services of the special inspector are terminated for any reason prior to completion of the project.

4) DSA requests a verified report. (See interim verified reports below. This is a "DSA request.")

9. Submit an interim Special Inspection Verified Report (form DSA 292) to DSA and a copy to the project inspector for each of the applicable sections of the form DSA 152, prior to the project inspector signing off that section of the project inspection card, if that section required special inspections.

   a. The sections are:

      1) Initial Site Work

      2) Foundation Prep

      3) Vertical Framing

      4) Horizontal Framing

      5) Appurtenances

      6) Finish Site Work

      7) Other Work

      8) Final

3.11 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. DSA Requirements:

1. Each Multi-Prime Contractor or Subcontractor shall comply with DSA Construction Oversight Procedure PR 13-01. California Code of Regulations (CCR), Title 24, Part 1, CCR, Chapter 4, Article 1 (Sections 4-211 through 4-220) and Group1, Articles 5 and 6 (Sections 4-331 through 4-344) which provide regulations governing the construction process for projects under the jurisdiction of the Division of the State Architect (DSA).

   a. Assist the Project Inspector (IOR) and complete and fill out the following forms during the course of construction.

      1) Form-102-IC: Construction Start Notice/ Inspection Card Request: Verify Project Inspector has an active form issued by DSA.

      2) Form-151: Project Inspector Notifications: Contractor to notify IOR and assist.

      3) Form-152: Project Inspection Card: See below.

      4) Form-154: Notice of Deviations/ Resolution of Deviations: Contractor to verify all deviations are reviewed, corrected, and accepted by the design professional, and filed with DSA through the Project Inspector (IOR).

         (a) When the Project Inspector identifies deviations from the DSA approved construction documents the inspector must verbally notify the contractor. If the deviations are not corrected within a reasonable time frame, the inspector is required to promptly issue a written notice of deviation to the contractor, with a copy sent to the design professional in general responsible charge and the DSA.

(b) When the noticed deviations are corrected, the inspector is required to promptly issue a written notice of resolution to the contractor, with a copy sent to the design professional in general responsible charge and the DSA.

(c) Deviations include both construction deviations and material deficiencies.

(d) The written notice of deviations shall be made using form DSA 154.

(e) The notice of resolution of deviations shall be made using the original form DSA 154 that reported the deviations.

5) Form-156: Commencement/Completion of Work Notification

6) Form-6.C: Verified Report – Contractor: From each contractor having a contract with the school board.

2. Duties of Contractor related to the use of form DSA 152 are as follows:

a. The Contractor shall carefully study the DSA approved documents and shall plan a schedule of operations well ahead of time.

b. If at any time it is discovered that work is being done which is not in accordance with the DSA approved construction documents, the Contractor shall correct the work immediately.

c. Verify that forms DSA 152 are issued for the project prior to the commencement of construction.

d. Meet with the design team, the Laboratory of Record and the Project Inspector to mutually communicate and understand the testing and inspection program and the methods of communication appropriate for the project.

e. Notify the Project Inspector, in writing, of the commencement of construction of each and every aspect of the work at least 48 hours in advance by submitting form DSA 156 (or other agreed upon written documents) to the Project Inspector.

f. Notify the Project Inspector of the completion of construction of each and every aspect of the work by submitting form DSA 156 (or other agreed upon written documents) to the Project Inspector.

g. Consider the relationship of the signed off blocks and sections of the form DSA 152 and the commencement of subsequent work. Until the Project Inspector has signed off applicable blocks and sections of the form DSA 152, the Contractor may be prohibited from proceeding with subsequent construction activities that cover up the unapproved work. Any subsequent construction activities, that cover up the unapproved work, will be subject to a "Stop Work Order" from the DSA or the district and are subject to removal and remediation if found to be in non-compliance with the DSA approved construction documents.

h. Submit the final verified report. All prime contractors are required to submit final Contractor Verified Reports (form DSA 6-C) to DSA and the project inspector.

1) The reports are required to be submitted upon any of the following events occurring:

(a) The project is substantially complete. DSA considers the project to be complete when the construction is sufficiently complete in accordance with the DSA approved construction documents so that the owner can occupy or utilize the project.

(b) Work on the project is suspended for a period of more than one month.

(c) The services of the contractor are terminated for any reason prior to the completion of the project.

(d) DSA requests a verified report.

B. Contractor Responsibilities, General:

1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.

2. Availability of Samples

a. Contractor shall make materials required for testing available to Laboratory and assist in acquiring these materials as directed by the District's Inspector. The samples shall be taken under the immediate direction and supervision of the Testing Laboratory or District's Inspector.

b. If work which is required to be tested or inspected is covered up without prior notice or approval, such work may be uncovered at the discretion of Architect at no additional cost to the District. Refer to paragraph "Payments" herein.

c. Unless otherwise specified, Contractor shall notify Testing Laboratory a minimum of 10 working days in advance of all required tests, and a minimum of 2 working days in advance of all required inspections. All extra expenses resulting from a failure to notify the Laboratory will be paid by the District and backcharged to the Contractor.

d. Contractor shall give sufficient advance notice to Testing Laboratory in the event of cancellation or time extension of a scheduled test or inspection. Charges due to insufficient advance, notice of cancellations, or time extension will be paid for by the District and backcharged to the Contractor.

3. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.

4. Provide incidental labor and facilities:

a. To provide access to work to be tested or inspected.

b. To obtain and handle samples at the site or at source of Products to be tested or inspected.

c. To facilitate tests or inspections.

d. To provide storage and curing of test samples.

5. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.

6. Arrange with District's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

7. The Contractor shall notify the District's Inspector a minimum of 5 working days in advance of the manufacture of material to be supplied by him under the Contract Documents, which must be by terms of the Contract be tested, in order that the District may arrange for the testing of such material at the source of supply.

8. Material shipped by the Contractor from the source of supply before having satisfactorily passed such testing and inspection or before the receipt of notice from said Inspector that such testing and inspection will not be required, shall not be incorporated in the Project.
9. The District will select and pay testing laboratory costs for all tests and inspections, but may be reimbursed by the Contractor for such costs under the Contract conditions. Any direct payments by the Contractor to the testing laboratory on this project is prohibited.

C. Contractor shall submit a written statement of responsibility to comply with CBC section 1704A.4.
   1. Each contractor responsible for the construction of a main wind- or seismic-force-resisting system, designated seismic system or a wind- or seismic-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building official and the owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:
      a. Acknowledgment of awareness of the special requirements contained in the statement of special inspections;
      b. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official;
      c. Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of the reports; and
      d. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

D. Contractor Responsibilities, Seismic Force-Resisting System, Designated Seismic System, and Seismic Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and District prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

E. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and District prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

F. Unless otherwise directed, materials not conforming to the requirements of Contract Documents shall be promptly removed from the Project site.

3.12 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 30 days in advance of required observations.

1. Observer subject to approval of Architect.
2. Observer subject to approval of District.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary telecommunications services.

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Security requirements.

E. Waste removal facilities and services.

1.02 RELATED REQUIREMENTS

A. Section 01 35 53 - Security Procedures

1.03 REFERENCE STANDARDS

1.04 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, and water required for construction purposes.

B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.05 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:

1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
2. Telephone Land Lines: One line, minimum; one handset per line.
3. Internet Connections: Minimum of one; DSL modem or faster.
4. Email: Account/address reserved for project use.

1.06 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

1. Provide temporary toilet facilities if maximum number of personnel on project is greater than 10.
2. Submit proposed location of temporary toilet(s) to Construction Manager for approval.
    a. Place on-site portable toilets away from building air intakes and entryway.

B. Maintain daily in clean and sanitary condition.

1.07 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 FENCING

A. Construction: Contractor's option.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks. Chain link Fence with Windscreen (Sch. 40 post and top rail).

1.09 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and District's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with District's security program.

1.10 CAFETERIA AND FOOD

A. Construction personnel shall police their own areas. All cups, cans, paper, wrappers, and discarded food must be placed in trash receptacles at end of each break.

B. Contractor(s) shall submit to Construction Manager proposed location of any break areas and eating areas for approval.

1.11 SMOKING AND TOBACCO

A. Smoking and vaping is not permitted on property.

B. No chewing tobacco or spitting of tobacco is permitted.

1.12 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and District.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.13 WASTE REMOVAL

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 55 00
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access roads.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Flag persons.

G. Flares and lights.

H. Haul routes.

I. Traffic signs and signals.

J. Maintenance.

K. Removal, repair.

L. Mud from site vehicles.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: access to site, work sequence, and occupancy.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Construction: Contractor's option.

B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.02 SIGNS, SIGNALS, AND DEVICES

A. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

B. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

B. Limit the number of haul trucks on site and establish a haul route. Install a gravel or base road on site for loading trucks. Haul route shall be reviewed and approved by Construction Manager.

C. Provide a boundary/zone where equipment shall not enter because of proximity to active adjacent operation, and if necessary, equipment shall operate on alternative fuel to reduce diesel particulate matter.

D. Establish construction site and access road speed limits and enforce them during the construction period.

E. Restrict the hours of material transport to the periods and days permitted by both this contract and local noise or other applicable ordinance.

F. Schedule haul trucks and material delivery trucks to prevent traffic congestion and impede the normal operation of the Facility. Set up truck queuing area away from public entrances.

3.02 ACCESS ROADS

A. Use of designated existing on-site streets and driveways for construction traffic is permitted.

B. Tracked vehicles not allowed on paved areas.

C. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.

D. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

E. Provide and maintain access to fire hydrants free of obstructions.

3.03 PARKING

A. Use of designated areas of existing parking facilities by construction personnel is permitted.

1. Construction Manager will meet with Contractor(s) to determine parking requirements.

B. Construction Manager will notify security of parking area to be used by construction personnel if at variance with this procedure.

C. Use of designated areas of new parking facilities by construction personnel is permitted.

D. Contractor(s) and related personnel shall park in authorized areas only.

E. Do not allow heavy vehicles or construction equipment in parking areas.

F. Arrange for temporary parking areas to accommodate use of construction personnel.

G. When site space is not adequate, provide additional off-site parking.

3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES

A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.05 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.06 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.07 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.08 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.09 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Relocate as Work progresses, to maintain effective traffic control.

3.10 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.11 REMOVAL, REPAIR

A. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

B. Repair existing facilities damaged by use, to original condition.

C. Remove equipment and devices when no longer required.

D. Repair damage caused by installation.

E. Remove post settings to a depth of 2 feet.

3.12 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.
   1. System Completeness.
   2. Installation of Products.
B. Re-use of existing products.
C. Transportation, handling, storage and protection.
D. Product option requirements.
E. Substitution limitations.
F. Procedures for District-supplied products.
G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Identification of District-supplied products.
B. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
C. Section 01 40 00 - Quality Requirements: Product quality monitoring.
D. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
E. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.
F. Technical Specifications Sections.

1.03 REFERENCE STANDARDS

A. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers.
B. NFPA 70 - National Electrical Code.
   1. Use California Electrical Code.

1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.05 QUALITY ASSURANCE

A. CAL (CDPH SM) v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.

B. Manufacturer's Inventory of Product Content: Publicly available inventory of every ingredient identified by name and Chemical Abstract Service Registration Number (CAS RN).

1. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Drawings and Specifications:

1. If a conflict exists between the Drawings and the Specifications (Project Manual), then the Contractor is to submit a Request for Interpretation from the Architect.

a. As noted in the General Conditions, the more stringent requirements govern, including cost of materials and/or installation.

2. If a specific product is indicated on the Drawings for use, then that product is to be used without exception in the location identified.

3. If the Contractor proposes the use of another product other than the item indicated, whether or not listed in these specifications, Contractor is to submit the product using the complete substitution process. See the the Article titled "SUBSTITUTIONS".

4. DSA (Division of the State Architect) approval is also required prior to the use or installation of any substitution, on any product or location of product (requiring a revision to the Drawings or Specifications), included in these construction documents.

a. Installation of a non-approved product may result in the Contractor removing and replacing the non-approved product at the Contractor's own expense.

B. General: Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock, and include materials, equipment, assemblies, fabrications and systems.

1. Named Products: Items identified by manufacturer's product name, including make or model designations indicated in the manufacturer's published product data.
2. Materials: Products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed or installed to form a part of the Work.
3. Equipment: A product with operating parts, whether motorized or manually operated, that requires connections such as wiring or piping.

C. Specific Product Requirements: Refer to requirements of Section 01 40 00 - Quality Requirements and individual product technical Sections for specific requirements for products.

D. Minimum Requirements: Specified requirements for products are minimum requirements. Refer to general requirements for quality of the Work specified in Section 01 40 00 - Quality Requirements and elsewhere herein.

E. Standard Products:
1. Where specific products are not specified, provide standard products of types and kinds that are suitable for the intended purposes and that are usually and customarily used on similar projects under similar conditions.
2. Products shall be as selected by Contractor and subject to review and acceptance by the District and Architect.

F. Product Completeness:
1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
2. Comply with additional requirements specified herein in Article titled "SYSTEM COMPLETENESS".

G. Code Compliance:
1. All products, other than commodity products prescribed by Code, are to have a current ICC Evaluation Service Research Report (ICC ESR), CABO National Evaluation Report (NER), or other testing agencies as accepted by the Division of the State Architect.
2. Refer to additional requirements specified in Section 01 41 00 - Regulatory Requirements.

2.02 SYSTEM COMPLETENESS

A. The Contract Drawings and Specifications are not intended to be comprehensive directions on how to produce the Work. Rather, the Drawings and Specifications are instruments of service prepared to describe the design intent for the completed Work.

B. It is intended that all equipment, systems and assemblies be complete and fully functional even though not fully described. Provide all products and operations necessary to achieve the design intent described in the Contract Documents.

C. Refer to related general requirements specified in Section 01 41 00 - Regulatory Requirements regarding compliance with minimum requirements of applicable codes, ordinances and standards.

D. Omissions and Misdescriptions: Contractor shall report to Architect immediately when elements essential to proper execution of the Work are discovered to be missing or misdescribed in the Drawings and Specifications or if the design intent is unclear.

1. Should an essential element be discovered as missing or misdescribed prior to receipt of Bids, an Addendum will be issued so that all costs may be accounted for in the Contract Sum.
2. Should an obvious omission or misdescription of a necessary element be discovered and reported after execution of the Agreement, Contractor shall provide the element as though fully and correctly described, and a no-cost Change Order shall be executed.
3. Refer to related General Requirements specified in Section 01 30 00 - Administrative Requirements regarding construction interfacing and coordination.

2.03 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the District, or otherwise indicated as to remain the property of the District, become the property of the Contractor; remove from site.

2.04 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

1. Provide products that fully comply with the Contract Documents, are undamaged and unused at installation.
2. Comply with additional requirements specified herein in Article titled "PRODUCT OPTIONS".

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

C. Use of products having any of the following characteristics is not permitted:

1. Made outside the United States, its territories, Canada, or Mexico.
2. Containing lead, cadmium, or asbestos.

D. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01 61 16.
2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Have longer documented life span under normal use.
5. Result in less construction waste. See Section 01 74 19

E. Provide interchangeable components of the same manufacture for components being replaced.

1. To the fullest extent possible, provide products of the same kind from a single source. Products required to be supplied in quantity shall be the same product and interchangeable throughout the Work.

2. When options are specified for the selection of any of two or more products, provide product selected to be compatible with products previously selected.

F. Product Nameplates and Instructions:

1. Except for required Code-compliance labels and operating and safety instructions, locate nameplates on inconspicuous, accessible surfaces. Do not attach manufacturer's identifying nameplates or trademarks on surfaces exposed to view in occupied spaces or to the exterior.

2. Provide a permanent nameplate on each item of service-connected or power-operated equipment. Nameplates shall contain identifying information and essential operating data such as the following example:

a. Name of manufacturer

b. Name of product

c. Model and serial number

d. Capacity

e. Operating and Power Characteristics

f. Labels of Tested Compliance with Codes and Standards

3. Refer to additional requirements which may be specified in various sections, as included in this Project Manual.

4. For each item of service-connected or power-operated equipment, provide operating and safety instructions, permanently affixed and of durable construction, with legible machine lettering. Comply with all applicable requirements of authorities having jurisdiction and listing agencies.

G. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to CEC/NFPA 70, include lugs for terminal box.

2.05 PRODUCT OPTIONS

A. Unless the specifications state that no substitution is permitted, whenever the Contract Documents indicate any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction or any specific name, make, trade name, or catalog number, with or without the words "or equal," such specification shall be deemed to be used for the purpose of facilitating description of the material, process, or article desired and shall be deemed to be followed by the words "or equal."

1. See Section 01 25 00 - Substitution Procedures.

B. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

1. Reference Standards:

a. Where Specifications require compliance with a standard, provided product shall fully comply with the standard specified.

b. Refer to general requirements specified in Section 01 42 19 - Reference Standards regarding compliance with referenced standards, standard specifications, codes, practices and requirements for products.

2. Product Description:
    a. Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that has the specified attributes and otherwise complies with specified requirements.
3. Performance Requirements:
    a. Where Specifications require compliance with performance requirements, provide product(s) that comply and are recommended by the manufacturer for the intended application.
    b. Verification of manufacturer's recommendations may be by product literature or by certification of performance from manufacturer.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

D. Products Specified by Identification of Manufacturer and Product Name or Number:
1. "Specified Manufacturer": Provide the specified product(s) of the specified manufacturer.
    a. If only one manufacturer is specified, without "acceptable manufacturers" being identified, provide only the specified product(s) of the specified manufacturer.
    b. If District standard is indicated make all efforts to provide that product.
    c. If the phrase "or equal" or "approved equal" is stated or reference is made to the "or equal provision," products of other manufacturers may be provided if such products are equivalent to the specified product(s) of the specified manufacturer.
        1) Equivalence shall be demonstrated by submission of information in compliance with requirements of Section 01 25 00 - Substitution Procedures.
2. "Acceptable Manufacturers":
    a. Product(s) of the named manufacturers, if equivalent to the specified product(s) of the specified manufacturer, will be acceptable in accordance with the requirements of Section 01 25 00 - Substitution Procedures.
        1) Exception: Considerations regarding changes in Contract Time and Contract Sum will be waived if no increase in Contract Time or Contract Sum results from use of such equivalent products.
3. Unnamed manufacturers: Product(s) of unnamed manufacturers will be acceptable when disclosed during the bidding period and only as follows:
    a. Unless specifically stated that substitutions will not be accepted or considered, the phrase "or equal" shall be assumed to be included in the description of specified product(s).
    b. Equivalent products of unnamed manufacturers will be accepted in accordance with the "or equal" provision specified herein, below.
    c. If provided, products of unnamed manufacturers shall be subject to the requirements of Section 01 25 00 - Substitution Procedures.
4. Quality basis:

a. Specified product(s) of the specified manufacturer shall serve as the basis by which products by named acceptable manufacturers and products of unnamed manufacturers will be evaluated.

b. Where characteristics of the specified product are described, where performance characteristics are identified or where reference is made to industry standards, such characteristics are specified to identify the most significant attributes of the specified product(s) which will be used to evaluate products of other manufacturers.

E. Products Specified by Combination of Methods: Where products are specified by a combination of attributes, including manufacturer's name, product brand name, product catalog or identification number, industry reference standard, or description of product characteristics, provide products conforming to all specified attributes.

F. "Or Equal" Provision: Where the phrase "or equal" or the phrase "or approved equal" is included, equivalent product(s) of unnamed manufacturer(s) may be provided as specified above in subparagraph titled "Unnamed manufacturers" and Section 01 25 00 - Substitution Procedures with the following conditions:

1. The requirements of Section 01 25 00 - Substitution Procedures applies to products provided under the "or equal" provision.

a. Exception: If the proposed product(s) are determined to be equivalent to the specified product(s) of the specified manufacturer, the requirement specified for substitutions to result in a net reduction in Contract Time or Contract Sum will be waived.

2. Use of product(s) under the "or equal" provision shall not result in any delay in completion of the Work, including completion of portions of the Work for use by District or for work under separate contract by District.

3. Use of product(s) under the "or equal" provision shall not result in any costs to the District, including design fees and permit and plan check fees.

4. Use of product(s) under the "or equal" provision shall not require substantial change in the intent of the design, in the opinion of the Architect.

a. The intent of the design shall include functional performance and aesthetic qualities.

5. The determination of equivalence will be made by the Architect and District, and such determination shall be final.

G. Visual Matching:

1. Where Specifications require matching a sample, the decision by the Architect on whether a proposed product matches shall be final.

2. Where no product visually matches but the product complies with other requirements, comply with provisions for substitutions for selection of a matching product in another category.

H. Visual Selection of Products:

1. Where requirements include the phrase "as selected from manufacturer's standard colors, patterns and textures", or a similar phrase, selections of products will be made by indicated party or, if not indicated, by the Architect. The will select color, pattern and texture from the product line of submitted manufacturer, if all other specified provisions are met.

2. The Architect will select color, pattern and texture from the product line of submitted manufacturer, if all other specified provisions are met.

2.06 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

A. See Section 01 10 00 - Summary for identification of District-supplied products.

B. District's Responsibilities:

1. Arrange for and deliver District reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:

1. Review District reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with District.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

1. Schedule delivery to minimize long-term storage and prevent overcrowding construction spaces.

2. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport products by methods to avoid product damage.

F. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

G. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

H. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

I. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

C. Inspection Provisions: Arrange storage to provide access for inspection and measurement of quantity or counting of units.

D. Structural Considerations: Store heavy materials away from the structure in a manner that will not endanger supporting construction.

E. Store and protect products in accordance with manufacturers' instructions.

F. Store with seals and labels intact and legible.

G. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.

H. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

I. For exterior storage of fabricated products, place on sloped supports above ground.

1. Place products on raised blocks, pallets or other supports, above ground and in a manner to not create ponding or misdirection of runoff.

J. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

1. Execute a formal supplemental agreement between District and Contractor allowing off-site storage, for each occurrence.

K. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

1. Periodically inspect to ensure products are undamaged, and are maintained under required conditions.
2. Remove and replace products damaged by improper storage or protection with new products at no change in Contract Sum or Contract Time.
3. Weather-Resistant Storage:
    a. Store moisture-sensitive products above ground, under cover in a weathertight enclosure or covered with an impervious sheet covering. Provide adequate ventilation to avoid condensation.
    b. Maintain storage within temperature and humidity ranges required by manufacturer's instructions.
    c. Store loose granular materials on solid surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Comply with manufacturer's warranty conditions, if any.

M. Do not store products directly on the ground.

N. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

O. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

P. Prevent contact with material that may cause corrosion, discoloration, or staining.

Q. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

R. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

3.05 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products, except where more stringent requirements are specified, are necessary due to Project conditions or are required by authorities having jurisdiction.

B. Anchor each product securely in place, accurately located and aligned with other Work.

C. Clean exposed surfaces and provide protection to ensure freedom from damage and deterioration at time of Completion review. Refer to additional requirements specified in General Conditions along with Section 01 50 00 - Temporary Facilities and Controls and Section 01 70 00 - Execution and Closeout Requirements.

3.06 PROTECTION OF COMPLETED WORK

A. Provide barriers, substantial coverings and notices to protect installed Work from traffic and subsequent construction operations.

B. Remove protective measures when no longer required and prior to Completion review of the Work.

C. Comply with additional requirements specified in Section 01 50 00 - Temporary Construction Facilities and Controls.

END OF SECTION

SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for VOC-Content-Restricted products.

B. Requirement for installer certification that they did not use any non-compliant products.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.

C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:

1. Exterior paints and coatings.
2. Exterior adhesives and sealants.
3. Other products when specifically stated in the specifications.

B. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

C. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

C. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

D. GreenSeal GS-36 - Standard for Adhesives for Commercial Use.

E. SCAQMD 1113 - Architectural Coatings.

F. SCAQMD 1168 - Adhesive and Sealant Applications.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1. Use the form following this section for installer certifications.

D. Verification of compliance with VOC limits as specified in the CalGreen Code Section 5.504 shall be provided at the request of the Building Inspector.

1. Product certification and specifications.
2. Chain of custody certifications.
3. Product, labeled and invoiced as meeting the Composite Wood Products regulation.
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards
5. Other methods approved by the building official.

1.06 QUALITY ASSURANCE

A. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

1. Evidence of Compliance: Acceptable types of evidence are:
   a. Report of laboratory testing performed in accordance with requirements.
   b. Published product data showing compliance with requirements.
   c. Certification by manufacturer that product complies with requirements.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. All VOC restricted products shall be compliant with local jurisdiction, South Coast Air Quality Management District, and California Green Standards Code, Rules and Regulations in effect at the time of installation. Products specified in this project shall be used as a basis of design. Updated products that are compliant with the rules in force at the time of installation shall be submitted as substitutions when they become available.

1. If a product is found to be non-compliant with the VOC rules at the scheduled time of installation, notify the Architect a minimum of 90 days prior to installation. Contractor shall submit a suggested compliant product that is equal to the performance and cost of the specified product using the substitution procedure.

2.02 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. VOC-Content-Restricted Products: VOC content not greater than required by the following:

1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
2. Aerosol Adhesives: GreenSeal GS-36.
3. Joint Sealants: SCAQMD 1168 Rule.
4. Paints and Coatings: Each color; most stringent of the following:
    a. 40 CFR 59, Subpart D.
    b. SCAQMD 1113 Rule.
    c. CARB (SCM).
    d. CalGreen Building Standards Section 5.504, Table 504.4.3 "VOC Content Limits for Architectural Coatings".

C. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. District reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to District.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 61 16.01
ACCESSORY MATERIAL VOC CONTENT CERTIFICATION FORM

1.01 PRODUCT CERTIFICATION

A. I certify that the installation work of my firm on this project:
   1. [HAS] [HAS NOT] required the use of any ADHESIVES.
   2. [HAS] [HAS NOT] required the use of any JOINT SEALANTS.
   3. [HAS] [HAS NOT] required the use of any PAINTS OR COATINGS.
   4. [HAS] [HAS NOT] required the use of any COMPOSITE WOOD or AGRIFIBER PRODUCTS.

B. Product data and MSDS sheets are attached.

2.01 CERTIFIED BY: (INSTALLER/MANUFACTURER/SUPPLIER FIRM)

A. Firm Name: _____
B. Print Name: _____
C. Signature: _____
D. Title: _____ (officer of company)
E. Date: _____

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures.

C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

D. Section 01 45 33 - Code-Required Special Inspections: Construction oversight procedures by Division of the State Architect regarding the execution, approval, and closeout of this building project.

E. Section 01 71 23 - Field Engineering: Additional requirements for field engineering and surveying work.

F. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

G. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

H. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

I. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

J. Individual Product Specification Sections:

1. Advance notification to other sections of openings required in work of those sections.
2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. CBC Ch. 11B - California Building Code-Chapter 11B.

B. CFC Ch. 35 - California Fire Code - Chapter 35 - Welding and Other Hot Work.

C. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.

1. On request, submit documentation verifying accuracy of survey work.
2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of District or separate Contractor.
6. Include in request:
   a. Identification of Project.
   b. Location and description of affected work. Include shop drawings as necessary to identify locations and communicate descriptions.
   c. Necessity for cutting or alteration.
   d. Description of proposed work and products to be used.
   e. Effect on work of District or separate Contractor.
   f. Effect on existing construction of District and, if applicable, work for Project being provided by District under separate contract.
   g. Written permission of affected separate Contractor.
   h. Date and time work will be executed.
7. Include written evidence that those performing work under separate contract for District have been notified and acknowledge that cutting and patching work will be occurring. Include written permission for intended cutting and patching, included scheduled times.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

1. Minimum of 5 years of documented experience.

B. For surveying work, employ a land surveyor registered in California and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in California. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

D. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in California.

1.06 PROJECT CONDITIONS

A. Protect site from puddling or running water.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

C. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers, pneumatic hammers, air-operated nail guns, and diesel engines.
2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.07 COORDINATION

A. See Section 01 10 00 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. Coordinate completion and clean-up of work of separate sections.

G. After District occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of District's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis fabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

1. Coordinate operations of the various trades to assure efficient and orderly installation of each part of Work.
2. Coordinate Work operations of the various trades that depend on each other for proper installation, connection, and operation of Work, including but not limited to:
    a. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
    b. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
    c. Provide provisions to accommodate items scheduled for later installation.
3. Prepare and administer coordination drawings. Refer to Section 01 31 14 - Facility Services Coordination.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of examination, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, District, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Notify the District at least 48 hours before staking is to be started.

B. Verify locations of survey control points prior to starting work.

C. Promptly notify Architect of any discrepancies discovered.

D. Contractor shall locate and protect survey control and reference points.

E. Control datum for survey is that established by District provided survey.

F. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

G. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

H. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

I. Utilize recognized engineering survey practices.

J. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

K. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
2. Grid or axis for structures.
3. Building foundation, column locations, ground floor elevations.
4. Controlling lines and levels required for mechanical and electrical trades.

L. Periodically verify layouts by same means.

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

N. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Dimensions for Accessibility:

1. Conventions: See CBC Ch. 11B Figure 11B-104. Dimensions that are not stated as "maximum" or "minimum" are absolute.
2. Tolerances shall be per CBC Ch. 11B-104.1.1 "Construction and manufacturing tolerances. All dimensions are subject to conventional industry tolerances except where the requirement is stated as a range with specific minimum and maximum end points."

B. In addition to compliance with regulatory requirements, conduct construction operations in compliance with ASTM F477 and NFPA 241, including applicable recommendations in Appendix A.

C. When welding or doing other hot work, comply with CFC Ch. 35.

D. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

E. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

F. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

G. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

H. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.

2. Remove items indicated on drawings.
3. Relocate items indicated on drawings.
4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment ; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
2. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:

1. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:

1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

1. Coordinate installation or application of products for integrated Work.
2. Uncover completed Work as necessary to install or apply products out of sequence.
3. Remove and replace defective or non-conforming Work.
4. Provide openings for penetration of utility services, such as plumbing, mechanical and electrical Work.

E. After uncovering existing Work, inspect conditions affecting proper accomplishment of Work.

F. Temporary Supports: Provide supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

G. Beginning of cutting or patching shall be interpreted to mean that existing conditions were found by Contractor to be acceptable.

H. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

I. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

1. Use a diamond grit abrasive saw or similar cutter for smooth edges. Do not overcut corners.

J. Restore work with new products in accordance with requirements of Contract Documents.

K. Fit work neat and tight allowing for expansion and contraction.

L. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

M. Finishing: Refinish surfaces to match adjacent and similar finishes as used for the Project.

1. For continuous surfaces, refinish to nearest intersection or natural break.
2. For an assembly, refinish entire unit.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site weekly and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

H. Prohibit traffic from landscaped areas.

I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 PROJECT CLOSEOUT CONFERENCE

A. Schedule and conduct a project closeout conference, at a time convenient to District and Architect, but no later than 90 days prior to the scheduled date of Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of District, Commissioning Authority (CxA), Architect, and relevant consultants; Contractor and project superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

   a. Preparation of record documents.

   b. Commissioning.

   c. Procedures required prior to inspection for Completion and for final inspection for acceptance.

   d. Submittal of written warranties.

   e. Coordination of separate contracts.

   f. District's partial occupancy requirements.

   g. Installation of District's furniture, fixtures, and equipment.

   h. Responsibility for removing temporary facilities and controls.

4. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, District, participants, and those affected by decisions made.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Division 23 - HVAC.

3.12 FINAL CLEANING

A. Cleaning and Disposal Requirements, General: Conduct cleaning and disposal operations in compliance with all applicable codes, ordinances and regulations, including environmental protection laws, rules and practices.

B. Execute final cleaning prior to final project assessment.

1. Clean areas to be occupied by District prior to final completion before District occupancy.

C. Final Inspection Review Cleaning, General: Execute a thorough cleaning prior to Completion review by Architect and District. Employ experienced workers or professional cleaners for cleaning operations for final inspection review.

D. Use cleaning materials that are nonhazardous.

1. Cleaning Agents and Materials: Use only those cleaning agents and materials which will not create hazards to health or property and which will not damage or degrade surfaces.

a. Use only those cleaning agents, materials and methods recommended by manufacturer of the material to be cleaned.

b. Use cleaning materials only on surfaces recommended by cleaning agent manufacturer.

c. Before use, review cleaning agents and materials with Construction Manager for suitability and compatibility. Use no cleaning agents and materials without approval as noted above.

2. Cleaning Procedures: All cleaning processes, agents and materials shall be subject to Architect, District and/or Construction Manager review and approval. Processes and degree of cleanliness shall be as directed by Architect, District and/or Construction Manager.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean debris from area drains and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect and District.

B. Accompany District, Architect, and Construction Manager on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's comprehensive list of items to be completed or corrected.

1. As authorized by the District; Architect and Architect's and District's consultants, as appropriate, will attend a meeting at the Project site to review Contract closeout procedures and to review the list of items to be completed and corrected (punch list) to make the Work ready for acceptance by the District.

2. This meeting shall be scheduled not earlier than 14 days prior to the date anticipated for the Final Inspection review.

C. Notify Architect when work is considered ready for Architect's Final inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Final inspection.

1. Final Application for Payment: In the Application for Payment that coincides with the date Final Inspection/Completion is claimed, show 100 percent completion for the portion of the Work claimed substantially complete.

2. Warranties, Bonds and Certificates: Submit specific warranties, guarantees, workmanship bonds, maintenance agreements, final certifications and similar documents.

3. Tests and Instructions: Complete start-up testing of systems, and instruction of the District's personnel. Remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Clearing and Cleaning: Prior to the Final Inspection review, Contractorr shall conduct a thorough cleaning and clearing of the Project area, including removal of construction facilities and temporary controls.

F. Inspection and Testing: Prior to the Final Inspection review, complete inspection and testing required for the Work, including securing of approvals by authorities having jurisdiction.

1. Complete inspections and tests of electrical power and signal systems.

G. District will occupy all of the building as specified in Section 01 10 00.

H. Conduct Final Inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

1. Correction (Punch) List: Contractor shall prepare and distribute at the preliminary Contract closeout review meeting, a typewritten, comprehensive list of items to be completed and corrected (punch list) to make the Work ready for acceptance by the District.

a. The punch list shall include all items to be completed or corrected prior to the Contractor's application for final payment.

b. The punch list shall identify items by location (room number or name) and consecutive number. For example, 307-5 would identify item 5 in Room 307, Roof-4 would identify item 4 on Roof.

c. Contractor shall prepare separate lists according to categories used for Drawings. For example, provide lists for Architectural, Structural, Electrical, Civil, and Landscape.

d. Architect, Architect's consultants and District's consultants, if in attendance, will conduct a brief walk-through of Project with the Contractor to review scope and adequacy of the punch list.

e. Verbal comments will be made to the Contractor by the DSA, the Architect and the Architect's and District's consultants, if in attendance, during the walk-through. These comments will indicate generally the additions and corrections to be made to the punch list. Such comments shall not be considered to be comprehensive; Contractor shall use the comments as guidance in preparing the punch list for the Final Inspection review.

2. Final Inspection Meeting: On a date mutually agreed by the District, Architect, and Contractor, a meeting shall be conducted at the Project site to determine whether the Work is satisfactory and complete for filing a Notice of Completion.

a. Contractor shall provide three working days notice to Architect for requested date of Final Inspection meeting.

b. The Construction Manager, the Architect with Architect's / District's consultants, as authorized by the District, will attend the Final Inspection meeting.

c. In addition to conducting a walk-through of the facility and reviewing the punch list, the purpose of the meeting shall include submission of warranties, guarantees and bonds to the District, submission of operation and maintenance data (manuals), provision of specified extra materials to the District, and submission of other Contract closeout documents and materials as required and if not already submitted.

d. The Construction Manager, Architect and Architect's consultants, as appropriate, will conduct a walk-through of the facility with the Contractor and review the punch list.

e. Contractor shall correct the punch list and record additional items as may identified during the walk-through, including notations of corrective actions to be taken.

f. Contractor shall retype the punch list and distribute it within three working days to those attending the meeting.

g. If additional site visits by the Construction Manager, the Architect and the Architect's and District's consultants are required to review completion and correction of the Work, the costs of additional visits shall be reimbursed to the District by the Contractor by deducting such costs from the Final Payment.

I. Correct items of work listed in Final Correction Punch List and comply with requirements for access to District-occupied areas.

J. Notify Architect when work is considered finally complete and ready for Architect's Final Inspection.

1. Architect's Certification of Completion:

a. When Architect determines that list of items to be completed and corrected (Punch List) is sufficiently complete for District to occupy Project for the use to which it is intended.

K. Complete items of work determined by Architect listed in executed Certificate of Completion.

3.14 FINAL PAYMENT

A. After completion of all items listed for completion and correction, after submission of all documents and products and after final cleaning, submit final Application for Payment, identifying total adjusted Contract Sum, previous payments and sum remaining due.

B. Payment will not be made until the following are accomplished:

1. All Project Record Documents have been transferred and accepted by District.

2. All extra materials and maintenance stock have been transferred and received by District.

3. All warranty documents and operation and maintenance data have been received and accepted by District.

4. All liens have been released or bonded by Contractor.

5. Contractor's surety has consented to Final Payment.

6. All documentation required by DSA has been completed.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Project Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the District.

END OF SECTION

SECTION 01 71 23
FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Field engineering services by Contractor.

B. Land surveying services by Contractor.

1.02 DESCRIPTION OF SERVICES

A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.

B. Sole responsibility for establishing all locations, dimensions and levels of items of work.

C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure, and pipeline elevation stakes, and other items.

D. Having a skilled instrument person(s) available on short notice when necessary for laying out the work.

E. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.

F. Provision of facilities and assistance necessary for Architect to check lines and grade points placed by Contractor.

1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by Architect.

G. Preparation and maintenance of daily reports of activity on the work. Submission of reports containing key progress indicators and job conditions to Architect.

1. Number of employees at the Site.
2. Number employees at the Site for each of Contractor's subcontractors.
3. Breakdown of employees by trades.
4. Major equipment and materials installed as part of the work.
5. Major construction equipment utilized.
6. Location of areas in which construction was performed.
7. Materials and equipment received.
8. Work performed, including field quality control measures and testing.
9. Weather conditions.
10. Safety.
11. Delays encountered, amount of delay incurred, and the reasons for the delay.

12. Instructions received from Architect or District, if any.

H. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

I. Prior to backfilling operations, surveying - locating, and recording on a copy of Contract Documents - an accurate representation of buried work and Underground Facilities encountered.

J. Setting up and executing time-lapse photography of construction activities.

1.03 REFERENCE STANDARDS

A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology.

B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks.

C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement.

D. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems.

E. State Plane Coordinate System for California.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Submit in addition to items required in Section 01 70 00 - Execution and Closeout Requirements.

C. Informational Submittals: Submit the following:

1. Field Engineering: Submit daily reports, with content as indicated in this section.
    a. When requested by Architect, submit for Record documentation verifying accuracy of field engineering including, but not limited to, Contractor’s survey notes and field notes.
2. Final property survey.

1.06 QUALITY ASSURANCE

A. Field Engineer's Qualifications: As established in Section 01 70 00 - Execution and Closeout Requirements.

B. Land Surveyor's Qualifications: As established in Section 01 70 00 - Execution and Closeout Requirements.

C. Use adequate number of skilled and thoroughly-trained workers to perform the work of this section in a timely and comprehensive manner.

D. Minimum accuracy for required work is as follows:

1. Grade: Horizontal Tolerance: Plus or minus 0.5 feet, Vertical Tolerance: Plus or minus 0.05 feet.
2. Culverts and ditches: Horizontal Tolerance: Plus or minus 0.5 feet, Vertical Tolerance: Plus or minus 0.05 feet.
3. Structures: Horizontal Tolerance: Plus or minus 0.5 feet (location), Vertical Tolerance: Plus or minus 0.05 feet.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. Notify District's Representative and Architect of any discrepancies immediately in writing before proceeding to lay out the work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.

B. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existing conditions.

3.02 FIELD ENGINEERING

A. Maintain field office files, drawings, specifications, and record documents.

B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.

C. Prepare layout and coordination drawings for construction operations.

D. Check and coordinate the work for conflicts and interferences, and immediately advise Architect and District of all discrepancies of which Contractor is aware.

E. Cooperate as required with Architect and District in observing the work and performing field inspections.

F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.

G. In general, match existing adjacent grades and maintain existing flow lines.

H. Check the location, line and grade of every major element as the work progresses. Notify the Architect when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without District's concurrence of the remediation plan.

I. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with shop drawings and Contract Documents requirements.

J. Check all bracing and shoring for structural integrity and compliance with designs prepared by the Contractor.

3.03 LAND SURVEYING

A. General: Follow standards for geospatial positioning accuracy.
   1. FGDC-STD-007.1 as amended by Authority Having Jurisdiction.
   2. FGDC-STD-007.2 as amended by Authority Having Jurisdiction.
   3. FGDC-STD-007.4 as amended by Authority Having Jurisdiction.

B. Coordinate survey data with the State Plane Coordinate System of California.

C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor's expense by a surveyor licensed in California, and approved by the Architect.
   1. Temporarily suspend work at such points and for such reasonable times as the District may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

3.04 CONSTRUCTION SURVEYING

A. General: Perform surveying as applicable to specific items necessary for proper execution of work.
   1. Alignment Staking: Provide alignment stakes at 50 foot intervals on tangent, and at 25 foot intervals on curves.
   2. Slope Staking: Provide slope staking at 50 foot intervals on tangent, and at 25 foot intervals on curves. Re-stake at every ten-foot difference in elevation.
   3. Structure: Stake out structures, including elevations, and check prior to and during construction.
   4. Pipelines: Stake out pipelines including elevations, and check prior to and during construction.
   5. Site Utilities: Stake out utility lines including elevations, and check prior to and during construction.
   6. Road: Stake out roadway elevations at 50 foot intervals on tangent, and at 25 foot intervals on curves.
   7. Cross-sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveys.
   8. Easement Staking: Provide easement staking at 50 foot intervals on tangent, and at 25 foot intervals on curves. If required by project conditions, provide wooden laths with flagging at 100 foot intervals.
   9. Record Staking: Provide permanent stake at each blind flange and each utility cap is provided for future connections. Use stakes for record staking of material(s) acceptable to Architect.
   10. Structural Frame: Upon completion, certify location and plumbness.

B. Surveying to Determine Quantities for Payment.

1. For each application for progress payment, perform such surveys and computations necessary to determine quantities of work performed or placed. Perform surveys necessary for Architect to determine final quantities of work in place.
2. Notify Architect at least 24 hours before performing survey services for determining quantities. Unless waived in writing by Architect, perform quantity surveys in presence of Architect.

C. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used.

D. Use by the Architect: The Architect may at any time use line and grade points and markers established by the Contractor. The Contractor's surveys are a part of the work and may be checked by the Architect at any time.

E. Accuracy:
1. Establish Contractor's temporary survey references points for Contractor's use to at least second-order accuracy (e.g., 1:10000). Set construction staking used as a guide for the work to at least third-order accuracy (e.g., 1:5000). Provide the absolute margin for error specified below on the basis established by such orders.
   a. Horizontal accuracy of easement staking: Plus or minus 0.1 feet.
   b. Accuracy of other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.02 feet vertically.
   c. Include an error analysis sufficient to demonstrate required accuracy in survey calculations.
2. District reserves the right to check the Contractor's survey, measurements, and calculations. The requirement for accuracy will not be waived, whether this right is exercised or not.

3.05 SUPPORT AND BRACING

A. General requirements: Design all support and bracing systems, if required. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure.

B. Seismic Bracing: Design where required by authorities having jurisdiction.
1. Design and install all support systems to comply with the seismic requirements of the Construction Code of California.
2. Design and install seismic bracing so as not to defeat the operation on any required vibration isolation or sound isolation devices.
3. For seismic bracing guidelines for mechanical, electrical and plumbing systems, refer to SMACNA (SRM).

3.06 REPORTS

A. Submit two copies of Contractor's daily reports at Architect's field office (or electronically) by 9:00 AM the next working day after the day covered in the associated report. Daily report shall be signed by responsible member of Contractor's staff, such as project manager or superintendent, or foreman designated by Contractor as having authority to sign daily reports.

3.07 RECORDS

A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.

1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in California. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records,(including field books) may be rejected by District due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.
2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.

B. Submit three copies of final property survey to District. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:

1. Structure locations from property lines, and distances to adjacent buildings.
2. Dimensions and locations of drives, walks, walls, underground utilities, appurtenances, and major site features.
3. Location of easements.
4. Final grading topographic survey.

3.08 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Comply with the requirements Section 5.408 of the California Green Building Standards Code.

1. Recycle and/or salvage for reuse a minimum of 65 percent of the nonhazardous construction and demolition waste in accordance with Section 504.8.1.1, 5.408.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

B. District requires that this project generate the least amount of trash and waste possible.

C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:

1. Aluminum and plastic beverage containers.
2. Corrugated cardboard.
3. Wood pallets.
4. Clean dimensional wood.
5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 10 00 - Site Clearing for use options.
    a. Comply with California Green Code (CGC) 5.408.3; Excavated soil and land clearing debris: 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.
        1) Exception: Reuse, either on-or off-site, of vegetation or soil contaminated by disease or pest infestation.
6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
9. Asphalt paving: May be recycled into paving for project.
10. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
11. Glass.

12. Gypsum drywall and plaster.
13. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (http://flooring.dupont.com) and Interface (www.interfaceinc.com) conduct reclamation programs.
14. Roofing.
15. Paint.
16. Plastic sheeting.
17. Rigid foam insulation.
18. Windows, doors, and door hardware.
19. Plumbing fixtures.
20. Mechanical and electrical equipment.
21. Fluorescent lamps (light bulbs).
22. Acoustical ceiling tile and panels.
23. Materials which could be hazardous and subject to special disposal regulations include but are not limited to the following: CalGreen Section 5.408.2
    a. Lead-Based Paint
    b. Asbestos: Found in older pipe insulation, asphalt floor tiles, linoleum, insulation, etc.
    c. Polychlorinated Biphenyls (PCBs):
        1) Found in electrical oil filled equipment manufactured prior to 1978 such as transformers, switches and fluorescent lamp ballasts.
        2) Also found in adhesive, sealant, caulk, glazing putty, roofing material, pesticide vehicle, ink, paper, fabric dye, gaskets, and hydraulic fluid.
    d. HVAC Refrigerants: Containing Fluorinated and Chlorinated compounds.
    e. Drinking Fountain Refrigerants: Containing Fluorinated and Chlorinated compounds.
    f. Fluorescent Light Tubes: Contain mercury.
    g. EXIT signs and Smoke Detectors: May contain unregulated, radioactive tritium. · Required to be returned to manufacturer.
    h. Contaminated Soils.
    i. Pressure Treated Lumber.

F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
    1. Contractor's quantitative reports for construction waste materials as a condition of approval of progress payments.

G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements. CalGreen Section 5.408.1.1.
    1.

H. The following sources may be useful in developing the Waste Management Plan:
    1. California Recycling Department, at www.dgs.ca.gov/BSC/CALGreen.

2. General information contacts regarding construction and demolition waste:
    a. Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies: www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf.
    b. Additional resources to be developed by Contractor with assistance from District and **Contractor, as requested.**
3. Recycling Haulers and Markets: The source list below contains local haulers and markets for recyclable materials. This list is provided for information only and is not necessarily comprehensive; other haulers and markets are acceptable.
    a. CAL-MAX: www.calrecycle.ca.gov/calmax/.
        1) A free service designed to help businesses find markets for non-hazardous materials they have traditionally discarded.
    b. General Recycling/Reuse Centers: For information on qualified local solid waste haulers contact the California Department of Resources Recycling and Recovery - CalRecycle. The website lists wastes recycling facilities in counties throughout the State of California.
        1) www.calrecycle.ca.gov.
4. Recycling Economics Information: The above lists contain information that may be useful in estimating the costs or savings or recycling options.

I. Methods of trash/waste disposal that are not acceptable are:
1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.
5. Incineration, either on- or off-site.

J. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: List of items to be salvaged from the existing building for relocation in project or for District.

B. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

F. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

1. Debris that is not hazardous as defined in CalGreen Section 5.408.2 and California Code of Regulations, Title 22, Section 66261.3 et seq.

2. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel.

3. The debris may be commingled with rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Diversion: Avoidance of demolition and construction waste sent to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes.

E. Enforcement Agency (EA). Enforcement agency as defined in CA Public Resources Code 40130.

F. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

G. Landfill, Inert waste or Inert Disposal Facility:

1. A disposal facility that accepts only inert waste such as soil and rock, fully cured asphalt paving, uncontaminated concrete (including fiberglass or steel reinforcing rods embedded in the concrete), brick, glass, and ceramics, for land disposal.

H. Landfill, Class III:

1. A landfill that accepts non-hazardous resources such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations.

2. A Class III landfill must have a solid waste facilities permit from the California Integrated Waste Management Board (CIWMB) and is regulated by the Enforcement Agency (EA).

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A processing facility that accepts loads of commingled construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing the non-recyclable residual materials.

K. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

L. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

M. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

N. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

O. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

P. Recycling Center: A facility that receives only C&D material that has been separated for reuse prior to receipt, in which the residual (disposed) amount of waste in the material is less than 10% of the amount separated for reuse by weight.

Q. Return: To give back reusable items or unused products to vendors for credit.

R. Reuse: To reuse a construction waste material in some manner on the project site.

S. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

T. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

U. Separated for Reuse:

1. Materials, including commingled recyclables.
2. Separated or kept separate from the solid waste stream for the purpose of:
    a. Additional sorting or processing those materials for reuse or recycling.
        1) In order to return them to the economic mainstream in the form of raw material for new, reused, or reconstituted products.
    b. Products shall meet the quality standards necessary to be used in the marketplace.
    c. Includes materials that have been “source separated”.

V. Solid Waste:

1. All putrescible and nonputrescible solid, semisolid, and liquid wastes, including:
    a. Garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes.
    b. Abandoned vehicles and parts thereof.
    c. Discarded home and industrial appliances.
    d. Dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste.
    e. Manure, vegetable or animal solid and semisolid wastes.
    f. Other discarded solid and semisolid wastes.
2. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by State law.

W. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

1. Materials, including commingled recyclables, that have been separated or kept separate from the solid waste stream at the point of generation, for the purpose of additional sorting or processing of those materials for reuse or recycling in order to return them to the economic mainstream in the form of raw materials for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.

X. Toxic: Poisonous to humans either immediately or after a long period of exposure.

Y. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

Z. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

AA. Waste Hauler: A company that possesses a valid permit from the local waste management authority to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal in the locality.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Submit Waste Management Plan within 30 calendar days after receipt of Notice to Proceed, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

1. Submit four copies of CWMP for review.
    a. Contractor's Construction Waste and Recycling Plan must be approved by the Architect and Construction Manager prior to the start of Work.
2. Approval of the Contractor's CWMP shall not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

C. Waste Management Plan: Include the following information:

1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
    a. List each material proposed to be salvaged, reused, or recycled.
    b. List the local market for each material.
    c. State the estimated net cost, versus landfill disposal.
4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.

6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
      a. Inert materials shall achieve a construction waste diversion rate of at least 95 percent.
         1) These materials include, but are not limited to, concrete, asphalt and rock.
         2) Earthwork is not included.
         3) Excavated soil shall not be included in any of the calculations used to ensure compliance with this specification section.
      b. The overall diversion rate must be based on weight.
      c. The diversion rate of individual materials can be measured in either weight or volume, but the rate shall be converted into the units selected for calculating the overall diversion rate.
         1) All individual material diversions must be converted to a consistent set of units when calculating the overall diversion rate for the all reports and submittals required for the Work.
      d. Base conversion rate numbers on standard conversion rate data for construction projects provided by the California Integrated Waste Management Board (CIWMB). This data is available at the following internet location, www.calrecycle.ca.gov/LGCentral/Library/Guidance.
   2. Submit Report on a form acceptable to District.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Recycled and Salvaged Materials: Include the following information for each:
      a. Identification of material, including those retrieved by installer for use on other projects.
      b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.

c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

5. Material Reused on Project: Include the following information for each:

a. Identification of material and how it was used in the project.

b. Amount, in tons or cubic yards.

c. Include weight tickets as evidence of quantity.

6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 - Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:

1. Relative amount of waste produced, compared to specified product.

2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.

3. Proposed disposal method for waste product.

4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, District, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.

1. Prebid meeting.
2. Preconstruction meeting.
3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. As a minimum, provide:
    a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
    b. Separate dumpsters for each category of recyclable.
    c. Recycling bins at worker lunch area.
2. Provide containers as required.
3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
4. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
5. Locate enclosures out of the way of construction traffic.
6. Provide adequate space for pick-up and delivery and convenience to subcontractors.
7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

3.03 DISPOSAL OPERATIONS AND WASTE HAULING

A. Remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except for items or materials to be salvaged, recycled, or otherwise reused.
2. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.
3. Use a permitted waste hauler or Contractor's trucking services and personnel. To confirm valid permitted status of waste haulers, contact the local solid waste authority.
4. Become familiar with the conditions for acceptance of new construction, excavation and demolition materials at recycling facilities, prior to delivering materials.
5. Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.
6. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
7. Do not burn or bury waste materials on or off site. Appropriate on-site topical application of ground gypsum or wood, or use of site paving as granulated fill is considered reuse, not waste.

3.04 PLAN AND REPORT FORMS

A. See suggested forms on the following pages.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. District issued Bidding Instructions and Contract General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 45 33 - Code-Required Special Inspections: Construction oversight procedures by DSA regarding the execution, approval, and closeout of this building project.

D. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

E. Section 01 78 39 - Project Record Documents: Detailed requirements.

F. Individual Product Sections: Specific requirements for operation and maintenance data.

G. Individual Product Sections: Warranties required for specific products or Work.

1. Special Project warranty requirements for specific products or elements of the Work; commitments and agreements for continuing services to District.

1.03 DEFINITIONS

A. Warranty: Assurance to District by Contractor, installer, supplier, manufacturer or other party responsible as warrantor, for the quantity, quality, performance and other representations of a product, system service of the Work, in whole or in part, for the duration of the specified period of time.

B. Guarantee: Assurance to District by Contractor or product manufacturer or other specified party, as guarantor, that the specified warranty will be fulfilled by the guarantor in the event of default by the warrantor.

C. Standard Product Warranty: Preprinted, written warranty published by product manufacturer for particular products and specifically endorsed by the manufacturer to the District.

D. Special Project Warranty: Written warranty required by or incorporated into Contract Documents, to extend time limits provided by standard warranty or to provide greater rights for District.

E. Correction Period: As defined in the Conditions of the Contract, Correction Period shall be synonymous with "warranty period", "guarantee period" and similar terms used in the Contract Specifications.

1.04 SUBMITTALS

A. Advance Submittals: For equipment and systems, or component parts of systems, put into service during construction and operated by District, submit documents within ten days of start of operation by District.

B. Final Completion Submittals: Prior to application for final payment, Contractor shall submit 3 copies the following:

1. Agency Document Submittals: Submit to District all documents required by authorities having jurisdiction, including serving utilities and other agencies. Submit original versions of all permit cards, with final sign-off by inspectors. Submit all certifications of inspections and tests.

a. Complete all required Contractor forms and obtain DSA approval of these same forms. Comply with "Final Certification of Construction" per Title 24 Part 1 section 4-339.

1) Form-6.C: Verified Report – Contractor: From each Contractor having a contract with the District.

2. Final Specifications Submittals: Submit to District all documents and products required by Specifications to be submitted, including the following:

a. Project record drawings and specifications.

b. Operating and maintenance data.

c. Guarantees, warranties and bonds.

d. Keys and keying schedule.

e. Spare parts and extra stock.

f. Test reports and certificates of compliance.

3. Certificates of Compliance and Test Report Submittals: Submit to District certificates and reports as specified and as required by authorities having jurisdiction, including the following:

4. Lien and Bonding Company Releases: Submit to District, with copy to Architect, evidence of satisfaction of encumbrances on Project by completion and submission of The American Institute of Architects Forms:

a. G706 - Contractor's Affidavit of Payment of Debts and Claims;

b. G706A - Contractor's Affidavit of Release of Liens;

c. (if applicable) G707 - Consent of Surety;

d. or forms as as agreed to by the District.

e. Comply also with other requirements of District, as directed.

f. All signatures shall be notarized.

5. Subcontractor List: Submit to two copies to District and two copies to Architect of updated Subcontractor and Materials Supplier List.

6. Warranty Documents: Prepare and submit to District all warranties and bonds as specified in Contract General Conditions and this Section.

C. Project Record Documents: Submit final progress markup PDF documents by uploading via Bluebeam to Architect with claim for final Application for Payment.

D. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with District's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.05 WARRANTIES AND GUARANTEES

A. General:
1. Provide all warranties and guarantees with District named as beneficiary.
2. For equipment and products, or components thereof, bearing a manufacturer's warranty or guarantee that extends for a period of time beyond the Contractor's warranty and guarantee, so state in the warranty or guarantee.

B. Provisions for Special Warranties: Refer to Conditions of the Contract for terms of the Contractor's special warranty of workmanship and materials.

C. General Warranty and Guarantee Requirements:
1. Warranty shall be an agreement to repair or replace, without cost and undue hardship to District, Work performed under the Contract which is found to be defective during the Correction Period (warranty or guarantee) period.
2. Repairs and replacements due to improper maintenance or operation, or due to normal wear, usage and weathering are excluded from warranty requirements unless otherwise specified.

D. Specific Warranty and Guarantee Requirements: Specific requirements are included in product Specifications Technical Sections, including content and limitations.

E. Disclaimers and Limitations:
1. Manufacturer's disclaimers and limitations on product warranties and guarantees shall not relieve Contractor of responsibility for warranty and guarantee requirements.
2. This applies to the Work that incorporates such products, nor shall they relieve suppliers, manufacturers, and installers required to countersign special warranties with Contractor.

F. Related Damages and Losses: When correcting warranted Work that has been found defective, remove and replace other Work that has been damaged as a result of such defect or that must be removed and replaced to provide access for correction of warranted Work.

G. Reinstatement of Warranty:
1. When Work covered by a warranty has been found defective and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
2. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

H. Replacement Cost:
1. Upon determination that Work covered by a warranty has been found to be defective, replace or reconstruct the Work to a condition acceptable to District, complying with applicable requirements of the Contract Documents.

2. Contractor is responsible for all costs for replacing or reconstructing defective Work regardless of whether District has benefited from use of the Work through a portion of its anticipated useful service life.

I. District's Recourse:

1. Written warranties made to the District are in addition to implied warranties, and do not limit the duties, obligations, rights and remedies otherwise available under law, nor shall warranty periods be interpreted as limitations on time in which the District can enforce such other duties, obligations, rights, or remedies.
2. Rejection of Warranties:
    a. The District reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

J. Warranty as Condition of Acceptance:

1. District reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment shall be required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. See also Section 01 78 39 - Project Record Documents.

B. Record Documents are to be maintained and submitted in searchable live electronic format (PDF), unflattened.

1. Develop in compliance with Section 01 30 00 - Administrative Requirements.
2. Acceptable markup software:
    a. Adobe Acrobat Professional.
    b. Bluebeam Revu.

C. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Contract Drawings.
2. Project Manual with Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

D. Ensure entries are complete and accurate, enabling future reference by District.

E. Store record documents separate from documents used for construction.

F. Record information concurrent with construction progress.

G. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.
4. Provide copies of all approved addenda, directives, corrections, and change orders affecting the associated project.
    a. These copies shall be included with the "Bid Set" and/or "Record Set" listed above and formatted as detailed above.

H. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Reproducible (PDF) set of Contract Drawings will be provided to Contractor by District through Architect or Construction Manager.
2. Measured depths of foundations in relation to finish first floor datum.
3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
5. Field changes of dimension and detail.
6. Details not on original Contract drawings.
    a. Application of copies of details produced and provided by Architect during construction will be accepted.
7. Sketches, clarifications (RFI's), Field Orders, Supplemental Instructions, Construction Change Documents, and Approved Change Orders

I. Submission: Submit by uploading, Record Documents to Architect prior to each Application for Payment.

1. Provide, by email, to the Architect, a download link the Record Documents consisting of an unflattened PDF format with live text and redline mark-ups, not scanned.
2. Maintain one additional paper copy and one in PDF format (on CD) of the fire suppression and fire protection detection system drawings and specifications at the building premises.
    a. One copy is to be kept on site for a period of three years to comply with CFC section 901.6.2.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

1. Product data, with catalog number, size, composition, and color and texture designations.

2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for District's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

1. Provide duplicate electronic formatted (PDF) versions of the O&M binder for record purposes. Organize the same as the printed versions.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:

1. Project Directory.
2. Table of Contents, of all volumes, and of this volume.
3. Operation and Maintenance Data: Arranged by system, then by product category.
    a. Source data.
    b. Product data, shop drawings, and other submittals.
    c. Operation and maintenance data.
    d. Field quality control data.
    e. Photocopies of warranties and bonds.
4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with District's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Project Warranty and Guarantee Forms:

1. Example forms for special Project warranties and guarantees are included at the end of this Section.
2. Prepare written documents utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer.
    a. Submit a draft to District through Architect for approval prior to final execution.
3. Refer to product Specifications Sections of Divisions 2 through 33 for specific content requirements, and particular requirements for submittal of special warranties.
4. Prepare standard warranties and guarantees, excepting manufacturers' standard printed warranties and guarantees, on Contractor's, subcontractor's, material supplier's, or manufacturer's own letterhead, addressed to District.
5. Warranty and guarantee letters shall be signed by all responsible parties and by Contractor in every case, with modifications only as approved in advance by District to suit the conditions pertaining to the warranty or guarantee.

C. Manufacturer's Guarantee Form:

1. Manufacturer's guarantee form may be used in lieu of special Project form included at the end of this Section.
2. Manufacturer's guarantee form shall contain appropriate terms and identification, ready for execution by the required parties.

3. If proposed terms and conditions restrict guarantee coverage or require actions by District beyond those specified, submit draft of guarantee to District through Architect for review and acceptance before performance of the Work.
4. In other cases, submit draft of guarantee to District through Architect for approval prior to final execution of guarantee.

D. Signatures: Signatures shall be by person authorized to sign warranties, guarantees and bonds on behalf of entity providing such warranty, guarantee or bond.

E. Co-Signature: All installer's warranties and bonds shall be co-signed by Contractor. Manufacturer's guarantees will not require co-signature.

F. Verify that documents are in proper form, contain full information, and are notarized.

G. Co-execute submittals when required.

H. Retain warranties and bonds until time specified for submittal.

I. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

J. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
1. If more than one volume of warranties, guarantees and bonds is produced, identify volume number on binder.

K. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

L. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

M. Form of Warranty and Bond Submittals:
1. Prior to final Application and Certificate for Payment, compile two copies of each required warranty, guarantee and bond, properly executed by Contractor, or jointly by Contractor, subcontractor, supplier, or manufacturer.
2. Collect and assemble all written warranties and guarantees into binders and deliver binders to District for final review and acceptance.
3. Include Table of Contents for binder, neatly typed, following order and Section numbers and titles as used in the Project Manual.
4. Provide heavy paper dividers with celluloid or plastic covered tabs for each separate warranty.
    a. Mark tabs to identify products or installation, and Section number and title.
5. Include on separate typed sheet, if information is not contained in warranty or guarantee form, a description of the product or installation, and the name, address, telephone number and responsible person for applicable installer, supplier and manufacturer.

6. When operating and maintenance data manuals are required for warranted construction, include additional copies of each required warranty and guarantee in each required manual.
    a. Coordinate with requirements listed in the prior articles for operating and maintenance data manuals.

3.06 TIME OF WARRANTY AND BOND SUBMITTALS

A. Submission of Preliminary Copies:
    1. Unless otherwise specified, obtain preliminary copies of warranties, guarantees and bonds within ten days of completion of applicable item or Work.
    2. Prepare and submit preliminary copies for review as specified herein.

B. Submission of Final Copies:
    1. Submit fully executed copies of warranties, guarantees and bonds within ten days of date identified in Certificate of Completion but no later than three days prior to date of final Application for Payment.

C. Date of Warranties and Bonds:
    1. Unless otherwise directed or specified, commencement date of warranty, guarantee and bond periods shall be the date established in the Certificate of Completion.
    2. Warranties for Work accepted in advance of date stated in Certificate of Completion:
        a. When a designated system, equipment, component parts or other portion of the Work is completed and occupied or put to beneficial use by District:
            1) By separate agreement with Contractor, prior to completion date established in the Certificate of Completion, submit properly executed warranties to District within ten days of completion of that designated portion of the Work.
            2) List date of commencement of warranty, guarantee or bond period as the date established in the Certificate of Completion.
    3. Warranties for Work not accepted as of date established in the Certificate of Completion:
        a. Submit documents within ten days after acceptance, listing date of acceptance as beginning of warranty, guarantee or bond period.

D. Duration of Warranties and Guarantees:
    1. Unless otherwise specified or prescribed by law, warranty and guarantee periods shall be not less than the Correction Period required by the Conditions of the Contract.
    2. In no case, the period is to be less than one year from the date established for completion of the Project in the Certificate of Completion.
    3. See product Specifications Sections of the Project Manual for extended warranty and guarantee beyond the minimum one year duration.

END OF SECTION

SECTION 01 78 00.01
WARRANTY FORM LETTER

FOR CONTRACTOR'S / SUBCONTRACTOR'S / MANUFACTURER'S WARRANTY

CONTRACTOR'S/SUBCONTRACTOR'S/SUPPLIER'S LETTERHEAD

SPECIAL LIMITED PROJECT WARRANTY FOR _____ WORK.

We, the undersigned, do hereby warrant that the portion of the Work described above which we have provided for Relocatable Classroom - RCA Master is in accordance with the Contract Documents and that all such Work as installed will fulfill or exceed all minimum warranty requirements. We agree to repair or replace Work installed by us, together with any adjacent Work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or function within a period of (years), commencing (date identified in Certificate of Completion, unless otherwise directed) and terminating (date).

The following terms and conditions apply to this warranty (obtain District 's approval before submission):

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

LOCAL REPRESENTATIVE: FOR WARRANTY MAINTENANCE, REPAIR, OR REPLACEMENT SERVICE, CONTACT:

(Name) _____

(Address) _____

(City) _____ (State) _____ (ZIP) _____

(Phone) _____ / _____

(signed) _____

(Typed Name) _____ (Date) _____

(Title) _____ (Firm) _____

CONTRACTOR:

State License No: _____

(signed) _____

(Date) _____ (Typed Name) _____

(Title) _____ (Firm) _____

FORM LETTER

FOR CONTRACTOR'S / MANUFACTURER'S GUARANTEE

CONTRACTOR'S / MANUFACTURER'S LETTERHEAD

SPECIAL LIMITED PROJECT [__WARRANTY__] [__GUARANTEE__] FOR _____ WORK.

We, the undersigned, do hereby [__warrant__] [__guarantee__] that the portion of the Work described above which [__we have provided__] [__was provided by (Installer or Subcontractor's Name)__] for Relocatable Classroom - RCA Master in accordance with the Contract Documents and that all such Work as installed will fulfill or exceed all minimum warranty requirements. We agree to repair or replace Work installed by [__us,__] [__(Installer or Subcontractor's Name)__] together with any adjacent Work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or function within a period of (years), commencing (date indicated in Certificate of Completion, unless otherwise directed) and terminating (date).

The following terms and conditions apply to this [__warranty__] [__guarantee__] (obtain District's approval before submission):

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

LOCAL REPRESENTATIVE: FOR WARRANTY MAINTENANCE, REPAIR, OR REPLACEMENT SERVICE, CONTACT:

(Name) _____

(Address) _____

(City) _____ (State) _____ (ZIP) _____

(Phone) _____ / _____

(signed) _____

(Date) _____ (Typed Name) _____

(Title) _____ (Firm) _____

CONTRACTOR:

State License No: _____

(signed) _____

(Date) _____ (Typed Name) _____

(Title) _____ (Firm) _____

FORM LETTER

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Record Drawings.

B. Record Specifications.

C. Record Product Data.

D. Record Samples.

E. Record Photos.

F. Record Schdeule of Values.

G. Miscellaneous record submittals.

1.02 RELATED REQUIREMENTS:

A. Section 01 20 00 - Price and Payment Procedures: Schedule of Values.

B. Section 01 30 00 - Administrative Requirements: Project Coordination.

C. Section 01 78 00 - Closeout Submittals: General Closeout.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Recorded actual locations.

PART 2 -PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 RECORD DRAWINGS

A. Record Documents: Construction Manager is to maintain one set of electronically marked-up PDF copy of the Contract Drawings including Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark Record Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record document.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an acceptable drawing technique.

c. Record data as soon as possible after obtaining it.

d. Record and check the markup before enclosing concealed installations.

e. Cross-reference Record Drawings to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Field changes of dimensions from Contract Drawings.
   b. Revisions to details shown on Contract Drawings.
      1) Details not on original Contract Drawings. Application of copies of details produced and provided by Architect during construction will be accepted.
   c. Depths of foundations and footing, measured in relation to finish First Floor datum.
   d. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent ground improvements.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuits.
   g. Actual equipment locations and sizes.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Permanent Room names and Room numbers.
   k. Changes made by Change Order or Construction Change Directive.
   l. Changes made following written orders by District or Construction Manager.
   m. Changes made following Architect's written orders.
   n. Note clarifications from RFI's.
   o. Field records for variable and concealed conditions.
   p. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up Record Drawings.
4. Mark Record sets with erasable, red text and graphics. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Contract Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before Final Inspection, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
      a. Format: PDF, Version, Microsoft Windows operating system.
   2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Architect and Construction Manager for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
    a. See Section 01 35 50 - Requests for Electronic Files for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect and Construction Manager for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled. Do not flatten the document.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sectionidentification. Include identification in each digital data file.
4. Identification:
    a. Project name and number.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect and Construction Manager.
    e. Name of Contractor.

3.02 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications in PART 2 to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and Record Drawings, where applicable.

B. Format: Submit Record Specifications as annotated PDF electronic file. Do not flatten the document.

3.03 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file. Do not flatten the document.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

3.04 RECORD SAMPLES

A. Immediately before date of Substantial Completion, meet with District or Construction Manager at Project site to determine which Samples maintained during the construction period aer to be transmitted to District or Construction Manager for record purposes.

B. Comply with District or Construction Manager's instructions for packaging, identification, marking, and delivery to District or Construction Manager's Sample storage space. Dispose of other Samples in the manner specified for disposing surplus and waste materials

3.05 RECORD PHOTOS

A. Photograph all work before covering up, including:
1. The extent of all open trenches and manholes.
2. Identify all exposed utilities in the photos.
3. Show photograph locations and dates on Record Drawings.

3.06 RECORD SCHEDULE OF VALUES

A. Provide a PDF copy of the final Schedule of Values as indicated in Section 01 20 00 - Price and Payment Procedures.

3.07 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1. Field records on excavations and foundations.
2. Field records on underground construction and similar work.
3. Surveys showing locations and elevations of underground lines.
4. Invert elevations of drainage piping.
5. Surveys establishing building lines and levels.
6. Authorized measurements using unit prices or allowances.
7. Records of plant treatment.
8. Ambient and substrate condition tests.
9. Certifications received in lieu of labels on bulk products.
10. Batch mixing and bulk delivery records.
11. Testing and qualification of trade persons.
12. Documented qualification of installation firms.
13. Load and performance testing.
14. Inspections and certifications by governing authorities.
15. Leakage and water-penetration tests.
16. Fire-resistance and flame-spread test results.
17. Final inspection and correction procedures.

B. Format: Submit miscellaneous record submittals as PDF electronic file.
   1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

3.08 SUBMISSION

A. Keep Project Record Documents current, as they will be reviewed for completeness by Architect, Engineer, Project Inspector, and Construction Manager; as a condition of certification for each Progress Payment Application.

B. Prior to the date of the Notice of Completion, submit marked Record Documents to Architect and Construction Manager for review, approval and further processing.

3.09 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Review of documents by Architect, Engineer, Project Inspector, or Construction Manager to be in concert with approval of the monthly Application for Payment.

C. Maintenance of Record Documents and Samples:
   1. Store record documents and Samples in the field office apart from the Contract Documents used for construction.
   2. Do not use project record documents for construction purposes.
   3. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss.

4. Provide access to project record documents for Architect and Construction Manager reference during normal working hours.

3.10 FINAL SUBMITTAL/CLOSEOUT

A. Contractor is to provide a complete coordinated set of electronic PDF Record Documents to the Architect as part of the final closeout procedure.

END OF SECTION

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of District personnel in operation and maintenance is required for:

1. All software-operated systems.
2. Electrical systems and equipment.
3. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.

B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Training Plan: District will designate personnel to be trained; tailor training to needs and skill-level of attendees.

1. Each Sub, Design-Builder SubContractor and vendor responsible for training submits a written training plan to the Architect and District Representative for review and approval prior to training.
2. Submit to Architect for transmittal to District.
3. Submit not less than two weeks prior to start of training.
4. Revise and resubmit until acceptable.
5. Provide an overall schedule showing all training sessions.
6. Include at least the following for each training session:
    a. Identification, date, time, and duration.
    b. Description of products and/or systems to be covered.
        1) Equipment list
    c. Name of firm and person conducting training; include qualifications.
    d. Intended audience, such as job description.
    e. Objectives of training and suggested methods of ensuring adequate training.
        1) Agenda and subjects (design intent, equipment inspections, modes of operation, system interactions, troubleshooting, preventative maintenance, etc.)
    f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    g. Media to be used, such a slides, hand-outs, etc.

1) The approved O&M manuals shall be used during the training for equipment specific references.

h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.

1. Include applicable portion of O&M manuals.
2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:

1. Identification of each training session, date, time, and duration.
2. Sign-in sheet showing names and job titles of attendees.
3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
4. Include Commissioning Authority's formal acceptance of training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for District's subsequent use.

1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TRAINING OF OWNER PERSONNEL

A. The Contractor and Design-Builder SubContractors shall be responsible for training coordination and scheduling and for ensuring that training is completed.

B. The specific training requirements of District personnel by Subs, Design-Builder SubContractors and vendors is specified in the Division in which the equipment is specified.

C. For primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

3.02 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by District.

B. Demonstrations conducted during Functional Testing need not be repeated unless District personnel training is specified.

C. Demonstration may be combined with District personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.03 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. District will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of District's personnel to be trained; re-schedule training sessions as required by District; once schedule has been approved by District failure to conduct sessions according to schedule will be cause for District to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:

1. The location of the O&M manuals and procedures for use and preservation; backup copies.
2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:

1. Review the applicable O&M manuals.

2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

1. Demolition and removal of existing site improvements within Project area, as indicated on Drawings and as necessary to accomplish the Work, including:
    a. Asphaltic concrete and portland cement concrete paving.
    b. Abandoned underground utility lines outside of utility easement.
    c. Pavement cutting and removal.
    d. Debris removal.
2. Handling and disposal of removed materials.
3. Dewatering of excavations as necessary to control surface and sub-surface water.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 10 00 - Summary: Description of items to be removed by District.

C. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

D. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

E. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

F. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

G. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction.

B. CFC Ch. 33 - Fire Safety During Construction and Demolition.

C. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 DEFINITIONS

A. Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.

B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.

C. Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.

1. Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete, that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.

D. Class III Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A Class III landfill must have a solid waste facilities permit from the State of California.

E. Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

F. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.

G. Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

H. Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.

I. Solid Waste: All putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by State law.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Pre-Construction Conference: Conduct a pre-construction conference one week prior to the start of the work of this section; require attendance by all affected trades.

B. Convene a conference at the Project site 3 days prior to starting demolition to review the Drawings and Specifications, requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations and project conditions.

C. Conference shall be attended by DSA, supervisory and quality control personnel of Contractor and all subcontractors performing this and directly-related Work.

D. Submit minutes of meeting to District, Project Inspector and Architect, for Project record purposes.

E. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1. Refer to sequence requirements specified in Section 01 10 00 - Summary; and construction progress schedule requirements specified in Section 01 32 16 - Construction Progress Schedule.

1.06 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain property of [_District Name_], demolished materials shall become the Contractor's property and shall be removed, recycled, or disposed from Project site in an appropriate and legal manner.

1. Arrange a meeting no less than ten (10) days prior to demolition with the District or DSA and other designated representatives to review any salvageable items to determine if District wants to retain ownership, and discuss Contractor's Waste Management and Recycling Plan.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:

1. Areas for temporary construction and field offices.

2. Areas for temporary and permanent placement of removed materials.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1. Record drawings: Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.08 SUBMITTALS

A. Demolition and Removal Procedures and Schedule: Submit for Project record only.

B. Project Record Drawings: Submit in accordance with provisions specified in Section 01 78 00 - Closeout Submittals. Indicate verified locations of underground utilities and storm drainage system on project record drawings.

1.09 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.

1. Minimum of 5 years of documented experience.

1.10 SCHEDULING

A. Schedule Work to precede new construction.

B. Describe demolition removal procedures and schedule.

C. Perform work between the hours of 8am and 5pm, subject to noise abatement regulations and District's approval for noise considerations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove other items indicated, for salvage, relocation, and recycling.

C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Conform to the relevant Article of the General Conditions, South Coast Air Quality Management District and other applicable regulatory procedures when discovering hazardous or contaminated materials.

B. Selective Demolition of Site and Building Elements:

1. Use techniques acceptable to authorities having jurisdiction and which will achieve intended results and provide protection of surrounding features to remain.

2. Some items may have been demolished prior to Work of this Contract. Verify existing conditions prior to start of demolition. If items are or have been demolished contact the Architect.

3. Some items may require postponement of demolition until late in Contract Time period.

4. Phase demolition as necessary to provide adequate interfacing of related Work.

5. Demolish in an orderly and careful manner. Protect existing foundations, retaining walls, utility structures, other structures and finish materials to remain.

C. Field Measurements and Conditions:

1. Survey existing conditions and correlate with requirements indicated to determine extent of demolition and recycling required.

2. In addition to provisions of the Conditions of the Contract, verify dimensions and field conditions prior to construction. Verify condition of substrate and adjoining Work before proceeding with demolition Work. If conflict is found notify DSA, Project Inspector and Architect.

D. Comply with other requirements specified in Section 01 70 00.

E. Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.

F. Environmental Controls

1. Comply with federal, state and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.

2. Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.
3. Temporary Construction: Remove indications of temporary construction facilities, such as haul roads, work areas, structures, stockpiles or waste areas.
4. Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters.
    a. Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.
        1) Store and service construction equipment at areas designated for collection of oil wastes.
5. Dust Control, Air Pollution, and Odor Control: Prevent creation of dust, air pollution and odors.
    a. Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
    b. Store volatile liquids, including fuels and solvents, in closed containers.
    c. Properly maintain equipment to reduce gaseous pollutant emissions.
6. Noise Control: Perform demolition operations to minimize noise.
    a. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary to comply with the requirements of this Contract.
    b. At least once every five successive working days while work is being performed above 55 dB noise level, measure sound level for noise exposure due to the demolition.
        1) Measure sound levels on the 'A' weighing network of a General Purpose sound level meter at slow response.
        2) To minimize the effect of reflective sound waves at buildings, measurements may be taken three to six feet in front of any building face.

G. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
1. Obtain required permits.
2. Comply with applicable requirements of NFPA 241 and CFC Ch. 33.
3. Use of explosives is not permitted.
4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
    a. 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.
        1) Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.

b. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

c. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

5. Provide, erect, and maintain temporary barriers and security devices.

a. Provide, erect, and maintain temporary barriers, safety and security devices , for protection of streets, sidewalks, curbs, adjacent property and the public.

b. Protection: Protect existing construction and adjacent areas with temporary barriers and security devices in accordance with requirements specified in Section 01 50 00 - Temporary Facilities and Controls.

1) Review location and type of construction of temporary barriers with District and/or the DSA.

2) Barriers shall control dust, debris and provide protection for persons occupying and using adjacent facilities.

3) Maintain protected egress and access at all times, in accordance with requirements of authorities having jurisdiction and with permission of DSA (AHJ having jurisdiction).

6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

8. Do not close or obstruct roadways or sidewalks without permit.

9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

H. Do not begin removal until receipt of notification to proceed from District.

I. Do not begin removal until built elements to be salvaged or relocated have been removed.

J. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.

2. Prevent movement or settlement of adjacent structures.

3. Stop work immediately if adjacent structures appear to be in danger.

4. Protect existing landscaping materials, appurtenances, structures and items that are not to be demolished, or are on adjacent property.

5. Mark location of utilities.

K. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

L. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

M. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect in accordance with requirements of Section 01 60 00 - Product Requirements.

N. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

O. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

P. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to District.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to District.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

I. Utility Lines, Posts and Structures:

1. Work by Utility: Posts, conductors, guy wires, boxes, structures and equipment shown to be cleared or removed by the responsible utility company or agency shall be considered work under a separate contract.
2. Coordination: The Contractor shall arrange, schedule and coordinate work by utility companies and agencies.
3. Payment: Costs, if any, imposed by utility companies and agencies shall be included in the Contract Sum.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.

C. Remove temporary work.

D. Leave site in clean condition, ready for subsequent work.

E. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Nonstructural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Sheathing.

E. Roof-mounted curbs.

F. Roofing nailers.

G. Roofing cant strips.

H. Preservative treated wood materials.

I. Miscellaneous framing and sheathing.

J. Communications and electrical room mounting boards.

K. Concealed wood blocking, nailers, and supports.

L. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 01 50.20 - Roofing, Restoration, Patch, and Repair.

1.03 REFERENCE STANDARDS

A. AFPA (NDS) - National Design Specification for Wood Construction.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

E. ASTM F2130 - Standard Test Method for Measuring Repellency, Retention, and Penetration of Liquid Pesticide Formulation Through Protective Clothing Materials.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

H. AWC SDPWS - Special Design Provisions for Wind and Seismic.

I. AWPA U1 - Use Category System: User Specification for Treated Wood.

J. CBC - California Building Code.

K. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems.

L. PS 1 - Structural Plywood.

M. PS 2 - Performance Standard for Wood Structural Panels.

N. PS 20 - American Softwood Lumber Standard.

O. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Evaluation Service Reports: Show compliance with specified requirements.

D. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in District's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a two-year period commencing on Date of Final Inspection or Final Acceptance.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.
2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19; Maximum 19%.

D. Stud Framing (2 by 2 through 2 by 6):

1. Species: Douglas Fir-Larch.
2. Grade: No. 1 & Better.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

1. Species: Douglas Fir-Larch.
2. Grade: No. 1 and Better.
   a. No. 1 & Better for joists and rafters;
   b. No. 1 for beams and stringers.

F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 1 or Construction Grade.
2. Boards: No. 2 or Standard Grade.

2.03 STRUCTURAL COMPOSITE LUMBER

A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.

B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.

2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.
3. Headers Not Longer Than 48 inches: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.
4. Basis of Design Product: RedLam LVL as manufactured by RedBuilt, LLC, or approved equal.
5. Products:
    a. Boise Cascade Company: www.bc.com/#sle.
        1) ICC ESR-1040, VAR-1017.
    b. RedBuilt LLC; Redbuilt Laminated Veneer Lumber: www.redbuilt.com//#sle.
        1) ICC ESR-2993.
    c. Louisiana-Pacific Corp.: www.lpcorp.com.
        1) ICC ESR-2403.
    d. Weyerhaeuser Company: www.weyerhaeuser.com/#sle.
        1) ICC ESR-1387, VAR-1008.
    e. Or Equal Substitutions: See Section 01 60 00 - Product Requirements.

2.04 EXPOSED BOARDS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
B. Moisture Content: Kiln-dry (15 percent maximum).
C. Surfacing: S4S.
D. Species: Douglas Fir.
E. Grade: No. 2, 2 Common, or Construction.

2.05 CONSTRUCTION PANELS

A. Roof Sheathing: PS 1 type, rated Structural I Plywood Sheathing.
    1. Bond Classification: Exterior.
    2. Span Rating: 24.
    3. Performance Category: 15/32 PERF CAT.
    4. Edge: Square edge.
B. Wall Sheathing: PS 2 type plywood.
    1. Bond Classification: Exterior.
    2. Grade: Structural I Sheathing.
    3. Span Rating: 24.
    4. Performance Category: 5/16 PERF CAT.
    5. Edge Profile: Square edge.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:

1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.06 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
3. Anchors: As indicated on Drawings.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
2. Basis of Design Product: Connectors as manufactured by Simpson Strong-Tie, or approved equal.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
2. Basis of Design Product: Connectors as manufactured by Simpson Strong-Tie, or approved equal.

D. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

E. Termite Resistant Base Condition:

1. Termite-Resistant Sill Plate Barrier: Self-adhesive, 4 mil film-backed 64 mil barrier with release sheet; adheres to concrete substrates and blocks termite access.
    a. Thickness: 68 mil, 0.068 inch.
    b. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
    c. Water Vapor Permeance: 0.035 perm, maximum, when tested in accordance with ASTM E96/E96M.
    d. Products:
        1) Basis of Design: Polyguard Products Inc.; TERM® Sill Barrier | Termite Barrier : www.polyguardproducts.com, or approved equal.
        2) Or Equal Substitutions: See Section 01 60 00 - Product Requirements.

2. Termite-Resistant Sill Flashing: Self-adhesive membrane; 4 mil polyethylene film bonded to 36 mil sealant.
    a. Thickness: 40 mil, 0.040 inch.
    b. Width: 12 inches, minimum.
    c. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
        1) ICC ESR 3632.
    d. Water Vapor Permeance: 0.035 perm, maximum, when tested in accordance with ASTM E96/E96M.
    e. Pesticide repellency; chlorodane, fipronil, and permethrin: 0 percent penetration, tested to ASTM F2130.
    f. Products:
        1) Basis of Design: Polyguard Products Inc.; TERM® Flashing Barrier | Termite Barrier : www.polyguardproducts.com, or approved equal.
        2) Or Equal Substitutions: See Section 01 60 00 - Product Requirements.
3. Accessory Sealants: indicated on details to maintain warranty.
    a. Sill Barrier Sealant: Polygard Detail Sealant PW (California VOC Compliant), or approved equal.
    b. Sill Flashing Sealant : Polyguard California Sealant, or approved equal.

F. General Purpose Construction Adhesives: Comply with ASTM C557.

G. Water-Resistive Barrier: See Section 07 25 00.

H. Air Barrier: See Section 07 27 00.

2.07 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
    1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
    1. Products:
        a. Lonza Group: www.wolmanizedwood.com/#sle.
        b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com/#sle.
        c. Viance, LLC; Preserve ACQ: www.treatedwood.com/#sle.
        d. Or Equal Substitutions: See Section 01 60 00 - Product Requirements.
    2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
        a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.

b. Treat lumber exposed to weather.

c. Treat lumber in contact with roofing, flashing, or waterproofing.

d. Treat lumber in contact with masonry or concrete.

e. Treat lumber less than 18 inches above grade.

f. Treat lumber in other locations as indicated.

3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.

a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.

b. Treat plywood in contact with roofing, flashing, or waterproofing.

c. Treat plywood in contact with masonry or concrete.

d. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AFPA (NDS), and AWC SDPWS.

E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

1. Comply with CBC Section 718.2 Fireblocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific nonstructural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Chalkboards and marker boards.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. At long edges provide solid edge blocking where joints occur between roof framing members.
2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails or screws.
1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
2. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.
4. Size and Location: As indicated on drawings.

3.07 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.10 CLEANING

A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 07 01 50.20
ROOFING, RESTORATION, PATCH, AND REPAIR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Partial removal of existing roofing system in preparation for new penetrations.

B. Patching and repair shall not void or reduce Contractor's and manufacturer's warranty of existing roofing. Removal of existing roofing and repair is to be done by the Roofing Contractor in which the roofing system was originally installed.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood framing, plywood sheathing, wood curbs, cants, nailers, blocking and backing.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings, reglets, .

C. Division 22 - Plumbing: Roof drains, plumbing items penetrating roofing membrane.

D. Division 23 - Heating, Ventilation and Air-Conditioning (HVAC): Roof mounted equipment, curbs, and ducts penetrating roofing membrane.

E. Division 26 - Electrical.

1. Conduit penetrating roofing membrane.

F. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board.

G. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

H. NRCA ML104 - The NRCA Roofing and Waterproofing Manual.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with affected mechanical and electrical work associated with roof penetrations.

B. Preinstallation Meeting: Convene two weeks before starting work of this section.

1. Attendance is mandatory at conference required in section specifying new roofing installation.

a. Require attendance by Contractor's superintendent and other supervisory and quality control personnel having responsibility for roofing, supervisory personnel of roofing installer and, if required for warranty provisions, representative of roofing products manufacturer.

b. DSA, testing and inspection agency (if engaged by District), District's insurance underwriter (if necessary, at District's option), and Architect (if authorized by District) will attend.

c. At Contractor's option, installers of each component of related Work, including deck or substrate construction, rooftop equipment, penetrations of roof deck, and other Work integral with or adjacent to roofing may attend.

d. If required, attendance shall include Authority Having Jurisdiction (AHJ). Contractor shall verify requirement with Authority Having Jurisdiction (AHJ) and arrange for attendance.

2. Establish at pre-bid job walk, number of layers to be removed and reconfirm at pre-installation conference.
3. See new roofing installation section for additional information.
4. Agenda items specific to patch and repair.
    a. Review Drawings and Specifications for suitability for application of roofing system. Review application procedures and coordination required with related Work.
        1) Discuss changes and deviations from Drawings and Specifications, if any, recommended or required.
    b. Walk roof areas to review and discuss substrate preparation including repair of unacceptable surfaces, roof drainage, penetrations, equipment curbs, and work performed by other trades which requires coordination with roofing system.
    c. Review Contract Document requirements and submittals for roofing system, including roofing schedule, inspection and testing, and environmental conditions.
        1) Identify which governing regulations or insurance requirements will affect roofing system installation.
    d. Discuss anticipated weather, as well as procedures for responding to unacceptable weather, including using temporary roofing.
        1) Temporary roofing, if necessary, will be added to scope of the Work by contract modification (change order or construction change directive), with acceptable adjustment in Contract Time and Contract Sum.
    e. Document discussions in writing, including actions required, and distribute copy of report to each meeting participant.
    f. Attendance by DSA, Architect and independent testing and inspection agency shall not relieve Contractor of sole responsibility for means, methods, techniques and sequence of construction, in accordance with provisions of the Bidding and Contract Requirements.

C. Schedule work to coincide with commencement of installation of new roofing system.

1.04 QUALITY ASSURANCE

A. Comply with Title 24 Part 2 - California Building Code Sections 1504 Performance Requirements, 1505 Fire Classification and 1507 Requirements for Roof Coverings; and Part 6 - California Energy Code requirements

B. Materials Removal Firm Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

C. Industry Standards:

1. Work specified in this Section shall comply to manufacturer's product data and application instructions.

2. Work shall also conform to recommended practices and details published in NRCA Roofing and Waterproofing Manual, NRCA ML104 and recommended practices and details of Western States Roofing Contractors Association (WSRCA), where such practices and details are more stringent.

D. Testing and Inspection:

1. At District's option, services of an independent inspection and testing agency may be obtained. Costs of this service will be paid for by District.
2. Contractor shall cooperate with independent testing and inspection agency.

1.05 SCHEDULING

A. Remove only existing roofing materials that can be replaced with new materials as the weather will permit.

1.06 FIELD CONDITIONS

A. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

B. Maintain continuous temporary protection prior to and during installation of new roofing system.

1.07 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces affected by reroofing, by methods and with materials acceptable to warrantor.

1. Notify warrantor of existing roofing system before proceeding, and upon completion of reroofing.
2. Obtain documentation verifying that existing roofing system has been inspected by warrantor and warranty remains in effect. Submit documentation at Project closeout.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Roofing Assembly Requirements:

1. External Fire Exposure Classification: ASTM E108 Class A, UL (DIR) or Warnock Hersey listed.

B. Indicated Roof Areas: Patch and repair existing roofing, perimeter flashings, base flashings, counter flashings, vent stack flashings, roofing membrane, and insulation where required for the installation of new roof mounted equipment.

C. Patch and repair roofing as necessary to provide complete, weathertight installation conforming to referenced industry standards and as necessary to accommodate new Work.

D. Contract Drawings and Specifications:

1. Contract Drawings and Specifications are diagrammatic and of a general nature only.
2. Materials manufacturer's specifications for roofing and related flashings shall govern Work as if set forth herein, except as specifically indicated or where more stringent

requirements are specified or required by Authority Having Jurisdiction (AHJ).

3. All Work shall be completed as required to obtain specified warranty and guarantee.

E. Design Review:

1. Contractor, roofing installer and manufacturer's representative of the original roofing installation (if known or or identifiable) shall review Drawings and Specifications.

2. Obtain confirmation from roofing installer and manufacturer of original roofing (if known or identifiable) that selected roofing materials for patching and repair are proper, compatible and adequate for the Project and that conditions and details indicated and specified do not conflict with requirements and recommendations of manufacturer.

2.02 MATERIALS

A. Temporary Protection: Sheet polyethylene; provide weights to retain sheeting in position.

1. Provide thickness sufficient to prevent tearing or damage during use.

B. Protection Board: ASTM C208 cellulose fiber board, one face finished with mineral fiber, asphalt and kraft paper.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions.

B. Verify that existing roof surface is clear and ready for work of this section.

1. Verify that roof deck is structurally sound to support live and dead load requirements of roofing system and sufficiently rigid to support construction traffic.

3.02 PREPARATION

A. Coordination: Coordinate patching and repairs of roofing with installation of penetrations, supports and other adjoining new construction which affects existing roofing.

B. Deck Preparation:

1. Clean and prepare roof deck in accordance with roofing system manufacturer's instructions and recommendations.

2. Correct substrate surfaces which are unacceptable to installer.

C. Sweep roof surface clean of loose matter.

D. Remove loose refuse and dispose off site.

1. Free Fall Maximum: 8 feet, provide enclosed chutes for higher fall.

2. Do not use District's disposal system.

E. Deck Condition: Firm, smooth, clean and sufficiently dry to suit roofing manufacturer's requirements.

1. Conduct moisture test of deck and surrounding roofing.

2. Do not proceed with roofing application until deck and surrounding materials are dry.

3.03 MATERIAL REMOVAL

A. Remove only existing roofing materials that can be replaced with new materials as the weather will permit.

B. Remove metal counter flashings.

C. Remove damaged portions of roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets.

D. Cut and lay flat any membrane blisters.

E. Remove damaged insulation and fasteners, cant strips, blocking .

F. Remove sheathing paper and underlay..

G. Repair existing underlying deck surface to provide smooth working surface for new roof system.

3.04 TEMPORARY PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

3.05 PATCHING AND REPAIRS

A. General:

1. It is intended to leave existing roofing intact as much as feasible.
    a. Roofing Work is intended to be patching and repair of portions of existing roofing due to new:
        1) Structural supports.
        2) Penetrations.
        3) Heating, ventilating and air conditioning (HVAC) equipment.
        4) Electrical system penetrations.
    b. Include repairs of areas damaged as result of construction activities.
2. Comply with instructions and recommendations of manufacturer of existing roofing system for making patches and repairs.
3. Comply also with recommended practices of referenced industry standards.
4. Protect other Work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace and restore other construction damaged or degraded by roofing Work.
5. Apply roofing materials in accordance with NRCA Roofing and Waterproofing Manual and published details and recommendations of Western States Roofing Contractors Association (WSRCA).
6. Keep roofing materials dry before and during application. Do not permit phased construction.

B. Flashing Replacement: Entire sheet of flashing membrane is to be adhered to vertical substrate and hot-air welded to the secured field membrane.

C. Penetrations:

1. Coordinate roofing Work with plumbing, mechanical and electrical Work and other Work involving penetrations of roofing membrane.

2. Provide pipe and conduit penetrations as indicated on Drawings, or if more stringent, as detailed in NRCA - Roofing and Waterproofing Manual.

3. Verify that penetrations through roof are adequately separated by a minimum of 18 inches from each other, away from curbs, platforms, sleepers and walls and are also located a minimum of 24 inches beyond all waterways.

D. Other Roofing Accessories: Install other accessories in accordance with manufacturer's instructions and recommendations, and NRCA Construction Details, as applicable.

E. Crickets and Tapered Areas: Install to provide positive slope at proper transitions at changes in roof plane.

F. Flashing and Sheet Metal Work: Set and flash in integrated sheet metal.

3.06 FIELD QUALITY CONTROL

A. Independent agency inspection and testing will be provided under provisions of Section 01 40 00.

B. The drawings identify the approximate limits to material removal.

C. Testing will identify the condition of existing materials and their reuse, repair or removal.

D. Test Reports: Indicate existing insulation moisture content and existing roof system quality.

3.07 PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

3.08 SCHEDULES

A. Roof Areas as Indicated: Remove, where required, existing perimeter flashings, base flashings, counter flashings, vent stack flashings, roofing membrane, and insulation.

B. Remove indicated roof mounted mechanical equipment and electrical equipment.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

C. Reglets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

C. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction; 2012.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

E. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).

G. CDA A4050 - Copper in Architecture - Handbook; current edition.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage (0.0239 inch) thick base metal.

B. Lead Coated Copper: ASTM B101, 24 oz/sq ft weight of bare copper sheet, HOO (cold-rolled) temper.

2.02 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.

B. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

C. Underlayment: Self-adhesive sheet flexible flashing complying with ASTM D1970/D1970M.

D. Slip Sheet: Rosin sized building paper.

E. Primer: Zinc chromate type.

F. Protective Backing Paint: Zinc molybdate alkyd.

G. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

H. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

I. Sealant: Type as specified in Section 07 92 00 - Joint Sealants. Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants.

   1. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

J. Plastic Cement: ASTM D4586/D4586M, Type I.

K. Solder: ASTM B32; Sn50 (50/50) type.

L. Miscellaneous Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of the Work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

1. Coping and Cap Flashing:
    a. Coping and caps of type and profile indicated on Drawings, 20 gage galvanized sheet metal, with integral expansion.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
    1. Typical Seams: Overlapped and sealed seams.
    2. Coping Seams: Lock seams, flattened.
    3. Seams, Horizontal to Vertical Transitions: Solder joints.
    4. Soldered seams: Tin edges to be seamed, form seams, and solder.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

G. Cleats and Starter Strips: Fabricated of same material as sheet metal fabrication, minimum 4-inches wide, except at continuous strips, interlockable with sheet metal fabrication. Typically use continuous strips.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Conform to drawing details and the following:
    1. Parapet Coping/Cap: SMACNA Architectural Sheet Metal Manual, Detail 3-1, 3-3(18 Butt Seam w/ backing plates).
    2. Roof - Penetration Flashing: SMACNA Architectural Sheet Metal Manual, Detail 4-13 through 4-16.

B. Insert flashings into reglets to form tight fit. Secure in place with manufacturer approved wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

1. Counterflashings Installation: Install counterflashing in reglets to form tight fit, either by snap-in seal arrangement or by securing in place with lead wedges spaced 18-inches on center maximum. Pack remaining spaces with lead wool.
    a. Except where indicated or specified otherwise, insert counterflashing in reglets, extending down vertical surfaces over upturned vertical leg of base flashings not less than 3-inches.
    b. Form counterflashings to required shapes before installation.
    c. Lengths of metal counterflashings shall not exceed 10 feet.
    d. Where stepped counterflashings are required, counterflashing may be installed in short lengths or may be of the preformed one-piece type.
    e. Provide factory- or shop-form corners not less than 12-inches from the angle.
    f. Provide end laps in counterflashings not less than 3-inches and make laps weathertight with sealant.
    g. Turn up concealed edge of counterflashings built into masonry or concrete walls not less than 1/4-inch and extend not less than 2-inches into wall.
    h. Fold exposed edges of counterflashings 1/2-inch.
    i. Install counterflashing to provide a spring action against base flashing.

F. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

G. Flashing at Wall and Roof Penetrations and Equipment Supports:

1. Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck or walls.
    a. Goose-necks, rainhoods, power roof ventilators, and other plumbing, HVAC and electrical products are specified as appropriate in:
        1) Division 26 - Electrical.
    b. Coordinate also with sheet metal curbs specified in Section 07 72 00 - Roofing Accessories.
2. Exception:
    a. Roofing: Where single ply system assembly has provided flashing for penetrations.
3. Equipment Support and Pad Flashing:
    a. Fully cap support and pad.
    b. Overlap base flashing 4-inches.
    c. Lap and solder joints.
    d. Provide sealant around penetrations through flashing.
4. Penetrations through Single Ply (ex; PVC or TPO) membrane:
    a. Roofing contractor is to install Single Ply (ex; PVC or TPO) cones and or flashing per roofing manufacturers standard details.

b. Roofing contractor is to provide sealant and stainless draw band to seal Single Ply (ex; PVC or TPO) cones and or flashings in accordance with the roofing manufacturer's standard details.

3.04 CLEANING AND PREPARATION FOR FIELD PAINTING

A. Metal Preparation: As sheet metal installation progresses, neutralize excess flux with 5 to 10 percent washing soda solution, and thoroughly rinse.

B. Repairs: Repair or replace damaged and deformed sheet metal.

C. Cleaning: Wash down exposed surfaces and remove stains, scrap and debris such that sheet metal is ready to receive field painting and related Work.

1. Wash down exposed surfaces and remove soiling, dust, contamination from steel wool and drilling residue, and other scrap and debris.

2. Scrub surfaces with detergent solution as necessary to remove grease and oil films, handling marks, and stains.

3.05 FIELD PAINTING

A. Field Painting: Field-paint exposed sheet metal for corrosion resistance and decorative purposes. Field finish painting is specified in Section 09 90 00 - Painting and Coating.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

D. District-provided field quality control.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants.

D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

E. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. District will employ an independent testing agency to perform the field quality control inspection and testing as referenced in PART 3 of this section and as follows, to prepare and submit the field quality control plan and log, and to provide recommendations of remedies in the case of failure.

1. Contractor shall cooperate with testing agency and repair failures discovered and destructive test location damage.

E. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.

1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: www.bostik-us.com.
3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
4. Fortifiber Building Systems Group: www.fortifiber.com/sle.
5. Hilti, Inc: www.us.hilti.com/#sle.
6. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
7. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
8. Pecora Corporation: www.pecora.com.
9. QUIKRETE Companies: www.quikrete.com/#sle.

10. Sherwin-Williams Company: www.sherwin-williams.com.
11. Sika Corporation: www.usa-sika.com.
12. Specified Technologies Inc: www.stifirestop.com/#sle.
13. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
14. W.R. Meadows, Inc: www.wrmeadows.com/sle.
15. Substitutions: See Section 01 60 00 - Product Requirements.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: www.bostik-us.com.
3. Dayton Superior Corporation: www.daytonsuperior.com.
4. Dow Corning Corporation: www.dowcorning.com/construction/sle.
5. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
6. Pecora Corporation: www.pecora.com.
7. QUIKRETE Companies: www.quikrete.com/#sle.
8. Sherwin-Williams Company: www.sherwin-williams.com.
9. Sika Corporation: www.usa-sika.com.
10. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
11. W.R. Meadows, Inc: www.wrmeadows.com/sle.
12. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Other joints indicated below.
2. Do not seal the following types of joints.
a. Intentional weepholes in masonry.
b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.

e. Joints between suspended panel ceilings/grid and walls.

B. Type CP-1 - Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

B. Colors: As indicated on the drawings. Match adjacent surface.

2.04 NONSAG JOINT SEALANTS

A. Type ST-1 - Silyl-Terminated Polyether (STPE) and Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 35 percent, minimum.
2. Hardness Range: 20 to 40, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's full range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
   a. Sherwin-Williams Company; Stampede 100 Low-Modulus Hybrid Urethane Sealant: www.sherwin-williams.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Type PS-1 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.

1. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
2. Color: To be selected by Architect from manufacturer's full range.
3. Service Temperature Range: Minus 40 to 180 degrees F.
4. Manufacturers:
   a. Master Builders Solutions by BASF; MasterSeal NP1: www.master-builders-solutions.basf.us/en-us/#sle.
   b. Sherwin-Williams Company; Stampede-1/-TX Polyurethane Sealant: www.sherwin-williams.com/#sle.
   c. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
   d. Sika Corporation; Sikaflex-15 LM: www.usa-sika.com/#sle.
   e. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.
   f. Substitutions: See Section 01 60 00 - Product Requirements.

C. Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.

1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.

3. Color: To be selected by Architect from manufacturer's full range.
4. Service Temperature Range: Minus 40 to 180 degrees F.

2.05 SELF-LEVELING SEALANTS

A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
   1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
   2. Hardness Range: 0 to 15, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's full range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Manufacturers:
      a. Sika Corporation; Sikasil 728SL: www.usa-sika.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.
   6. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   7. Color: To be selected by Architect from manufacturer's full range.
   8. Service Temperature Range: Minus 40 to 180 degrees F.
   9. Manufacturers:
      a. Pecora Corporation: www.pecora.com.
      b. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
      c. Sika Corporation; Sikaflex-1c SL: www.usa-sika.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Self-Leveling Polysulfide Sealant: ASTM C920, Grade P, Uses M and A; multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
   1. Movement Capability: Plus and minus 25 percent.
   2. Hardness Range: 30 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's full range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Manufacturers:
      a. W.R. Meadows, Inc; Deck-O-Seal (pourable): www.wrmeadows.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
   1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.
   2. Manufacturers:
      a. ARDEX Engineered Cements; ARDEX ARDIFIX: www.ardexamericas.com/#sle.

b. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.

1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
3. Record each test on Preinstallation Adhesion Test Log as indicated.
4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

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

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:

1. Width/depth ratio of 2:1.
2. Neck dimension no greater than 1/3 of the joint width.
3. Surface bond area on each side not less than 75 percent of joint width.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. District will employ an independent testing agency to perform field quality control inspection and testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.

C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.

D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

E. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Condensate piping
   2. Natural gas piping
   3. Flanges, unions, and couplings.

1.02 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

E. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

F. ASTM B32 - Standard Specification for Solder Metal.

G. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.

H. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

I. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.

J. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Accept any valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 CONDENSATE PIPING, ABOVE GRADE, ROUTED ON ROOF

A. Copper Tube: ASTM B88 (ASTM B88M), Type M

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, alloy Sn95 solder.

2.02 NATURAL GAS PIPING, ABOVE GRADE, ROUTED ON ROOF

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.

1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
2. Joints: Threaded or welded to ASME B31.1.

2.03 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:

1. Ferrous Pipe: Class 150 malleable iron threaded unions.
2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:

1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to conserve space and not interfere with use of space.

E. Prepare exposed gas piping, unfinished pipe, fittings, supports, and accessories for finish painting.

F. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 TOLERANCES

A. Drainage Piping: Slope to drain at minimum of 1/8 inch per foot slope.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Multizone Units: Nameplates.

B. Automatic Controls: Tags. Key to control schematic.

C. Control Panels: Nameplates.

2.02 NAMEPLATES

A. Letter Color: White.

B. Letter Height: 1 inch minimum for nameplates on units, 1/4 inch minimum for control panels, 2 inch minimum for the building identifier placard

C. Background Color: Black.

2.03 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Measurement of final operating condition of HVAC systems.

C. Sound measurement of equipment operating conditions.

D. Vibration measurement of equipment operating conditions.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

C. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.

1. Submit to Architect.
2. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
3. Include at least the following in the plan:
    a. Preface: An explanation of the intended use of the control system.
    b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    d. Identification and types of measurement instruments to be used and their most recent calibration date.
    e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
    f. Final test report forms to be used.

g. Detailed step-by-step procedures for TAB work for each system and issue, including:
    1) Terminal flow calibration (for each terminal type).
    2) Diffuser proportioning.
    3) Branch/submain proportioning.
    4) Total flow calculations.
    5) Rechecking.
    6) Diversity issues.
h. Expected problems and solutions, etc.
i. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
j. Details of how TOTAL flow will be determined; for example:
    1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
k. Confirmation of understanding of the outside air ventilation criteria under all conditions.
l. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
m. Method of checking building static and exhaust fan and/or relief damper capacity.
n. Proposed selection points for sound measurements and sound measurement methods.
o. Time schedule for TAB work to be done in phases (by floor, etc.).
p. Description of TAB work for areas to be built out later, if any.
q. Time schedule for deferred or seasonal TAB work, if specified.
r. False loading of systems to complete TAB work, if specified.
s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
t. Interstitial cavity differential pressure measurements and calculations, if specified.
u. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
v. Procedures for formal progress reports, including scope and frequency.
w. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Field Logs: Submit at least twice a week to the Construction Manager.

E. Progress Reports.

F. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
   4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   6. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
   7. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Architect.
      g. Project Engineer.
      h. Project Contractor.
      i. Project altitude.
      j. Report date.

G. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).

4. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:

1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:
    a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
    b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   3. Contract interpretation requests.
   4. Lists of completed tests.
B. Ensure recorded data represents actual measured or observed conditions.
C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the District.
H. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

O. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.07 SCOPE

A. Test, adjust, and balance the following:

1. Plumbing Pumps.
2. Packaged Roof Top Heating/Cooling Units.
3. Computer Room Air Conditioning Units.
4. Make up Air Units
5. Air Handling Units.
6. Fans.
7. Air Filters.
8. Air Terminal Units.
9. Air Inlets and Outlets, including those at hoods

3.08 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.
   6. Service factor.
   7. Starter size, rating, heater elements.
   8. Sheave Make/Size/Bore.

B. V-Belt Drives:
   1. Identification/location.
   2. Required driven RPM.
   3. Driven sheave, diameter and RPM.
   4. Belt, size and quantity.
   5. Motor sheave diameter and RPM.
   6. Center to center distance, maximum, minimum, and actual.

C. Pumps:
   1. Identification/number.
   2. Manufacturer.
   3. Size/model.
   4. Impeller.
   5. Service.
   6. Design flow rate, pressure drop, BHP.
   7. Actual flow rate, pressure drop, BHP.
   8. Discharge pressure.
   9. Suction pressure.
   10. Total operating head pressure.
   11. Shut off, discharge and suction pressures.
   12. Shut off, total head pressure.

D. Air Cooled Condensers:
   1. Identification/number.
   2. Location.
   3. Manufacturer.
   4. Model number.

5. Serial number.
6. Entering DB air temperature, design and actual.
7. Leaving DB air temperature, design and actual.
8. Number of compressors.

E. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

F. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

G. Exhaust Fans:
1. Location.

2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

H. Duct Traverses:
1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.
10. Air correction factor.

I. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
    a. Blower.
    b. Orifice, tube size.
    c. Orifice size.
    d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

J. Air Monitoring Stations:
   1. Identification/location.
   2. System.
   3. Size.
   4. Area.
   5. Design velocity.
   6. Design air flow.
   7. Test velocity.
   8. Test air flow.

K. Flow Measuring Stations:
   1. Identification/number.
   2. Location.
   3. Size.
   4. Manufacturer.
   5. Model number.
   6. Serial number.
   7. Design Flow rate.
   8. Design pressure drop.
   9. Actual/final pressure drop.
   10. Actual/final flow rate.
   11. Station calibrated setting.

L. Terminal Unit Data:
   1. Manufacturer.
   2. Type, constant, variable, single, dual duct.
   3. Identification/number.
   4. Location.
   5. Model number.
   6. Size.
   7. Minimum static pressure.
   8. Minimum design air flow.
   9. Maximum design air flow.
   10. Maximum actual air flow.
   11. Inlet static pressure.

M. Air Distribution Tests:
   1. Air terminal number.

2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

N. Sound Level Reports:
1. Location.
2. Octave bands - equipment off.
3. Octave bands - equipment on.

O. Vibration Tests:
1. Location of points:
a. Fan bearing, drive end.
b. Fan bearing, opposite end.
c. Motor bearing, center (if applicable).
d. Motor bearing, drive end.
e. Motor bearing, opposite end.
f. Casing (bottom or top).
g. Casing (side).
h. Duct after flexible connection (discharge).
i. Duct after flexible connection (suction).
2. Test readings:
a. Horizontal, velocity and displacement.
b. Vertical, velocity and displacement.
c. Axial, velocity and displacement.
3. Normally acceptable readings, velocity and acceleration.
4. Unusual conditions at time of test.
5. Vibration source (if non-complying).

END OF SECTION

SECTION 23 08 00
COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 01 91 13 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 01 91 13.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:

1. Control system.
2. Major equipment items.
3. Variable frequency drives.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

B. Section 01 79 00 - Demonstration and Training: Scope and procedures for District personnel training.

C. Section 23 09 23 - Direct-Digital Control System for HVAC.

D. Section 23 09 13 - Instrumentation and Control Devices for HVAC.

E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - The HVAC&R Technical Requirements for the Commissioning Process.

1.04 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. Draft Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:

1. System name.
2. List of devices.
3. Step-by-step procedures for testing each controller after installation, including:
    a. Process of verifying proper hardware and wiring installation.
    b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
    c. Process of performing operational checks of each controlled component.
    d. Plan and process for calibrating valve and damper actuators and all sensors.
    e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has “passed” and is operating within the contract parameters.
5. Description of the instrumentation required for testing.
6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.

C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.

D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:

1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
2. Full as-built set of control drawings.
3. Full as-built sequence of operations for each piece of equipment.
4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
    a. Floor.
    b. Room number.
    c. Room name.
    d. Air handler unit ID.

e. Reference drawing number.
f. Air terminal unit tag ID.
g. Heating and/or cooling valve tag ID.
h. Minimum air flow rate.
i. Maximum air flow rate.

5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as-built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
    a. Sequences of operation (See EMS plans).
    b. Control drawings.
    c. Points lists.
    d. Controller and/or module data.
    e. Thermostats and timers.
    f. Sensors and DP switches.
    g. Dampers and damper actuators.
    h. Program setups (software program printouts).

E. Project Record Documents: See Section 01 78 00 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.

F. Draft Training Plan: In addition to requirements specified in Section 01 79 00, include:
1. Follow the recommendations of ASHRAE Guideline 1.1.
2. Control system manufacturer's recommended training.
3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.

G. Training Manuals: See Section 01 79 00 for additional requirements.

1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of District.

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to District; such equipment, tools, and instruments are to become the property of District.

PART 3 EXECUTION

3.01 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.

B. Furnish additional information requested by the Commissioning Authority.

C. Prepare a preliminary schedule for HVAC equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.

D. Notify the Commissioning Authority when pipe and duct system testing, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.

E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.

F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.

G. Provide temperature and pressure taps in accordance with Contract Documents.

1. Provide a pressure/temperature plug at each water sensor that is an input point to the control system.

3.02 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.

B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.

C. Provide two-way radios for use during the testing.

D. Valve/Damper Stroke Setup and Check:

1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to District.

3.03 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.

B. Coordinate commissioning schedule with TAB schedule.

C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.

D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.

E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.

F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.

C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.

D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
   1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to District.
   2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.

E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.

F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
   1. Setpoint changing features and functions.
   2. Sensor calibrations.

G. Demonstrate to the Commissioning Authority:
   1. That all specified functions and features are set up, debugged and fully operable.
   2. That scheduling features are fully functional and setup, including holidays.
   3. That all graphic screens and value readouts are completed.
   4. Correct date and time setting in central computer.
   5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to District.
   6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to District.
   7. Power failure and battery backup and power-up restart functions.
   8. Global commands features.
   9. Security and access codes.
   10. Occupant over-rides (manual, telephone, key, keypad, etc.).
   11. O&M schedules and alarms.
   12. Occupancy sensors and controls.
   13. “After hours” use tracking and billing.
   14. Communications to remote sites.
   15. Fire alarm interlocks and response.
   16. Fire protection and suppression systems interfaces.
   17. Security system interlocks.

18. That points that are monitored only, having no control function, are reporting properly to the control system.
19. All control strategies and sequences not tested during controlled equipment testing.
20. Trend logging and graphing features that are specified.
21. Other integrated tests specified in Contract Documents
22. That control system features that are included but not specified to be setup are actually installed.

H. Perform and submit trend logging on the following using the control system, for minimum period of 5 days including one weekend, if the control points are monitored by the control system:
1. Duty cycling, if specified.
2. Demand limiting, including over-ride of limiting.
3. Sequential staging ON of equipment; optionally demonstrate manually.
4. Optimum start-stop functions.
5. Miscellaneous equipment current or status for duty cycling and demand limiting.
6. Equipment or building kW or current for demand limiting.
7. Equipment optimum start/stop functions.

I. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to District.

3.05 OPERATION AND MAINTENANCE MANUALS

A. See Section 01 78 00 for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to District.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to District.

3.06 DEMONSTRATION AND TRAINING

A. See Section 01 79 00 for additional requirements.

B. Demonstrate operation and maintenance of HVAC system to District' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.

C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.

D. Provide classroom and hands-on training of District's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned. Provide the following minimum durations of training:

1. HVAC Control System: [__4__] hours.
2. Air Handling Units: [___4_] hours.
3. Variable Speed Drives: [__4__] hours.

E. TAB Review: Instruct District's personnel for minimum [__2__] hours, after completion of TAB, on the following:

1. Review final TAB report, explaining the layout and meanings of each data type.
2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
5. Other salient information that may be useful for facility operations, relative to TAB.

F. HVAC Control System Training: Perform training in at least three phases:

1. Phase 1 - Basic Control System: Provide minimum of [___4_] hours of actual training on the control system itself. Upon completion of training, each attendee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
   a. This training may be held on-site or at the manufacturer's facility.
   b. If held off-site, the training may occur prior to final completion of the system installation.
   c. For off-site training, Contractor shall pay expenses of up to two attendees.
2. Phase 2 - Integrating with HVAC Systems: Provide minimum of [___8_] hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
   a. The specific hardware configuration of installed systems in this facility and specific instruction for operating the installed system, including interfaces with other systems, if any.
   b. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.

c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.

d. Every display screen, allowing time for questions.

e. Use of keypad or plug-in laptop computer at the zone level.

f. Use of remote access to the system via phone lines or networks.

g. Setting up and changing an air terminal unit controller.

h. Graphics generation.

i. Point database entry and modifications.

j. Understanding DDC field panel operating programming, when applicable.

3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of [_8___] hours of training. Tailor training session to questions and topics solicited beforehand from District. Also be prepared to address topics brought up and answer questions concerning operation of the system.

G. Provide the services of manufacturer representatives to assist instructors where necessary.

H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

END OF SECTION

SECTION 23 09 13
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control panels.

B. Dampers.

C. Damper Operators:

1. Electric operators.

D. Input/Output Sensors:

1. Temperature sensors.
2. Static pressure (air pressure) sensors.
3. Equipment operation (current) sensors.
4. Damper position indicators.
5. Carbon dioxide sensors.

E. Thermostats:

1. Electric room thermostats.
2. Line voltage thermostats.
3. Room thermostat accessories.
4. Outdoor reset thermostats.
5. Airstream thermostats.
6. Heating/cooling valve top thermostats.

F. Time clocks.

G. Transmitters:

1. Building static pressure transmitters.
2. Pressure transmitters.
3. Air pressure transmitters.
4. Temperature transmitters.

H. Flow Sensors:

1. Flow nozzles.
2. Venturi tubes.
3. Airflow measurement array (AFMA).
4. Annular pitot tubes.
5. Orifice plates.

6. Ultrasonic flow meters.

1.02 RELATED REQUIREMENTS

A. Section 23 09 23 - Direct-Digital Control System for HVAC.

B. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

C. Section 26 27 26 - Wiring Devices: Elevation of exposed components.

1.03 REFERENCE STANDARDS

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats.

D. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.04 ADMINISTRATIVE REQUIREMENTS

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

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

D. Samples: Submit two of each type of room thermostat and cover.

E. Design Data: Provide design data for sizing and selection of compressor.

F. Manufacturer's Instructions: Provide for all manufactured components.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

J. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

1. Revise shop drawings to reflect actual installation and operating sequences.

K. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in District's name and registered with manufacturer.

L. Maintenance Materials: Furnish the following for District's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Thermostats and Other Exposed Sensors: One of each type.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section documented experience approved by manufacturer.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Substantial Completion.

C. Provide five year manufacturer's warranty for control air compressors.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

B. NEMA 250, general purpose utility enclosures with enameled finished face panel.

C. Provide common keying for all panels.

2.03 DAMPERS

A. Performance: Test in accordance with AMCA 500-D.

B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gauge, 0.1046 inch.

C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gauge, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.

D. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.

E. Jamb Seals: Spring stainless steel.

F. Shaft Bearings: Graphite impregnated nylon sleeve, with thrust washers at bearings.

G. Linkage Bearings: Graphite impregnated nylon.

H. Leakage: Less than one percent based on approach velocity of 2000 ft per min and 4 inches wg.

I. Maximum Pressure Differential: 6 inches wg.

J. Temperature Limits: Minus 40 to 200 degrees F.

2.04 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
2. Provide one operator for maximum 36 sq ft damper section.

B. Electric Operators:

1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

2.05 INPUT/OUTPUT SENSORS

A. Temperature Sensors:

1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
4. Temperature Sensing Device: Compatible with project DDC controllers.
5. Performance Characteristics:
   a. RTD:
      1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
      2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
      3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
      4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
      5) Range: Minus 40 degrees F through 220 degrees F minimum.
   b. Thermistor:
      1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
      2) Range: Minus 25 degrees F through 122 degrees F minimum.
      3) Heat Dissipation Constant: 2.7 mW per degree C.
   c. Temperature Transmitter:

1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
2) Output: 4 to 20 mA.

d. Sensing Range:
1) Provide limited range sensors if required to sense the range expected for a respective point.
2) Use RTD type sensors for extended ranges beyond minus 30 degrees F to 230 degrees F.
3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.

e. Wire Resistance:
1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.

f. Room Sensors: Locking cover.

g. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.

h. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.

i. Ceiling and Recessed Mount Temperature Sensors: Ceiling-mounted sensor in a low-profile housing.

j. Room Security Sensors: Stainless steel cover plate with insulated back and security screws.

k. Room Temperature Sensors:
1) Construct for surface or wall box mounting.
2) Provide the following:
(a) Setpoint reset slide switch with an adjustable temperature range.
(b) Individual heating/cooling setpoint slide switches.
(c) Momentary override request push button for activation of after-hours operation.
(d) Analog thermometer.

l. Room Temperature Sensors with Integral Digital Display:
1) Construct for surface or wall box.
2) Provide a four button keypad with the following capabilities:
(a) Indication of space and outdoor temperatures.
(b) Setpoint adjustment to accommodate room setpoint, DDC Input/Output Points List, and Sequence of Operation.
(c) Display and control fan operation status.

(d) Manual occupancy override and indication of occupancy status.
(e) Controller mode status.
(f) Password enabled setpoint and override modes.

m. Temperature Averaging Elements:
1) Use on duct sensors for ductwork 10 sq ft or larger.
2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.
3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.

n. Insertion Elements:
1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

B. Humidity Sensors:
1. Duct Mounted Sensor: Voltage type encased in a die-cast metal, weather-proof housing.
a. Input Power, Voltage Type: Class 2; 12-30 VDC/24 VAC, 15mA max.
b. Input Power, mA Type: Class 2; Loop powered 12-30 VDC only, 30 mA max.
c. Output Voltage Type: 3-wire observed polarity.
d. Output mA Type: 2-wire, not polarity sensitive (clipped and capped).
e. Humidity:
1) HS Element: Digitally profiled thin-film capacitive.
2) Accuracy 1 percent at 10 to 80 percent relative humidity at 77 degrees F, multi-point calibration, NIST traceable.
(a) Plus/minus 1 percent at 20 to 40 percent RH in mA output mode; (multi-point calibration, NIST traceable).
3) Scaling: 0 to 100 percent RH.
f. Temperature Effect:
1) Duct Mounted: Plus/minus 0.18 percent per degree F.
2) Outdoor Mounted: 4 to 20mA version: (0.0013x%RHx(TdegreeC-25)).
g. Hysteresis: 1.5 percent typical.
h. Linearity: Included in accuracy specification.
i. Reset Rate: 24 hours.
j. Stability: Plus/minus 1 percent at 68 degrees F (20 degrees C) annually, for two years.
k. Temperature Monitoring:

1) Temperature Transmitter Output: Digital, 4 to 20mA (clipped and capped) or 0-5V/0-10V output.
   (a) HO Transmitter Accuracy: Plus/minus 2.3 degrees F.
   (b) HD Transmitter Accuracy: Plus/minus 1.0 degree F.

l. Operating Environment:
   1) Operating Humidity Range: 0 to 100 percent RH noncondensing.
   2) Operating Temperature Range: Minus 40 degrees F to 122 degrees F.

2. Wall Mounted Sensor: Voltage type encased in a plastic housing.

C. Static Pressure (Air Pressure) Sensors:
1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
3. Accuracy: One percent of full scale with repeatability 0.3 percent.
4. Output: 0 to 5 vdc with power at 12 to 28 vdc.

D. Equipment Operation (Current) Sensors:
1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 inches wg.
2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.

E. Damper Position Indicators: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 to 100 percent damper travel.

F. Carbon Dioxide Sensors, Duct and Wall:
1. General: Provide non-dispersive infrared (NDIR), diffusion sampling CO2 sensors with integral transducers and linear output.
2. Air Temperature: Range of 32 to 122 degrees F.
3. Relative Humidity: Range of 0 to 95 percent (non-condensing).
4. Power Input: Class 2; 12 to 30VDC or 24VAC 50/60 Hz; 100mA max.
5. Calibration Characteristics:
   a. Automatically compensating algorithm for sensor drift due to sensor degradation.
   b. Maximum Drift: 2 percent.
   c. User calibratable with a minimum calibration interval of 5 years.
6. Construction:
   a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.
   b. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.
   c. Housing: High impact plastic.

7. Optional Equipment
    a. Temperature Sensor:
        1) Solid state, integrated circuit; Accuracy: Plus/minus 1 degree F; Resolution: 0.2 degrees F; Output Range: 50 to 95 degrees F.

2.06 THERMOSTATS

A. Electric Room Thermostats:
    1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
    2. Service: Cooling and heating.
    3. Covers: Locking with set point adjustment, with thermometer.
B. Line Voltage Thermostats:
    1. Integral manual On/Off/Auto selector switch, single or two pole as required.
    2. Dead Band: Maximum 2 degrees F.
    3. Cover: Locking with set point adjustment, with thermometer.
    4. Rating: Motor load.
C. Room Thermostat Accessories:
    1. Thermostat Covers: Brushed aluminum.
    2. Insulating Bases: For thermostats located on exterior walls.
    3. Thermostat Guards: Metal mounted on separate base.
    4. Adjusting Key: As required for device.
    5. Aspirating Boxes: Where indicated for thermostats requiring flush installation.
D. Outdoor Reset Thermostats:
    1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
    2. Scale range: Minus 10 to 70 degrees F.
E. Airstream Thermostats:
    1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
    2. Averaging service remote bulb element: 7.5 feet.
F. Heating/Cooling Valve Top Thermostats:
    1. Proportional acting for proportional flow, molded rubber diaphragm, remote bulb liquid filled element, direct and reverse acting at differential pressure to 25 psig, cast housing with position indicator and adjusting knob.

2.07 TIME CLOCKS

A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple

switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.

2.08 TRANSMITTERS

A. Building Static Pressure Transmitters:

1. One pipe, direct acting, double bell, scale range 0.01 to 6.0 inch wg positive or negative, and sensitivity of 0.0005 inch wg. Transmit electronic signal to receiver with matching scale range.

B. Pressure Transmitters:

1. One pipe direct acting indicating type for gas, liquid, or steam service, range suitable for system, proportional electronic output.

C. Air Pressure Transmitters:

1. General: Provide dry media differential pressure transducers to monitor duct and room pressure.
    a. Media Compatibility: Dry air.
    b. Input Power: Class 2; 12 to 30 VDC; 2-wire: 20 mA max.
    c. Output: Field selectable, 2-wire, loop-powered 4 to 20 mA (DC only, clipped and capped).
    d. Pressure Ranges: 4 and 7, field selectable.
    e. Response Time:
        1) Standard: T95 in 20 seconds.
        2) Fast: T95 in 2 seconds.
        3) Switch selectable.
    f. Mode: Switch selectable, unidirectional.
    g. Display:
        1) Signed 3-1/2 digit LCD, indicates pressure.
        2) Over-range indicator.
    h. Proof Pressure (pressure differential): 3 psid.
    i. Burst Pressure (pressure differential): 5 psid.
    j. Accuracy: Plus/minus 1 percent f.s. (full scale) of selected range (combined linearity & hysteresis).
    k. Temperature Effect (per transmitter size):
        1) 1 inch w.c.: 2.0 percent per degree C.
        2) 10 inch w.c.: 0.01 percent per degree C.; (Relative to 25 degrees C) 32 degrees F to 122 degrees F.
    l. Zero Drift (1-year) (per transmitter size):
        1) 1 inch w.c.: 2 percent maximum.

2) 10 inch: 0.05 percent maximum.

m. Zero adjust: Pushbutton auto-zero and digital input (2-pos terminal block).

n. Operating Environment:

1) 32 degrees F to 140 degrees F.

2) 0 to 90 percent RH noncondensing.

o. Fittings:

1) Brass barb.

2) 0.24 inches outer diameter.

3) UL 94 V-O fire retardant ABS.

D. Temperature Transmitters:

1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degrees F span and plus or minus 1 percent for 50 degrees F span, with 50 degrees F. temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig input pressure and 3 to 15 psig output.

E. Humidity Transmitters:

1. One pipe, directly proportioned output signal to measured variable, linearity within plus or minus 1 percent for 70 percent relative humidity span, capable of withstanding 95 percent relative humidity without loss of calibration.

2.09 FLOW SENSORS

A. Flow Nozzles:

1. Fabricate flow nozzle from austenitic stainless steel with an accuracy of plus/minus 1 percent of full flow.

2. Inlet Nozzle: Elliptical with the nozzle throat to be the quadrant of an ellipse.

3. Thickness of the nozzle wall and flange to be such that distortion of the nozzle throat from strains caused by the pipeline pressure and temperature, flange bolting, or other methods of installing the nozzle in the pipeline must not cause the accuracy to degrade beyond the specified limit.

4. Outside Diameter of the Nozzle Flange or Design of the Flange Facing: Nozzle throat to be centered accurately in the pipe.

B. Venturi Tubes:

1. Fabricate the venturi tube from cast iron with an accuracy of plus/minus 1 percent of full flow.

2. Line the throat section with austenitic stainless steel.

3. Thermal Expansion Characteristics of the Lining: Same as that of the throat casting material.

4. Machine the surface of the throat to plus/minus 50 micro-inches including the short curvature leading from the converging entrance section into the throat.

C. Airflow Measurement Array (AFMA):

1. Airflow Straighteners:

a. Provide AFMA's with an airflow straightener if required by the AFMA manufacturer's published installation instructions.

b. In the absence of published documentation, provide airflow straighteners if there is any duct obstruction within 5 duct diameters upstream of the AFMA.

c. Straightener: Contained inside a flanged sheet metal casing, with the AFMA located as specified according to the published recommendations of the AFMA manufacturer.

d. Construction to consist of 0.125 inch aluminum honeycomb with the straightener depth not less than 1.5 inches.

2. Outdoor Air Temperature: In outside air measurement or in low-temperature air delivery applications, provide an AFMA certified by the manufacturer to be accurate as specified over a temperature range of minus 20 degrees F to 120 degrees F.

3. Airflow Resistance:

a. Resistance to Airflow Through the AFMA and the Airflow Straightener: Not to exceed 0.085 inches at an airflow velocity of 2000 fpm.

b. AFMA Construction: Suitable for operation at air flows of up to 5000 fpm over a temperature range of 40 degrees F to 120 degrees F.

4. Pitot Tube:

a. Furnish each pitot tube AFMA with an array of velocity sensing elements.

b. Velocity Sensing Elements: Multiple pitot tube type with averaging manifolds.

c. Distribute the sensing elements across the duct section in the pattern and quantity specified or as recommended by the installation instructions of the AMFA manufacturer.

1) Pitot Tube AFMA's in Air Flows Over 600 fpm: Accuracy of plus/minus 5 percent over a range of 500 fpm to 2500 fpm.

2) Pitot Tube AFMA's in Air Flows Under 600 fpm: Accuracy of plus/minus 5 percent over a range of 125 fpm to 2500 fpm.

5. Electronic:

a. Each electronic AFMA to consist of an array of velocity sensing elements of the resistance temperature detector (RTD) or thermistor type.

b. Sensing Elements: Distributed across the duct cross section in the quantity and pattern specified or recommended by the published application data of the manufacturer.

c. Electronic AFMA's: Accuracy of plus/minus 5 percent over a range of 125 fpm to 5,000 fpm and temperature compensated output over a range of 32 degrees F to 212 degrees F.

D. Annular Pitot Tubes:

1. Fabricate the annular pitot tube from austenitic stainless steel with an accuracy of plus/minus 2 percent of full flow and a repeatability of plus/minus 0.50 percent of measured value.
2. Unit to have at least one static port with no less than four total head pressure ports with an averaging manifold.

E. Orifice Plates:
1. Fabricate orifice plate of austenitic stainless steel sheet of 0.125 inches nominal thickness with an accuracy of plus/minus 1 percent of full flow.
2. Configuration: Flat plate within 0.002 inches.
3. Orifice Surface Roughness: Not-to-exceed 20 micro-inches.
4. Orifice Cylindrical Face Thickness: Not-to-exceed 2 percent of the pipe inside diameter or 12.5 percent of the orifice diameter, whichever is smaller.
5. Upstream Edge of the Orifice Plate: Utilize in all applications except steam flow measurement in horizontal pipelines.

F. Ultrasonic Flow Meters:
1. Provide ultrasonic flow meters complete with matched transducers, self aligning installation hardware, and transducer cables.
2. Optimize ultrasonic transducers for the specific pipe and process conditions for the application.
3. Flow Meter Accuracy: Plus/minus 1 percent of rate from 0.98 fps to 40 fps.
4. Include dry contact outputs, 4 to 20 mA, 0 to 10 VDC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that systems are ready to receive work.
C. Beginning of installation means installer accepts existing conditions.
D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
F. Ensure installation of components is complementary to installation of similar components.
G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats. Refer to Section 26 27 26.

C. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

D. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

E. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

F. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

G. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.03 MAINTENANCE

A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

C. Provide service and maintenance of control system for one year from Date of Substantial Completion.

END OF SECTION

SECTION 23 09 23
DIRECT-DIGITAL CONTROL SYSTEM 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 manufacture representative.

C. Work specified under this section shall be performed by, or under the direct supervision of the local controls manufacture representative, or by a contractor that is certified by the controls manufacture to perform all work within Section 23 09 13 Instrumentation and Control for HVAC and those sections of 23 09 13 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 all operator workstation, controllers, routers and repeaters required for this project.

1.02 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 databases backup
2. Source files for all custom written controller applications
3. Source files for graphics if required for this project

1.03 WARRANTY

A. Components, system software, and parts shall be guaranteed against defects in materials, fabrication, and execution for (1) year 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.

1.04 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 (8) 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.

1.05 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

A. DDC Equipment: Basis of Design, Carrier OPEN BACnet Controls. Any substitution shall be approved equals and meet the substitution procedures outlined in Section 01 60 00 -3.01. Controls must be compatible and able to interface with existing District EMS server and rooftop package units, makeup air units and exhaust fans .

B. Controls installation will be by a Certified CONTROLS EXPERT DEALER.

C. 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 Control 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. 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 a split core design current sensing sensor. 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; Type 4, 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. Reuse existing conduit paths when possible. 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 74 50
CUSTOM MULTIZONE UNITS - HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Air conditioning equipment as indicated on drawings and as specified. Air conditioning equipment shall include but not be limited to the following:

1. Custom package rooftop multizone air conditioning unit.

1.02 REFERENCES

A. Air Movement and Control Association International (AMCA):

1. 211 - Certified Ratings Program - Product Rating Manual for Fan Air Performance.

2. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

3. AMCA 301 – Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

B. Air Conditioning and Refrigeration Institute (ARI):

1. ARI 410 - Forced Circulation Air-Cooling and Air-Heating Coils.

C. American Society for Testing and Materials International (ASTM):

1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

2. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratories, Inc. (UL):

1. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

3. UL 1995 - Standard for Safety Heating and Cooling Equipment.

E. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE):

1. ASHRAE Standard 62 - Ventilation for Acceptable Indoor Air Quality.

F. National Electrical Manufacturers Association (NEMA):

1. NEMA - Table 12-10.

1.03 SUBMITTALS

A. Manufacturer's Data:

1. Complete materials list of items proposed to be furnished and installed under this section. Materials lists, which do not require performance data, shall include manufacturer's name, type, and model number for indicated installation.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements. Literature shall include descriptions of equipment, types, models and sizes proposed, capacity tables or curves marked to indicate performance characteristics, electrical requirements, options selected, space requirements and other data necessary to ensure compliance with requirements of this Specification and performances indicated on Drawings.

3. Provide data of filter media, filter performance data, filter assembly, and filter frames.

B. Shop Drawings indicating methods of installation of equipment and materials, and details of supporting structures for items indicated. Items to be submitted shall include but not be limited to the following:

1. Layout Drawings of Equipment: Include plans, elevations and sections, of proposed equipment drawn to scale, to establish which equipment shall fit in allotted spaces with clearance for installation and maintenance. Indicate proposed details for attachment. Indicate vibration isolation units, foundations, supports, and openings for passage of pipes and ducts.

2. Electrical interlock or control diagrams for electrically controlled components furnishing more than one automatic or manual control devices, which are not indicated on Drawings.

C. Manufacturer's Recommended Installation Procedures: Manufacturer's recommended installation procedures, when reviewed by the Architect shall become basis for inspecting actual installation procedures provided.

D. Operations and Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts list and wiring diagrams.

1.04 QUALITY ASSURANCE

A. Factory Operational Test: Manufacture shall conduct a full cooling and heating operational test on the unit, for a minimum of four (4) hours, before it leaves the factory. A written test report shall be prepared by the manufacturer and submitted to the owner.

B. High Ambient Operation: The equipment manufacturer shall verify operational ability to 115°F. An operational factory test shall raise the head pressure to the equivalent of 115°F

to simulate operating conditions. They will then verify operation and that the compressor circuits will pump down without issue. A written test report shall be prepared by the manufacturer and submitted to the owner.

1.05 PROJECT RECORD DOCUMENTS

A. Provide Owner instructions on equipment operation and maintenance procedures.

1.06 SUBSTITUTION

A. The product named on the equipment schedule is the basis of design and the use of any item other than that named product may require modifications of the design. If Contractor uses any product, material or equipment other than that named on the schedule, Contractor shall, at least 10 days before bid time, along with request for equipment substitution, provide the following:

1. Contractor to provide all technical data including drawings, performance, specifications, complete control sequence, system performance data, energy analysis, dimensional and weight information of proposed equipment showing a clear understanding and compliance with the requirements of the replacement project.

2. Contractor to provide at least five successful multi-zone package unit replacement jobs with contact name and phone number.

3. Contractor to provide an itemized list of any exceptions taken to the base bid specification.

4. Contractor to provide a letter from an officer of the multi-zone package unit manufacturer stating that the exceptions listed are the only deviations from the specifications.

5. Contactor to provide seismic drawings and calculations, stamped by a registered professional structural engineer, showing the attachment of the new units to the existing curbs or equipment pads per applicable codes.

6. Contractor to provide equipment manufacturer's letter standing compliance with delivery requirements as indicated in these bid documents.

7. Owner representative's decision on the merits of the substitution request shall be final. An approval of any substitute equipment shall not void compliance with all aspects of these specifications.

8. Once reviewed and if approved, equipment substitution information shall be issued to all bidding contractors so as not to give an unfair advantage in bidding process.

B. If the Contractor uses a product, material or equipment other than that named on the equipment schedule, Contactor shall, at its sole cost:

1. Make all revisions and modifications to the design and construction of the Work necessitated by the use the product, material or equipment.

2. Be responsible for all costs of any changes resulting from the use of the product, material or equipment including without limitation, costs or changes which affect other parts of the Work, the work of Separate Contractors, or any other property or operations of the owner.

3. If more than 2 submissions of supporting data are required, the cost of reviewing the additional supporting data shall be at Contractor's expense.

C. Owners Representative may reject any substitution not proposed in the manner and within the time limits prescribed herein.

D. If a substitution request is finally rejected by the Owners Representative, Contractor shall furnish and install the specified product, material, or equipment as shown on the equipment schedule. Contractor will still need to comply with all submittal requirements (including submittal and project deadlines).

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Capacities of air conditioning and air handling equipment as indicated on Drawings are the net capacities actually required. Standard catalog ratings shall be adjusted to actual project site environmental conditions.

B. Approved Manufacturers:

1. SEASONS-4, Contact Stephen Bayer, 714-655-6530

2. Buffalo, Governaire, Huntair

2.02 MULTIZONE UNITS

A. General and special requirements

1. Replacement: The multi-zone package unit rooftop equipment shall have the design and construction in accordance with all applicable codes and standards. The equipment shall comply with the requirement and terms of ETL's Listing and Labeling. The complete unit shall bear the ETL Label. The unit shall comply with the requirements of CEC Title 24, UL, and AGA.

2. The new units shall be designed to exactly match the existing curbs, ducts, electrical, gas and condensate drain connections as shown on the drawings.

3. Prior to the design and construction of the new replacement units, the multi-zone unit manufacturer shall send a factory specialist to the project to measure the existing units' ducts, utility connections, etc. The contractor is responsible for submitting to

the engineer written proof that the visit by the multi-zone unit manufacturer has taken place and that the multi-zone units will exactly match existing conditions.

4. The Contractor/manufacturer shall design, build, and deliver a complete custom designed unit within 48 weeks after receiving a contract purchase order. The entire unit shall be fabricated in the same manufacturing facility. Units requiring field assembly of sections are not acceptable.

5. Manufacturer shall have a minimum of 10 years documented custom DX multi-zone unit experience which includes fabrication and use of its own condensing sections.

B. Exterior casing and frame construction

1. The unit frame shall be constructed of heavy gauge aluminum with a formed galvanized steel base, be electrically welded. Construction of base frame shall provide an integral curb counter flashing for positive curb positioning. Heavy duty lifting brackets shall be welded to the base frame for rigging unit into position.

2. The unit's bulkheads shall be constructed of heavy gauge Series 3003 aluminum and all exterior panels shall be fabricated from 0.040", thick Series 3105 aluminum, galvanized steel is not acceptable.

3. The aluminum casing shall be painted with a corrosion inhibitive primer (.020 mils) and a finish coating (.08 mils) of a fluropolymer coating containing 70% KYNAR 500 resin. The finish coat shall pass a 3000-hour salt spray resistance test per ASTM B117-90. Color shall be 'tan' or owner selected color. Painted galvanized steel is not acceptable. Aluminum panels shall be fastened to the frame with stainless steel screws and isolated from the steel frame with dielectric gaskets to prevent galvanic corrosion.

4. The roof of the unit shall be pitched to provide positive drainage. Top seams shall be covered with cap strips to prevent water leakage into the unit. The floor of each section shall have a galvanized steel deck to isolate the entire unit from the building. All seams shall be caulked with silicone inside and out to prevent air and water leakage.

5. Full height, walk-in access doors shall be provided for all sections housing components that require routine maintenance. Doors shall be supported on hinges and have a single-handle, multi-latch closure system. Doors shall be equipped with stainless steel door hold-backs.

6. All roofs, walls, floors and doors shall be double wall construction enclosing 2" thick, Polyphenyl foam injected insulation with an insulation value of R-13. Liners shall be 0.030 thick aluminum sheet metal to protect the insulation during routine maintenance to the unit, galvanized steel is not acceptable.

7. Provide 'Hydra-Zorb' refrigerant pipe insulation clamps.

C. Air cooled condensing section

1. The air cooled condensing section shall be designed and manufactured by the unit manufacturer. "Third party" condensing units bolted on the frame are not acceptable. The condensing section shall have full height hinged service access doors, identical to air handling section. Provide walk-in service vestibule when unit size permits. The floor of the air-cooled condenser section shall be crowned for water drainage and constructed of aluminum to resist the corrosive effects of the weather. All refrigerant piping shall be installed and leak tested in the factory prior to shipment of the complete unit.

2. Construction of condensing section shall be identical to that described in Section 2.02.B.1 thru 7.

3. Unit shall the number of compressors as listed on the schedule. Compressors shall be heavy duty suction cooled, hermetic scroll type complete with forced feed lubrication, suction and discharge service valves, suction strainer, crankcase heater, and 3 phase solid state thermal motor protection. The compressors shall be mounted on rubber in shear isolators to prevent transmission of any noise and vibration to the space below. The lead compressor shall be a modulating scroll compressor to enable operation at low load conditions and for efficient unloading down to 4 to 1 nominal capacity.

4. All compressors shall have independent refrigerant circuits and be completely piped, tested, dehydrated and fully charged with oil and R-410a refrigerant. Brazing of refrigerant piping shall be done with the proper application of nitrogen. The refrigeration circuit components shall include compressor, condenser with integral liquid sub-cooling, liquid line service and charging valve, replaceable core filter drier in the liquid line, filter in the suction line, liquid line sight glass and relief valve, thermostatic expansion valve with removable/replaceable power head element.

5. The air-cooled condenser coils shall be a minimum of six rows deep and have copper tubes expanded into a maximum of twelve aluminum fins per inch. Coils shall be tested at 550 PSIG and mounted vertically for complete surface utilization. Coils shall be counter flow with a minimum of 10 degrees of liquid sub-cooling and have adequate capacity to dissipate the total heat rejection of the system at design conditions. Condenser coils shall have 11 gauge aluminum vandalism guards to protect the coils from vandalism and weather related damage.

6. The air-cooled condenser coils shall be coated with Electro-Fin Coating:
   a. Coating Materials - The materials shall be a cathodic epoxy electrodeposition coating formulated for high edge build consisting of composition as noted below.
   b. Resin feed component - The resin feed component shall consist of an epoxy or an epoxy-urethane resin combined with the necessary amounts of flow control agents.
   c. Pigment paste component - The pigment paste shall consist of a resin as above, volatile solvents, titanium dioxide and siliceous extenders. Hexavalent

chromate, zinc chromate, or lead pigments shall not be used alone or as a component part of any pigment.

d. Refrigerant Coils - Refrigerant coils contain a charge of dry nitrogen and are capped and sealed. Seals are not to be broken. Both connection ends are to be masked for a minimum distance of 1.0 inch.
e. Coil Connections - Coils shall be inspected for open tubes, headers, and capillary tubes and sealed to prevent contamination of cleaning or coating solutions to the interior coil surfaces.
f. Cleaning - Cleaning shall include complete coil immersion in a heated alkaline cleaning solution to remove light fin lubricants, machining oils, and residual factory contamination. The cleaning immersion shall be followed by complete coil immersion in fresh city water to neutralize and remove residual alkaline solution.
g. Coating - The coil shall be completely immersed in the coating bath including headers, casing and heat exchanger surfaces. The coating shall be electrodeposited to obtain a nominal dry film thickness of .001" +/- .0002" (mils). The coating shall be free from voids, checks, cracks, and blisters. The quality and application shall be such that any portion of the coil will meet a minimum 2000 hours of 5% salt spray testing to American Society for Testing and Materials (ASTM) B117 under the following criteria:
h. No loss of coating adhesion and no evidence of attack to the fin proper. Only 5% of the fin collars may show corrosion product.
i. Complete deterioration of the sample in any location is considered failure of the part on this test, and shall be cause for rejection.
j. Baking - The coating shall be cured by baking at a metal temperature not to exceed 400° F.
k. Allow the coil to cool to ambient temperature of 65-95o F. A soft cloth or laboratory tissue should be saturated with Acetone. Applying medium pressure with the index finger, rub the same area of the primer for a minimum of 40 strokes (movement in one direction). Examine the coating for loss of film. The coating shall show no film softening when compared to an untested portion of the panel. Nonconformance shall constitute failure of this test and the coil shall be placed in bake oven for additional cure time and re-tested for conformance.
l. Process Quality - The coating process shall be carefully established and controlled to assure consistent and repeatable results. This includes documentation of coating composition, temperature, pH, and conductivity, including pretreatment of parts and baking procedures. All measuring and test equipment shall be calibrated and traceable to (National Institute of Standards and Testing) N.I.S.T.
m. No fin areas shall be bunched together, spread apart, cocked, or bowed. No fins shall be movable by hand on tubes, torn or buckled. Fins shall be straightened before the coil is shipped. When coils are direct shipped to the customer instead of the manufacturing facility originating the Purchase Order, the supplier shall document and notify the manufacturer Quality Assurance prior to shipping, if over 5% of the total face area of a coil requires straightening of fins.

7. Condenser fans shall be steel coated with epoxy enamel and have a steel hub locked on a stainless steel motor shaft with a keyway and square head set screws. Fans shall

have a radius spun venturi for efficient performance. Fans shall have vinyl coated OSHA type inlet and outlet guards capable of being removed for service without removing the fan motor. Fans shall be direct driven by NEMA constructed, three phase motors operating at 1140 RPM. Motors shall have stainless steel shafts to prevent "rust welding" of the fan hubs to the shaft. Each motor shall have a shaft slinger to prevent water seepage into the motors. Condenser head pressure shall be controlled and maintained down to an ambient of 50 degrees Fahrenheit by the application of a Variable Frequency Drive (VFD) controlling the speed of all condenser fans simultaneously. For the VFD, provide manual bypass and line reactors. A condenser fan staging controller shall also be included for fan cycling in case of a VFD failure. Variable Frequency Drive (VFD) manufacturer shall be ABB.

8. Compressor sound wraps shall be provided to reduce radiated sound from compressors. Compressor sound wraps shall be made from reinforced vinyl sewn around a 2.0 lb density fiberglass blanket plus 12 oz. load barrier material.

D. Cooling coil section

1. Cooling coil shall be installed downstream of the supply air blower and parallel with the heating section. Coils shall be direct expansion type and constructed of seamless copper tubes expanded into aluminum fins and be provided with thermostatic expansion valves with provision for superheat adjustment and external equalizer. Coils shall be tested at 550 PSIG and mounted vertically for complete surface utilization.

2. Provide capillary tube plastic covers to prevent rubbing.

3. The drain pans shall be 316 stainless steel and known as the Indoor Air Quality (IAQ) type that insures that no standing condensate ever remains in the pan. The drains for the main IAQ pan shall be metallic and extend through the side of the unit.

4. The coil casing shall be 316 stainless steel.

E. Gas Heating Section

1. The heater must be installed downstream of the supply air blower and parallel with the cooling section.
2. The heater shall be natural gas indirect gas fired Heatco Module(s) with minimum efficiency of 81% and capacity as required for the individual project. The module shall employ a stainless-steel tubular heat exchanger and a draft inducer assembly to provide for positive venting of the flue gases.
3. Burner assemblies shall employ inshot type burners constructed of aluminized steel body and sintered metal flame holder with integral carryover plenum. The burner shall be a Recognized Component by Intertek Testing Service (ITS / ETL).
4. The gas train shall be complete with a modulating gas valve for each heat exchanger and be ready for connection to a natural gas supply with pressure between 7" and 14" W.C.

5. Standard controls shall include combination redundant gas valve consisting of combination pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shut off, and manual shut off all in one body. Each gas train shall have its own shut-off valve.

F. Multi-Zone Damper Section

1. Units shall have factory mounted triple-deck, multi-zone damper in the hot and cold deck for each zone.

2. Dampers shall be linked together to provide individual zone control with a single factory mounted electric operator and wired for each zone.

3. Damper shafts shall be mounted in permanently lubricated Nylon, Turcite or Teflon bearings to assure smooth operation. Damper blades shall operate without clatter or binding.

4. The cold deck, bypass deck, and hot deck shall be separated by double wall insulated dividers.

5. Provide a single actuator to operate each zone's hot/bypass/cold deck. Separate actuators for hot and cold decks are not acceptable.

6. All damper actuators to have complete and easy access for service and maintenance.

G. Supply air blower section

1. The supply air blower shall be a single width/single inlet airfoil backward inclined plenum type, secured to a machined, ground and polished solid steel shaft. The shaft shall be coated with a rust inhibitor. The complete blower assembly shall be dynamically balanced.

2. Motors shall be premium efficiency heavy duty totally enclosed fan cooled, 3-phase, 1800 rpm, mounted on a heavy duty sliding base. Motor and blower assembly shall be mounted on a heavy duty steel frame supported by 2" deflection springs designed for 90-98% isolation efficiency. In addition to the spring isolators, the blower assembly shall have seismic restraints designed for Seismic Zone 4.

3. Blower drive shall be a direct drive motor.

4. Blower shall be connected to a direct drive, heavy inverter ready, premium efficiency totally enclosed fan cooled, 3-phase, 1800 rpm motor. Motor and blower assembly shall be mounted on a heavy duty steel frame base supported by 2 " deflection springs designed for 90-98% isolation efficiency. In addition to the spring isolators, the blower assembly shall have seismic restraints designed for Seismic Zone 4.

5. Blower speed shall be controlled by an ABB variable frequency drive (VFD), factory mounted & wired in a flush mounted unit control panel. Mounting the drive on the

outside of the unit is unacceptable. The drive shall be an advanced microprocessor type utilizing a PWM/Voltage Vector design technique. Six step and current source drives are not acceptable. The drive shall be furnished with manual bypass and line reactors. Unit shall include controls to provide variable air volume and maintain constant static pressure at the unit. Provide a manually reset adjustable range high pressure safety switch to prevent excessive pressure build up.

6. Supply air blower section shall be lined with an additional 2", 3-lb. density insulation protected by a perforated aluminum liner with perforations selected for maximum sound attenuation.

7. Provide a motor trolley to lift motor out of motor mounts and trolley it out to edge of access door.

H. Power return air section

1. The return air blower shall be a single width/single inlet airfoil backward inclined plenum type, secured to a machined, ground and polished solid steel shaft. The shaft shall be coated with a rust inhibitor. The complete blower assembly shall be dynamically balanced.

2. Motors shall be premium efficiency heavy duty totally enclosed fan cooled, 3-phase, 1800 rpm, mounted on a heavy duty sliding base. Motor and blower assembly shall be mounted on a heavy duty steel frame supported by 2” deflection springs designed for 90-98% isolation efficiency. In addition to the spring isolators, the blower assembly shall have seismic restraints designed for Seismic Zone 4.

3. Blower drive shall be a direct drive motor.

4. Blower shall be connected to a direct drive, heavy inverter duty, premium efficiency totally enclosed fan cooled, 3-phase, 1800 rpm motor. Motor and blower assembly shall be mounted on a heavy duty steel frame base supported by 2 " deflection springs designed for 90-98% isolation efficiency. In addition to the spring isolators, the blower assembly shall have seismic restraints designed for Seismic Zone 4.

5. Blower speed shall be controlled by an ABB variable frequency drive (VFD), factory mounted & wired in a flush mounted unit control panel. Mounting the drive on the side of the unit is unacceptable. The drive shall be an advanced microprocessor type utilizing a PWM/Voltage Vector design technique. Six step and current source drives are not acceptable. The drive shall be furnished with manual bypass and line reactors. Unit shall include controls to provide variable air volume and maintain constant static pressure at the unit. Provide a manually reset adjustable range high pressure safety switch to prevent excessive pressure build up.

6. Power return air section shall be lined with an additional 2", 3-lb. density insulation protected by a perforated aluminum liner with perforations selected for maximum sound attenuation.

I. Filter section

1. The filter sections shall include UL Class 2, 2" thick MERV 13 panel type filters. Access for filter maintenance shall be through a full height service door on the side of the unit. Filter support rails shall include slide out "pulls" to facilitate removal of the filters. The filter rack shall be convertible to 4" filters.

2. Provide filter gauge, magnehelic type (Dwyer 200) mounted in control panel.

J. Return air/outside air/exhaust air section (economizer)

1. Outside air intake shall have stormproof louvers or hoods sized to prevent entrainment of rain water into the unit and shall include an aluminum bird screen.

2. Outside air intake shall be located on the opposite side of the unit from the exhaust air discharge.

3. Outside and return air dampers shall have factory mounted and wired electric operators.

4. Damper shafts shall be mounted in permanently lubricated nylon bearings to assure smooth operation. Damper blades shall operate without clatter or binding.

5. Motorized dampers shall be low leakage type limiting leakage to 6 CFM per square feet at a pressure differential of 4 inches.

6. Exhaust dampers shall be gravity relief type with a hood to divert rain from the face of the dampers.

K. Minimum ventilation section

1. In addition to the standard modulating economizer outside air damper, the unit has a non-motorized adjustable outside air damper with a locking quadrant to set the minimum ventilation CFM for the unit. This damper is sized to handle a nominal 450 CFM per classroom. Its actual operating CFM shall be set at the jobsite.

L. Main Control Panel

1. The unit shall have a single point electrical power connection in the same location as the unit being replaced. The new unit shall be able to utilize the same power wiring as the unit being replaced. The main control panel shall be a flush mounted weatherproof enclosure including a thru the door fused disconnect switch mounted in the front of the panel.

2. All components shall be identified with nametags and wired in accordance with the National Electric Code. The main control panel shall include the following:
   a. A terminal block for single point power supply with fuses for all branch circuits.
   b. A 24-volt control transformer and 24-volt field wiring control terminal strip. Terminals shall be numbered for field connection of all controls in accordance with the wiring diagram.

c. All wiring shall be numbered and color-coded.
d. A phase failure and low voltage protection relay.
e. All refrigeration safety and operating controls.
f. Wiring diagrams shall be laminated to the control panel door.
g. A service light with switch and a 115-volt, 10-amp Ground Fault Interrupted convenience outlet, factory mounted and wired to its own transformer in accordance with the NEC.
h. The unit shall have toggle switches for: controls and compressors “auto/off”; VFD “auto/bypass”; digital scroll “reset”; and unit “enable/disable”.
i. ABB VFDs for condenser, supply, return or exhaust fans including full 3 contactor manual bypass with necessary disconnects, 100 ka SCCR for both drive and bypass.
j. Compressor motor starters.
k. Condensing unit low ambient lockout set at 50 degrees F.
l. Condenser fan Variable Speed Drive (VSD) and bypass default mild weather switches.
m. The unit shall have a DDC controlled Night Purge Cycle (NPC) to allow the unit to schedule ventilation of the building during the unoccupied mode.
n. The unit shall have a LCD Digital display to allow monitoring and control of basic unit functions. All I/O points and setpoints shall be accessible through the display. The display shall be password protected to prevent unauthorized parameter changes

3. To continue District-wide multizone control standardization, the controller shall include the Direct Digital Controller, to comply with District requirements and the CEC Title 24 Code. The Control system cost shall be included in the basic equipment cost. The DDC control system shall be capable of communicating with BACnet, N2 Bus, Modbus protocols for future BMS integration.

4. Multizone Direct Digital Control: The control system shall be furnished with new Room Sensors.

5. The above components are in addition to electrical components associated with other sections required to accomplish the sequence of control specified below.

M. Other controls

1. Unit shall have terminal strips and interlocking relays factory mounted and wired to interlock with other components of the building. It will be the responsibility of Maintenance and Operations Branch and installing Contractors to advise the equipment supplier of any requirements for any additional interlocks not covered in this specification.

2. Photoelectric type smoke detectors shall be mounted and wired in the supply and the return air openings to the unit. Upon detection of smoke, fans shall stop and a signal shall be sent to the building fire alarm system. If smoke detectors are required to be compatible with a building fire alarm system, the equipment supplier will be advised

of any special mounting or wiring requirements to assure compliance with the requirements of the fire alarm supplier.

N. Installation

1. The equipment manufacturer shall send an installation expert to the job site to advise on proper rigging and alignment of the equipment. The Maintenance and Operations Branch personnel and/or Installing Contractor shall be advised of rigging and installation requirements prior to shipment of the equipment to the job site.

O. Check, test, startup and warranty

1. Units shall be run tested at the factory for a minimum of four hours and the operation of all functions, safeties, devices, etc, shall be verified. Operational test sheets shall be provided upon request.

2. The manufacturer shall have trained and authorized service personnel with documented ten years of service experience on multi-zone and custom air-handler located in the Southern California area for testing and startup of the equipment that is available 365 days a year from 6 AM to 5 PM. The manufacturer's service representative shall provide a written record for each unit to the owner's representative for unit startup information.

3. Equipment shall have a standard twenty-four (24) month parts and labor warranty. The equipment manufacturer shall be responsible for warranty service during the first twenty-four (24) months of equipment operation. The equipment manufacturer shall respond to a warranty call within 4 hours from receiving such call from the District. If OEM replacement parts are needed, then three (3) days from the response time will be allocated for replacement.

4. The compressors shall have a five (5) year parts and labor warranty provided by the equipment manufacturer.

5. The gas heat exchangers must have a ten (10) year parts warranty provided by the equipment manufacturer.

6. The external unit cabinetry shall have a fifteen (15) year warranty provided by the equipment manufacturer against defects, workmanship and corrosion.

7. The Direct Digital Controller shall have a five (5) year parts and labor warranty provided by the equipment manufacturer.

8. The fan motors shall have a three (3) year parts warranty provided by the equipment manufacturer.

9. All parts shall be available at the local wholesaler level. No proprietary OEM parts are allowed

P. Maintenance

1. Provide a twenty-four (24) month (to coordinate with twenty-four (24) month labor warranty) standard maintenance services agreement, tri-annual (August-September, December-January, April-May) on all unit manufacturers' equipment including, but not limited to, the following. Correct any items that are not within factory tolerances.

    a. Check unit proper operation
    b. Check electrical circuits for blown fuses, tripped overloads, etc.
    c. Check tightness & condition of blower fan belts & pulleys
    d. Lubricate bearings per factory recommended schedule
    e. Check motor mountings
    f. Check damper linkage
    g. Check refrigerant levels (keep records for audits if charging required)
    h. Check condenser & evaporator coils for dirt & debris (April-May)
    i. Check OSA & EA grilles for dirt & debris (clean if necessary)
    j. Change filters with same efficiency filters (every scheduled visit)
    k. Check access doors for air leaks (correct if leaking)
    l. Refer to manufacturer's recommended maintenance procedures

2. Services shall be provided during normal business hours.

Q. Unit replacement coordination

1. Unit shall match existing roof curb and shall be a weather tight installation without the use of a curb adaptor or modifications to roof or roof support.

2. Roof curb gasket shall be provided and shipped with unit.

3. Unit shall match existing duct connections (as close as possible) and shall require only minimal field time to reconnect and seal.

4. Unit shall match existing gas, and electrical power connections (as close as possible) and shall require only minimal field time to reconnect.

5. The weight of the units shall correspond with existing unit in so far as no additional roof support or roofing is required.

6. Adapter curbs are not permitted.

7. Prior to fabrication of the equipment, a direct factory-based employee (engineer) of the manufacturer shall visit the job site to become familiar with and measure the exact requirements of the project.

8. A local manufacturer's representative shall not be considered as a substitute for the measurement.

9. A factory authorized engineer/technician shall also be present at the installation to assist/supervise the unit installation and unit start up.

10. The responsibility for these functions shall not be abdicated to the local manufacturer's representative, and engineer/technician shall submit a check-test-start up report after the installation.

R. Warning decal

1. A sign shall be affixed to all AC units' casing. Such sign shall provide warning to "Shut off power before working on blower and drive assembly".

S. Catalogs, brochures and diagrams

1. Not later than four (4) weeks after a Purchase Order is issued, manufacturer SHALL provide complete submittal documentation, catalog, brochure, and diagrams for approval prior to shipment from factory.

2. Manufacturer to provide four (4) additional maintenance and operation manuals with delivery. Include product performance literature, mounting details, trouble shooting guide, schematic diagrams, etc.

T. Training

1. The equipment manufacturer shall provide six (6) hours training to owner personnel engaged in the operation, maintenance and repair of air conditioning units. Training may be broken up into two (2) separate sessions if needed. Refresher courses shall be provided free of charge for the life of the equipment.

2. The training shall cover the following as a minimum:
   a. Commercial off-the-shelf components
   b. Fans, coils, filters, smoke detectors
   c. Safeties
   d. Compressors
   e. Variable speed drives
   f. Sequence of operation and electrical diagrams
   g. Unit controls design, components, operations, and troubleshooting
   h. Required major and minor maintenance

3. Handouts shall be provided by the manufacturer's representative. Training shall be conducted by a qualified factory certified technician.

4. Coordination for training shall be done through owner.

PART 3 – EXECUTION

3.01 GENERAL

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

3.02 EQUIPMENT INSTALLATION

A. Equipment Installation: Equipment installation shall be in strict accordance with these specifications and manufacturers installation instructions. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on any of the equipment. Flanged joints shall be adequately extended before installation.

1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.

2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, and fan wheels.

3.03 FIELD TESTS AND INSPECTION

A. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, shall not require re-testing before installation. Equipment and materials not tested at the place of manufacture shall be tested before or after installation, as applicable or necessary, to determine compliance with reference specifications and standards.

B. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, filters shall be periodically cleaned until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments

as required to provide proper operation and control sequence. Refer to Section 15010: Basic Mechanical Requirements.

C. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 15010: Basic Mechanical Requirements.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 01 00
ELECTRICAL GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing all operations in connection with furnishing, delivery, and installation of the work of this Section, complete, as shown on the Drawings and/or specified herein. Work includes, but is not necessarily limited to, the following:

1. Examine all other Sections for work related to those other Sections and required to be included as work under this Section.
2. General Provisions and Requirements for electrical work.
3. Division-1; General Requirements; General Conditions.

B. Organization of the Specifications into Divisions, Sections and Articles, and arrangement of Drawings shall not control the Contractor in dividing the Contract Work among Subcontractors or in establishing the extent of work to be performed by any trade.

1.02 GENERAL SUMMARY OF ELECTRICAL WORK

A. The Specifications and Drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

B. Refer to the Drawings and Shop Drawings of other trades for additional details, which affect the proper installation of this work. Diagrams and symbols showing electrical connections are diagrammatic only. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.

C. Before submitting a bid, the Contractor shall become familiar with all features of the Building Drawings and Site Drawings, which may affect the execution of the work. No extra payment will be allowed for failure to obtain this information.

D. If there are omissions or conflicts between the Drawings and Specifications, clarify these points with the Owner's Representative before submitting bid and before commencing work.

E. Provide Work and Material in conformance with the Manufacturer's published recommendations for respective equipment and systems.

1.03 LOCATIONS OF EQUIPMENT

A. The Drawings indicate diagrammatically the desired locations or arrangements of conduit runs, outlets, equipment, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the work to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structure conditions encountered.

B. Where Outlets are placed on a wall, locate symmetrically with respect to each other and other features or finishes on the wall.

C. In the event changes in the indicated locations or arrangements are necessary, due to developed conditions in the building construction or rearrangement of furnishings or equipment, such changes shall be made without cost to the Contract, providing the change is ordered before the conduit runs, etc., and work directly connected to same is installed and no extra materials are required.

D. Coordinate and cooperate in every way with other trades to avoid interference and assure a satisfactory job.

E. The Location of the existing utilities, building, equipment, and conduit shown on the Drawings is approximate. Verify exact locations and routing of existing systems by potholing all trench routes prior to digging the trench. Pothole at least 100-feet ahead of the actual trenching to allow space to alter the new conduit routing to accommodate existing conditions.

F. Underground Detection Services Existing Utility Structures

1. Services shall be provided utilizing the latest detection equipment available. Services shall be performed by a company regularly engaged in the business of existing Underground Utility Structure Detection for the past 5-years.
2. Prior to excavation the following work shall be performed:
    a. Contractor to mark trenching locations and indicate width and depth.
    b. Locate, by way of vertical and horizontal control dimensions, existing subgrade petroleum product pipes, process piping, conduits, sewer, water, gas, storm drain, electrical, telephone and irrigation lines in the affected areas of Contract Construction Work.
    c. Arrange and meet with the Owner's Representative to review existing underground conditions.
    d. The proposed route of each excavation shall be continuously surveyed along the entire excavation path using Ground-Penetrating Radar (GPR) operating from the surface grade. The GPR shall detect and map existing underground metal and non-metal private and public utility lines, pipes, conduits, conductors, etc. The GPR shall identify the horizontal and vertical location of existing underground conditions located at a depth of up to 3-meters below finish grade and located with a vertical and horizontal accuracy within ±12-inches of actual condition.
3. Exercise extreme caution in excavating and trenching on this site to avoid existing underground utilities, and to prevent hazard to personnel and/or damage to existing underground utilities or structures. These Drawings and Specifications do not include necessary components for construction safety, which is the responsibility of the Contractor.
4. Repair/replace, without additional cost to the Contract, and to the satisfaction of the Owner any existing work damaged that was identified in the Record Drawings provided; Identified by the Owner's Representative; Identified by the Underground Detection Services performed; or any existing work damaged as a result of failure to comply with all the Referenced Requirements.
5. The Contractor shall contact Underground Service Alert (USA) of Southern California, at least 48-hours prior to excavation, and shall not excavate until verification has been

received from the USA and that public utilities serving the site have been located and marked.

G. The Locations of existing underground utilities, where shown on Drawings, are shown diagrammatically and have not been independently verified by the Owner, the Owner's Representative, the Architect/Engineer. The Owner, the Owner's Representative, and the Owner's Architect/Engineer are not responsible for the location of underground utilities or structures, whether or not shown or detailed and installed under this or any other Contracts. The Contractor shall identify each existing utility line prior to excavation and mark the locations on the ground of each existing utility line.

1.04 PERMITS

Take out and pay for all required permits, inspections, and examinations without additional cost to the Owner.

1.05 QUALITY ASSURANCE

A. Work and Materials shall be in full accordance with the latest Rules and Regulations as. The publications shall be included in the Contract Documents Requirements. If a conflict occurs between the following publications and any other part of the Contract Documents, the Requirements describing the more restrictive provisions shall become the applicable Contract definition: (Partial list of applicable Codes as of January 1, 2020)

1. 2022 California Building Code (CBC), Part 2, Title 24 C.C.R.
   (2022 International Building Code Vol. 1-2 and 2022 California Amendments)
2. 2022 California Electrical Code (CEC), Part 3, Title 24 C.C.R.
   (2022 National Electrical Code and 2022 California Amendments)
3. 2022 California Energy Code (CEC), Part 6, Title 24 C.C.R.
4. 2022 California Fire Code (CFC), Part 9, Title 24 C.C.R.
   (2022 International Fire Code and 2022 California Amendments)
5. 2022 California Referenced Standards Code, Part 12, Title 24 C.C.R.
6. Regulations of the State Fire Marshal, C.C.R. Title 19
7. Other applicable State and Local Government Agencies Laws and Regulations.
8. Electrical Installation Standards National Fire Protection Association (NFPA):

   NFPA 13: Automatic Sprinkler Systems 2022 Edition (CA Amended)
   NFPA 14: Standpipe and Hose Systems 2022 Edition (CA Amended)
   NFPA 17: Dry Chemical Extinguishing Systems 2022 Edition
   NFPA 17A: Wet Chemical Extinguishing Systems 2022 Edition
   NFPA 20: Stationary Fire Pumps For Fire Protection 2022 Edition
   NFPA 24: Private Fire Service Mains 2016 Edition
   NFPA 25: Inspection, Testing and Maintenance of Water Based Fire Protection Systems 2022 CA Edition
   NFPA 37: Installation and Use of Stationary Combustion Engines and Gas Turbines 2022 Edition
   NFPA 72: National Fire Alarm and Signaling Code 2022 Edition (CA Amended)
   NFPA 80: Fire Doors and other Opening Protectives 2022 Edition
   NFPA 101: Life Safety Code 2022 Edition

NFPA 110: Emergency and Standby Power Systems 2022 Edition
NFPA 170: Standard for Fire Safety and Emergency Symbols 2022 Edition
NFPA 221: Standard for High Challenge Fire Walls and Fire Barrier Walls 2022 Edition
NFPA 2001: Clean Agent Fire Extinguishing Systems 2022 Edition

B. All Material and Equipment shall be new and shall be delivered to the site in unbroken packages. All material and equipment shall be listed and labeled by Underwriters Laboratories or other recognized testing laboratories, where such listings are available. Comply with all Installation Requirements and restrictions pertaining to such listings.

C. Work and Material shown on the Drawings and in the Specifications are new and included in the Contract unless specifically indicated as existing or N.I.C. (not in contract).

D. Keep a copy of all applicable Codes and Standards available at the job site at all times for reference while performing work under this Contract. Nothing in Plans or Specifications shall be construed to permit work not conforming to the most stringent of Building Codes.

E. Where a conflict or variation occurs between applicable Codes, Standards, and/or the Contract Documents, the provisions of the most restrictive provision shall become the Requirement of the Contract Documents.

1.06 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. General

1. Review of Contractor's submittals is for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the Requirements of the Plans and Specifications. Contractor is responsible for quantities; dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of work with that of all other trades and satisfactory performance of their work.

2. The Contractor shall review each submittal in detail for compliance with the Requirements of the Contract Documents prior to submittal. The Contractor shall "Ink Stamp" and sign each item of the submittal with a statement "CERTIFYING THE SUBMITTAL HAS BEEN REVIEWED BY THE CONTRACTOR AND COMPLIES WITH ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS". The Contractor shall clearly and specifically identify each individual proposed substitution, substitution of equal or proposed deviation from the Requirements of the Contract Documents with a statement "THIS ITEM IS A SUBSTITUTION".

   The burden of research, preparation of calculations and the furnishing of adequate and complete Shop Drawings information to demonstrate the suitability of Contractor's proposed substitutions and suitability of proposed deviations from the Contract Documents is the responsibility of the Contractor.

3. Departure from the submittal procedure will result in resubmittals and delays. Failure of the Contractor to comply with the Submittal Requirements shall render void any acceptance or any approval of the proposed variation. The Contractor shall then be required to provide the equipment or method without variation from the Contract Documents and without additional cost to the Contract.

4. The Contractor at no additional cost or delays to the Contract shall remove any work, material and correct any deficiencies resulting from deviations from the Requirements of the Contract Documents not approved in advance by the Owner prior to commencement of work.
5. Shop Drawings submitted by the Contractor, which are not specifically required for submittal by the Contract Documents, or Contractor Shop Drawings previously reviewed and resubmitted without a written resubmittal request to the Contractor, will not be reviewed, considered, or commented on. The respective Shop Drawing submittal/ resubmittal will not be returned to the Contractor and will be destroyed without comment or response to the Contractor. The respective submittal shall be considered null and void as being not in compliance with the Requirements of the Contract Documents.
6. Refer to Division-1 for Additional Requirements.

B. Material Lists and Shop Drawings

1. Submit material list and Equipment Manufacturers for review within 35-days of award of Contract. Give name of Manufacturer and where applicable, brand name, type and/or catalog number of each item. Listing of more than one Manufacturer for any one item of equipment, or listing items "as specified", without both make and model or type designation, is not acceptable. Shop Drawings shall not be submitted before review completion of Manufacturers list. The right is reserved to require submission of samples of any material whether or not particularly mentioned herein.
2. After completion of review of the Material and Equipment Manufacturers list, submit Shop Drawings for review within 90-days after return of the review comments for Contractor Material List, submit all Shop Drawings for review. Shop Drawings shall be submitted in completed bound groups of materials (i.e., all lighting fixtures or all switch-gear, etc.). The Contractor shall verify dimensions of equipment and be satisfied as to fit and that they comply with all code Requirements relating to clear working space about electrical equipment prior to submitting Shop Drawings for review. Submittals, which are intended to be reviewed as substitution or departure from the Contract Documents, must be specifically noted as such. The Requirements of the Contract Documents shall prevail regardless of the acceptance of the submittal.
3. Shop Drawings shall include catalog data sheets, instruction manuals, Dimensioned Plans, elevations, details, wiring diagrams and descriptive literature of component parts where applicable. Structural calculations and mounting details, signed by a Structural Engineer registered by the State of California, shall be submitted for all equipment weighing over 400-pounds, and shall be in compliance with Title 21 of the California Code of Regulations.
4. Each Shop-Drawing items shall be identified with the Specification Section and paragraph numbers, lighting fixture types and Drawing Sheet numbers; the specific Shop Drawing is intended to represent. Shop Drawings 11-inches by 17-inches or smaller in size shall be bound in three ring binders. Divider tabs shall be provided in the three ring binders identifying and separating each separate Shop Drawing submittal item. Shop Drawings larger than 11-inches by 17-inches, Shop Drawing pages/sheets submittals shall be sequentially numbered with unique alphanumeric numbering system to facilitate correspondence referencing identification of individual sheets.

5. The time required to review and comment on the Contractor's submittals will not be less than 14-calendar days, or more than 21-calendar days after receipt of the submittals at the office of FBA Engineering. The review of Contractor submittals and return to Contractor of submittals with review comments will occur in a timely manner conditioned upon the Contractor complying with all the following:
    a. The submittals contain complete and accurate information, complying with the Requirements of the Contract Documents.
    b. Contractor's submittals are each marked with Contractor's approval "stamp", and with Contractor signatures.
    c. The submittals are received in accordance with a written, Shop Drawing submittal schedule for each submittal. The Contractor distributes the schedule not less than 35-day calendar days in advance of the Shop Drawing Submittals, and the schedule identifies the calendar dates, the Contractor will deliver the various submittals for review.
6. Shop Drawings shall include the Manufacturers projected days for shipment from the factory of completed equipment, after the Contractor releases the equipment for production. It shall be the responsibility of the Contractor to insure that all material and equipment is ordered in time to provide an orderly progression of the work. The Contractor shall notify the Owner's Representative of any changes in delivery, which would affect the project completion date.
7. Submittal Identification
    a. Each resubmittal shall be dated: with original submittal date and resubmittal transmission dates; sequentially numbered with original submittal number and sequential resubmittal revision number and titled with submittal contents identification and applicable Specifications/Drawing references *(i.e., Original Submittal Date: 5/12/22 Resubmittal Date: 10/9/22 Original Submittal #4 Resubmittal Revision R2 Contents: Transformer Resubmittal Specification Section 260500 Paragraph 2.11, etc.).*
    b. Contractor shall provide a written response narrative with each resubmittal. Describe each response action, resubmittal addition, change and deletion. Correspond to each response to A/E specific review comment.

C. The Contractor shall be responsible for incidental, direct and indirect costs resulting from the Contractor's substitution of; or changes to; the specified Contract Materials and Work.

D. The Contractor shall pay, upon request by the Owner's Representative, a fee for the Owner's Representative time involved in the review of substitution submittals and design changes resulting from the Contractor's requested substitutions. The fee shall be not less than $17.00 per hour but, in no case, less than stated in Division-1, whichever is greater.

E. Maintenance and Operating Manuals
    1. The Contractor shall furnish three copies of typewritten maintenance and operating manuals for all electrical equipment, fire alarm equipment, sound system equipment, etc., to the Owner.
    2. Instruct Owner's Personnel in correct operation of all equipment at completion of project. Provide the quantity and duration of instruction class as specified; but in no case less than a 2-hour to 4-hour duration separate instruction classes for each individual

equipment group furnished as part of the Contract. Instruction classes shall be presented by Manufacturer's Authorized Field Service Engineer at the project site. Instruction class size shall be at the Owner's discretion, not less than one or more than fifteen students shall attend each instruction session. Submit fifteen written outline copies of the proposed instruction class curriculum, 14-days prior to the class-scheduled dates.

a. Each of the individual instruction classes shall be recorded to provide a permanent instruction reference for the Owner. The recordings shall be made using audio and color video VHS-HQ "HiFi" audio videocassette magnetic tape recording, or DVD disk recording, battery operated cameras, for each instruction session.

b. Provide each instruction presenter with a personal portable "wireless" single channel FM microphone system, battery operated, transmit the audio voice to the camera audio input and insure voice and video are synchronized. Provide a matching receiver(s) for each camera.

c. Provide a minimum of two VHS-HQ, "HiFi" 120-minute; or DVD disk, Standard Play (SP) speed, audio video cassette recordings of each instruction session. Identify and label each cassette with date and instruction session name.

3. Maintenance and operating manuals shall be bound in three-ring, hard-cover, plastic binders with table of contents. Manuals shall be delivered to the Owner's Representative, with an itemized receipt.

F. Portable or Detachable Parts: The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of Contract Work. These parts shall then be delivered to the Owner's Representative with an itemized receipt.

G. Record Drawings (Additional Requirements)

1. Provide and maintain in good order a complete set of Electrical Contract "Record" prints. Changes to the Contract to be clearly recorded on this set of prints. At the end of the project, transfer all changes to one set of transparencies to be delivered unfolded to the Owner's Representative.

2. The actual location and elevation of all buried lines, boxes, monuments, vaults, stub-outs and other provisions for future connections shall be referenced to the building lines or other clearly established base lines and to approved benchmarks. If any necessary dimensions are omitted from the Record Drawings, the Contractor shall, at the Contractor's own expense, do all excavation required to expose the buried work and to establish the correct locations.

3. The Contractor shall keep the "Record" prints up to date and current with all work performed.

4. Refer to Division-1 for Additional Requirements.

1.07 CLEANING EQUIPMENT, MATERIALS, PREMISES

All Parts of the Equipment shall be thoroughly cleaned of dirt, rust, cement, plaster, etc., and all cracks and corners scraped out clean. Surfaces to be painted shall be carefully cleaned of grease and oil spots and left smooth, clean, and in proper condition to receive paint finish.

1.08 JOB CONDITIONS - PROTECTION

Protect all Work, Materials and Equipment from damage from any cause whatever and provide adequate and proper storage facilities during the progress of the work. Provide for the safety and good condition of all the work until final acceptance of the work by the Owner and replace all damaged or defective work, materials, and equipment before requesting final acceptance.

1.09 EXCAVATION, CUTTING, BACKFILL AND PATCHING ADDITIONAL REQUIREMENTS

A. General

1. Perform excavation, cutting, backfill, core drilling, directional boring, and patching of the construction work required for the proper installation of the electrical work.
2. Patching shall be of the same material, thickness, workmanship, and finish as existing and accurately match-surrounding work to the satisfaction of the Owner's Representative.
3. Prior to penetrating, coring, drilling or cutting existing building elements, concrete and/ or masonry, provide imaging equipment examinations of each specific location. The imaging process shall identify existing internal embedded components and locations, including structural elements/anchors, conduit, and piping that are present. Do not penetrate or damage the existing internal embedded elements. Imaging shall employ one of the following, with GPR methodology preferred:
    a. Non-invasive imaging employing high frequency, Ground Penetrating Radar (GPR), single side echo reflection technology.
    b. Non-invasive imaging employing x-ray radiography, through-and-through imaging technology.

B. Excavation Temporary Cover

1. Excavations for Contract Work occurring in streets, vehicular drive areas, parking lots, sidewalks; any paved surface; or any area accessible to the public; provide temporary steel plating and shoring support for the plates, to completely cover the excavations under one or more of the following conditions:
    a. Excavation shall not remain "open" for more than 4-calendar days; provide temporary plating.
    b. Excavation shall not be "open" over weekends (Saturday, Sunday) or Holidays; provide temporary plating.
2. The temporary plating shall be a minimum of 0.75-inch thickness steel, but in no case shall the thickness be less than required to support AASHO-H20 traffic loading.
3. Provide a minimum of two 100% open lane(s) (12 feet lane width) for vehicular traffic at all times during construction, for vehicle access to all areas.

1.10 IDENTIFICATION

A. Equipment Nameplates

1. Panelboards, terminal cabinets, circuit breakers, disconnect switches, starters, relays, time switches, contactors, push-button control stations, and other apparatus used for the operation or control of feeders, circuits, appliances, or equipment shall be properly

identified by means of descriptive nameplates or tags permanently attached to the apparatus and wiring.

2. Nameplates shall be engraved laminated phenolic. Shop Drawings with dimensions and format shall be submitted before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws or machine screws. Self-adhering or adhesive backed nameplates shall not be used.

3. Provide black-on-white laminated plastic nameplates engraved in minimum ¼-inch high letters to correspond with the designations on the Drawings. Provide other or additional information on nameplates where indicated.

B. Plates: All cover and device plates shall be furnished with engraved or etched designations under the following conditions: minimum character size not less than 0.188-inch. Engraving shall indicate circuits and equipment controlled or connected.

C. Wire and Cable Identification

1. Provide identification on individual wire and cable including signal systems, fire alarm, data, IP public address, IP clock, electrical power systems (each individual phase, neutral and ground), empty conduit pull ropes, and controls circuit.

2. Permanent identification shall be provided at each termination location, splice location, pullbox, junction box and equipment enclosure.

a. Individual wire and cable larger than #6 AWG or 0.25-inch diameter, shall be provided with polypropylene identification tag holders, with yellow polypropylene tags interchangeable black alphanumeric characters, character height 0.25-inch. Attach identification tags with plastic “tie” wraps, minimum of two for each tag. As manufactured by Almetek Industries- “EZTAG” series; or TECH Products - “EVERLAST” Series.

b. Individual wire and cable #6 AWG and smaller or smaller than 0.25-inch diameter, shall be provided with water and oil resistant, flexible, self-laminating pressure sensitive machine embossed plastic tags that wrap a minimum of 360 degrees around the wire/cable diameter. The entire tag shall then be covered with a clear flexible waterproof plastic cover wrapped a minimum of 540 degrees around the wire/cable diameter and completely covering the identification. As manufactured by Brady Identification; or 3M; or Panduit.

c. Each identification tag location shall indicate the following information: circuit number, circuit phase, source termination and destination termination equipment name (or outlet number as applicable).

3. Install permanent identification after installation/pulling of wire/cable is complete, to prevent loss or damage to the identification.

D. Junction and Pullboxes shall have covers stenciled with box number when shown on the Drawings, or circuit numbers according to panel schedule. Data shall be lettered in a conspicuous manner with a color contrasting to finish.

1.11 COMMISSIONING

A. General

1. The Commissioning shall verify the electrical systems for the term of the contract, by observation; and by calibration; and by testing. The Commissioning shall ensure the

electrical systems perform interactively and correctly, according to the Contract and Operational Requirements.

2. Commissioning shall provide startup, testing and documented confirmation of the Contract constructed systems, materials and work, functions in compliance within the criteria set forth in the Contract Documents to the satisfaction of the Owner's needs. The Commissioning Scope shall encompass each system identified as requiring "Commissioning" by the Contract Documents, including but not limited to:
   a. Fire alarm, equipment, and devices.
   b. Additional systems described in the Contract Documents.
3. Commissioning Process shall review all the Shop Drawing submittals, including:
   a. Controls, Operation and Maintenance Requirements.
   b. Facility performance testing compliance.
   c. Project Contract Requirements compliance.
   d. Compliance with basis for design and operational descriptions provided in the Contract.
4. Commissioning shall be the process of ensuring all the systems described in the Contract Documents comply with the Contract Document design; all systems are installed properly; all systems are functional, tested and capable of being operated and maintained to perform within the Contract Requirements and design intent.
5. Functional setup, recalibration, correcting deficiencies, retesting and the associated costs, for system(s) that fail Commissioning, shall be the responsibility of the Contractor. The Contractor shall include all Commissioning costs in the Contract Scope of Work.
6. Complete all Commissioning functions prior to the occupancy of the facility by the Owner, unless directed otherwise by the Owner’s Representative.
7. Submit six copies of Commissioning Documentation to Owner’s Representative.
8. Commissioning, unless specifically indicated otherwise, shall be performed by factory-trained Technician(s) authorized and certified by the Manufacturers of the respective equipment/systems. Where specifically indicated, Commissioning shall be performed by Independent Test Lab.

B. Commissioning Procedures
   1. Prepare a Commissioning Matrix identifying components and systems included in the Commissioning Scope; the status; actions completed and actions to be completed.
   2. Verify Contractor compliance with Contract Document Requirements Manufacturer's recommendations and approved Shop Drawings.
   3. Perform startup, functional tests, reports, and document results.
   4. Evaluate and document the setup parameters, software, operating condition, and performance of each system at the time of functional test completion. Document and record each performance parameter and condition, in the Commissioning Report.
   5. Schedule testing and prepare descriptions of testing.
   6. Describe measures performed to correct deficiencies.

7. Verify that instructions to Owner's Representatives, operations and maintenance manuals comply with Contract Documents.
8. Prepare warranty matrix identifying the start dates, expiration dates, routine preventative maintenance dates and the Owner's responsibility for performing preventative maintenance and keeping logs for each maintenance function and warranty claims.
9. Confirm completion of all punch list items that have been acceptably accomplished and a list of what has not been acceptably completed.
10. Describe uncorrected deficiencies accepted by the Owner.

1.12 ASBESTOS, POLYCHLORINATED BIPHENYL (PCB) OR HAZARDOUS WASTE:

It is Understood and Agreed that this contract does not contemplate the handling of asbestos, PCB or any hazardous waste material. If asbestos, PCB or any hazardous waste material is encountered, notify the Owner's Representative immediately. Do not disturb, handle or attempt to remove.

1.13 INDEPENDENT TESTING LABORATORY

A. Testing Laboratories Definition

1. The Testing Laboratory shall meet Federal OSHA criteria for accreditation of Nationally Recognized Testing Laboratories (NRTL) Title 29 Part 1907 and 29 CFR-1910.
2. Membership in the National Electrical Testing Association (NETA) shall also constitute acceptance of meeting said criteria, for testing of electrical systems.

1.14 WALL MOUNTED ELECTRICAL PANELS SEISMIC REQUIREMENTS

A. Surface Mounted Equipment

1. Provide multiple horizontal sections of metal "C" channels for support and attaching wall mounted equipment to walls. Channels shall provide "turned lips" at longitudinal edges to hold "lock-in" fasteners and shall comply with ANSI-1008 and ASTM-A569 latest revision. The channels shall be steel hot dip zinc galvanized. As manufactured by Unistrut or Kindorf.
2. The "C" channels shall be positioned horizontally within 3-inches of the top and bottom of each, equipment section cabinet and located behind each equipment vertical section. Provide additional intermediate "C" channels at not less than 36-inches on center between the "top" and "bottom" "C" channel positions, located behind each equipment vertical section.
3. The "C" channels shall be of sufficient length to provide connection to not less than two vertical structural wall framing elements separated by not less than 16-inches; but in no case shall the "C" channel length be less than the width of the respective equipment section.
4. Attach the "C" channels to the wall structural elements after the wall, finish surface, installation (including painting) is complete.
5. Attach the "C" channels with fasteners to the building wall framing structural elements as follows: welded to steel framing; bolted to wood framing; cast in place concrete

inserts for masonry and concrete construction; drilled “afterset” expansion anchors for existing masonry and concrete construction.

6. Attach the equipment to the “C” channels with threaded and bolted fasteners to “prelocate” and lock into the channel “turned lips” and channel walls.
7. Panels anchorage shall be able to withstand Seismic Forces specified in ASCE 7-16 and Chapter 16A of the 2022 CBC.

1.15 ELECTRICAL WORK CLOSEOUT

A. Prepare the following items and submit to the Owner’s Representative before final acceptance.

1. Two copies of all test results as required under this Section.
2. Two copies of Local and/or State Code enforcing authority’s final inspection certificates.
3. Copies of Record Drawings as required under the General Conditions, pertinent Division One Sections, and Electrical General Provisions.
4. Two copies of all receipts transferring portable or detachable parts to the Owner’s Representative when requested.
5. Notify the Owner’s Representative in writing when installation is complete and that a final inspection of this work can be performed. In the event any defect or deficiencies are found during this final inspection they shall be corrected to the satisfaction of the Owner’s Representative before final acceptance can be issued.
6. List of spare fuses and locations identified by equipment name and building designation.
7. Prior to energizing, retighten to the proper torque, each circuit conductor lug landing, each bus bar (phases, neutral and ground) and circuit protection device threaded connections in all switchboards, switchgear, motor control centers, transformers, busways, disconnect switches, motor starters, motor terminals and panelboards, after the equipment is installed/connected and prior to energizing the equipment. The torque values shall comply with Manufacturer's recommendations.

END OF SECTION 26 01 00
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SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing all operations in connection with furnishing, delivery, and installation of the work of this Section, complete as shown on the Drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other Sections for work related to those other Sections and required to be included as work under this Section.
2. General Provisions and Requirements for electrical work.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. Submit Product Data Sheets for all outlet boxes, floor boxes, wiring devices, device plates, relays, contactors, timeswitches, and disconnects fuses.

B. Submit Material List for outlet boxes.

PART 2 - PRODUCTS

2.01 OUTLET AND JUNCTION BOXES

A. General:

1. Flush or concealed outlet boxes and junction boxes.
   a. Non-masonry and/or non-concrete locations provide pressed steel boxes. Steel thickness not less than 0.062-inch, hot-dip galvanized. Knockout (KO) type with conduit entrances and quantities size to match conduit shown connecting to respective junction box and outlet box.
   b. UL-514 listed and labeled.
   c. Minimum required box depth is exclusive of extension-ring depth.
   d. Provide all boxes with matching cover plates. Cover plates shall be gasketed water-tight in wet and outdoor locations.
   e. Boxes installed in masonry or concrete shall be UL "concrete-tight" approved for installation in concrete and shall allow the placing of conduit without displacing reinforcing-bars.
2. Provide boxes of proper Code size for the number of wires or conduits passing through or terminating therein. In no case shall box be less than 4.0-inch square by 2.125-inches deep, unless specified elsewhere or noted otherwise on the Drawings. 2.5-inches minimum depth for box width's exceeding 2-gang.
3. Increase the minimum outlet box size to 4.69-inches square by not less than 2.125-inches deep, where one or more of the following conditions occurs:
   a. More than two conduits connect to the outlet box.

b. Circuit or Conduit “homerun” connects to outlet box.

4. Signal, Communication and Low Voltage:
   a. Individual audio/visual, telephone, computer or data outlets: 4.69-inches square by 2.125-inches deep minimum with 2-gang extension ring on flush boxes.
   b. Combination signal/telephone/data or computer outlets: 4.69-inches square by 2.125-inches deep minimum with 2-gang wide extension ring on flush boxes.
5. Junction boxes shall be sized to comply with the following:
   a. Code Requirements size based on the conduit quantities, conduit sizes and wire-fill connected to the junction box.
   b. Junction box minimum size shall not be less than 4.69-inches by 4.69-inches by 2.5-inches deep, but not less than size indicated on the Drawings or required by Code.
6. Provide extension rings on flush outlets to finish face of extension ring flush with finished building surfaces. Extension ring shall match outlet box construction and contain "attachment mounting-tabs" for wiring devices. Extension rings shall be "screw-attached" to respective outlet box and maintain "ground" bonding continuity.
7. Outlet boxes installed in outdoor locations, or in wet locations, or in concrete/ masonry, shall be cast-iron or cast-bronze, with threaded conduit hubs. UL rated for wet locations.
   a. Aluminum boxes shall NOT be in contact with concrete or masonry. Die-cast aluminum or cast aluminum water-tight electrical outlet boxes with threaded hubs may be provided as an alternate to cast-iron or cast-bronze outlet boxes, only where one or more of the following conditions occur:
      1) Outdoor locations above finish grade.
      2) Indoor wet locations surface or flush in walls or ceilings.
8. Outlet boxes installed penetrating into fire rated walls, fire rated floors, fire rated ceilings and all fire rated construction. The outlet boxes shall be UL listed, classified and labeled, for fire rated and temperature rated penetration of the respective fire rated surface and fire rated construction. The outlet box fire rating and temperature rating shall equal or exceed the fire/temperature rating of the surface/construction being penetrated. Provide UL listed and labeled supplemental fire and temperature protection to maintain ratings:
   a. Wall and ceiling penetrations, tumescent fire wrap (external or internal of outlet box).

B. Surface Outlet Boxes
   1. Surface mounted outlet boxes, cast iron Type FS or FD, with threaded hubs as required. Box interior dimensions and interior volume capacity not less than required for “press steel boxes”, and “sheet steel boxes”. Provide plugs in all unused openings. Provide weatherproof gaskets for all exterior boxes.

2.02 PULLBOXES

A. General
   1. Sizes as indicated on the Drawings and in no case of less size or material thickness than required by the Governing Code and AHJ.

2. Exercise care in locating pullboxes to avoid installation in drain water flow areas and to clear existing condition interferences.
3. UL listed and labeled for electrical circuits.

B. General Purpose Sheet Metal Pullbox

1. General purpose sheet steel pullboxes: Install only in dry protected locations with removable screw covers. Manufacturer's standard rust proofing and baked enamel finishes.
2. Weatherproof sheet steel pullboxes: Fabricate of code gauge steel. All surfaces interior and exterior hot-dip galvanized steel. Gasketed weather-tight cover of same material. Manufacturer's standard baked exterior enamel finish.

C. Concrete Pull Boxes and Hand-holes

1. H-20 traffic rated box and cover, pre-cast concrete, steel reinforced pull boxes and hand-holes. Provide complete with pulling irons, hot-dip galvanized metal traffic cover with hot-dip galvanized metal cover frame, pull-box concrete base with sump. Four cable full height wall racks with porcelain blocks.
2. Boxes shall be “Intercept” type with multiple sections and extension cable-intercepts at both ends of box. Refer to Drawings for box size.
3. Covers shall be flush bolt down. Covers weighing more than 40-pounds shall be split cover type “Torsion-Sping” assist, hinged open-close.
4. Box covers shall comply with Federal ADA, UL, State and Local AHJ for slip resistance. Provide bead weld on cover to pull box to indicate services within pullbox (i.e., "480/ 277-VOLT, 3-PHASE, 4-WIRE ELECTRICAL" OR “SIGNAL /TEL/P.A./CLOCK/FIRE ALARM" etc.).
5. Shall be set on a machine-compacted pea gravel base 12-inches thick and extend 6-inches beyond box base on all sides. Provide a ¾-inch by 10-feet copper clad ground rod through the box bottom with 9-inch projection into box, for grounding all metal parts with #10 AWG copper bond wire.
6. After cables have been pulled, connected, tested and inspected, seal all box joints and seal box between cover and frame with a mastic compound similar to Parmagum or Dukseal.
7. As manufactured by Jensen Precast, or Oldcastle Precast.

2.03 RECEPTACLES

A. General

1. All receptacle wiring devices in flush type outlet boxes shall be installed with a bonding jumper to connect the box to the receptacle ground terminal. Grounding through the receptacle mounting straps is not acceptable. The bonding jumper shall be sized in accordance with the branch circuit protective device as tabulated herein under "Grounding". Bonding jumper shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws 6-32 or larger (except isolated ground receptacles). For receptacles in surface mounted outlet boxes direct metal-to-metal contact between receptacle mounting strap (if it is connected to the grounding contacts) and outlet box may be used. Receptacle mounting-ears for screw attachment

to outlet box. Receptacle shall be UL listed and labeled; conform to NEMA-WD1 and WD6.

2. All receptacles shall be same Manufacturer.
3. Receptacle color as selected by Owner's Representative. Receptacles connected to emergency power circuits shall be red.
4. Wiring devices shall be listed and labeled for connection of both "solid" and "stranded" copper circuit conductors.
5. Duplex convenience receptacles and 120-volt single phase branch circuits.
   a. Duplex (convenience) receptacle, wiring device with two single receptacles with the same electrical rating, integrated into a single assembly by the Manufacturer.
   b. 20-amp branch circuits with a single duplex convenience receptacle connection on each circuit, receptacles shall be rated for 20-amp.
   c. 15-amp and 20-amp branch circuits with two or more duplex convenience receptacle connections each circuit, receptacle shall be rated 15-amp or 20-amp.
6. Devices shall additionally be listed and labeled as UL-All Weather-Resistant, provide weather resistant receptacles for the following install locations. Modify Manufacturer's catalog number descriptions, shall include all-weather-resistant UL listing and labeling:
   a. Devices indicated on Drawings as Weather-Proof (W.P.).
   b. Devices installed in outdoor locations.
   c. Devices installed in classified as damp or wet locations both indoor and outdoor.
   d. All GFCI (ground-fault) receptacles all locations.
7. Receptacles with ampere and voltage ratings different than described for duplex convenience receptacles. The different rated receptacles shall have the same characteristics and performance as the respective duplex convenience receptacles, except for differing ampere and voltage characteristics.
8. Receptacles shall be GFCI type for the following locations:
   a. located within 84-inches of a sink or hosebib shall be GFCI receptacles.
   b. Devices installed in outdoor locations.
   c. Devices installed in classified as damp or wet locations both indoor and outdoor.
   d. Devices indicated on Drawings as GFCI or Weather-Proof (W.P.).

B. Duplex Convenience Receptacles.

1. Shall be grounding type, 120 volt and shall have two current carrying contacts and one grounding contact which are internally connected to the frame. Outlet shall accommodate standard parallel blade cap and shall be side wired. Receptacles shall be tamper resistant–TR, UL-TR.
2. GFCI receptacles shall be all Weather-Resistant and wet location rated. Rated 120-volt 60Hz AC, 20 amp, unless indicated otherwise on Drawings.
3. Heavy Duty Industrial Grade

	Manufacturer	NEMA 5-15R	NEMA 5-20R	NEMA 5-20R-GFCI
a.	Legrand/P&S	#5262	#5362	#2095HG
b.	Leviton	#5262	#5362	#W7899

c.	Hubbell	#CR5252	#5362	#GFR8300
d.	Cooper-Arrow/Hart	#AH5262	#AH5362	#WRVGF20

2.04 PLATES

A. Metal cover plates for devices

1. Provide cover plates for every line voltage and low voltage switch, receptacle, telephone, computer, television, signal and other device outlets.
    a. All line voltage circuit plates shall be metal, 0.040-inch stainless steel Type 302 alloy, composed of 18% chromium and 8% nickel.
    b. Plates for low voltage signal systems may be metal or non-metal. Non-metal plates shall be high-abuse, hard-service and high-impact resistant.
2. Plates shall be as manufactured by P&S; or Hubbell; or Leviton; or General Electric.

2.05 VANDAL-PROOF FASTENINGS

Provide approved vandal-proof type screws, bolts, nuts where exposed to sight throughout the project. Screws for such items as switch plates, receptacle plates, fixtures, communications equipment, fire alarm, blank covers, wall and ceiling plates to be spanner head stainless steel, tamperproof type. Provide Owner with six screwdrivers for this type.

2.06 STRUCTURAL AND MISCELLANEOUS STEEL

Structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations, shall be hot dip galvanized unless otherwise specified. Included are underground pullbox covers and similar electrical items. Galvanizing averages 2.0 ounce per square foot and conforms to ASTM A123.

2.07 CONCRETE WORK (ADDITIONAL REQUIREMENTS)

A. Portland Cement

1. ASTM C33-(latest revision), Type 2, Low Alkali Cement. Composed of Portland cement, coarse aggregate, fine aggregate, and water.
    a. Concrete for underground duct/conduit encasement, the minimum 28-day compressive strength shall be 2000 psi. Provide a minimum of 10-pounds of red oxide concrete coloring per yard of concrete.
    b. Mix shall obtain a 6-inch slump, measured with standard slump cone per ASTM C143 / C143M (latest revision).
2. Coarse Aggregate: Uniformly graded between maximum size not over 1½-inch and not less than ¾-inch and minimum Size #4, crushed rock or washed gravel. For concrete encased conduit only, maximum aggregate size shall be ½-inch.
3. Fine Aggregate: Clean, natural washed sand of hard and durable particles varying from fine to particles passing ⅜-inch screen, of which at least 12% shall pass fifty mesh screens.

B. Water: Clean and free from deleterious quantities of acids, alkalis, salts, or organic materials.

C. Reinforcement

1. Bars: Intermediate Grade Steel conforming to ASTM A615/A615M Grade 60, with pattern deformations.
2. Welded Wire Fabric: ASTM A185/A185M.
3. Bending: Conform to Requirements of ACI 318.

D. Form Material: For exposed work, use PS 1-66 "B-B Concrete Form" plywood forms, or equal. Elsewhere, forms may be plywood, metal, or 1-inch by 6-inch boards. Forms for round lighting pole bases shall be sono-tube.

PART 3 - EXECUTION

3.01 GROUNDING (ADDITIONAL REQUIREMENTS)

A. Grounding shall be executed in accordance with all CEC Article 250.

B. Each Pullbox or any other enclosure in which several ground wires are terminated shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

3.02 OUTLET AND JUNCTION BOXES

A. General:

1. Accurately place boxes and securely fastens to structural members. Where outlets are shown at same location but at different mounting heights, install outlets in one vertical line. Where outlets are shown at same location and mounting height, mount outlets as close together in a horizontal row as possible. Where the outlet boxes for switches and receptacles are shown at the same location and mounting height, mount in common outlet box with barriers between devices. Provide single piece multi-gang cover plate for close mounted outlet boxes. Where switches are shown on wall adjacent to hinge side of doors, box shall be installed to clear door when door is fully opened.
2. Flush mounted boxes shall be attached to not less than two parallel studs or structure members by means of metal supports. The supports shall span between and attach to the structure members.
3. Boxes above accessible ceilings shall be attached to structural members. Where boxes are suspended, they shall be supported independently of conduit system by means of hanger rods and/or preformed steel channels. Boxes shall be supported independently of all piping, ductwork, equipment, ceiling hanger wires and suspended ceiling grid system.
4. Surface mounted outlets shall be attached to concrete or masonry walls by means of expansion shields.

5. Outlet Box Horizontal and Vertical Separation: Outlet boxes and device outlet rings installed flush in walls shall be horizontally and vertically separated by not less than 24-inches (edge of box to edge of box) from device outlet boxes and rings in common wall surfaces located on the opposite (back) side of the same wall.
    a. Where the separation cannot be maintained, provide a solid backing behind and completely enclosing each outlet box.
    b. The backing shall extend the width of the wall cavity (i.e., between "studs" or masonry cells) behind the box and 12-inches above and below the outlet box center-line, completely enclosing the outlet box.
    c. The backing shall consist of the following:
        1) ⅝-inch thick gypsum board anchored in place for "stud" wall construction.
        2) Solid "mortar" to completely fill the outlet box "cell" behind the box in masonry construction.
6. Provide metal outlet box for each device. Install devices in metal outlet boxes. Typical for all wiring devices including switches, receptacles, line voltage devices and low voltage/signal system devices.

B. Fire Wrap:

In fire rated walls and ceilings provide fire rated "box-wrap" around the outside of each outlet box placed in fire rated wall or ceiling. Install the fire wrap on exterior of box inside the wall or ceiling, to maintain the fire rating of wall or ceiling with the installed outlet boxes.

END OF SECTION 26 05 00
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SECTION 26 05 33
CONDUIT AND WIRE

PART 1 - GENERAL

1.01 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete as shown on the Drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other Sections for work related to those other Sections and required to be included as work under this Section.
2. General Provisions and Requirements for electrical work.
3. Submit material list for all conduit and conduit fittings.
4. Submit details and structural engineering calculations for conduit support systems.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

Submit Product Data Sheets for all wire, supports, conduit, fittings and splicing materials.

PART 2 - PRODUCTS

2.01 CONDUIT

A. General

1. The interior surfaces of conduits and fittings shall be continuous and smooth, with a constant interior diameter. Conduits and conduit fittings shall provide conductor raceways of fully enclosed circular cross section. The interior surfaces of conduits and fittings shall be without ridges, burrs irregularities or obstructions. Conduits and fittings of the same type shall be of the same uniform weight and thickness.
2. Type of conduit, type of conduit fittings and conduit supports shall be suitable for the conditions of use and the conditions of location of installation, based on the Manufacturer's recommendations and based on applicable Codes.
3. All fittings for metal conduit shall be suitable for use as a grounding means, pursuant to the applicable Code Requirements. All metal conduit and metal conduit fittings shall provide 3 second duration ground fault current carrying ratings, when installed and connected to the respective conduit, as follows:
   a. RMC and EMT conduit fittings.
      1) 0.5-inch through 1.5-inch conduit/fitting size - 10,000-amp RMS.
      2) 2.0-inches and larger conduit/fitting size - 20,000-amp RMS.
   b. FMC and LTFMC Conduit Fittings
      1) 0.5-inch through 1.25-inch conduit/fitting size - 1,000-amp RMS (without external bonding jumper).
      2) 1.5-inch through 4.0-inch fitting size - 10,000-amp RMS with bonding jumper.

4. Protective corrosion resistant finish for metal conduit fabricated from steel and metal conduit fittings fabricated from steel, shall be as follows:
    a. Clean all metal surfaces (including metal threads) with acid bath “pickle” prior to coating, to remove dirt, oil and prepare surfaces for galvanizing.
    b. Hot-dip galvanized zinc coating on all interior and exterior steel surfaces. Minimum finish zinc coating thickness shall not be less than 0.002 inches.
    c. Threads shall be hot-dip zinc coated after machine fabrication.
    d. Exterior metal surfaces shall be finished with clear organic polymer topcoat layer, after galvanizing.
    e. The inner metal surfaces of conduit fittings shall be finished with a lubricating top-coat after galvanizing, to facilitate conductor pulling through the conduit/fitting.
5. Threads for metal conduit and metal conduit fittings shall be taper-pipe-thread, National Pipe Standards (NPS) and shall comply with ANSI-B1.20.1.
6. Metal conduit termination connector fittings shall be provided with a Manufacturer installed, insulating throat bushing inside the fitting. The bushing shall protect the wire conductor insulation from cutting, nicks and abrasion during conductor installation and electrical load “cycling” after installation is complete. The bushing shall comply with UL 94V-0 flammability.
7. Provide conduit bonding/grounding jumper from metal enclosures with “concentric ring” knockouts, to positively ground/bond each respective conduit(s) to the metal enclosure.

B. Rigid Metal Conduit (RMC)
1. Rigid metal, round tubing, machine threaded at both ends.
    a. The conduit and conduit fittings shall comply with the Requirements for an equipment grounding conductor, pursuant to applicable Codes.
    b. The conduit shall be watertight and airtight without cracks and pinholes.
2. RMC raceway types shall be as follows:
    a. Rigid Galvanized Steel conduit (RGS), minimum yield strength shall be 35,000 PSI. Shall comply with NEMA standard 5-19 (latest revision); ANSI C80.1 and ANSI-C80.4 (latest revision); UL 514-B and UL 6 (latest revisions); National Pipe Standard Specification (latest revision).
    b. Intermediate steel conduit (IMC). Shall comply with NEMA Standard 5-19 (latest revision) ANSI-C80.6 (latest revision); UL 2142 (latest revision).
3. RMC fittings:
    a. Fittings shall be compatible with RGS and IMC.
    b. Fittings shall be rated “liquid tight”.
    c. Fittings imbedded in concrete shall be rated “liquid tight” and “concrete tight”.
    d. Connectors and couplings for terminating, connecting and coupling to RMC conduit shall be threaded metal.
    e. Fittings shall comply with ANSI C80.4 and ANSI C33-84 (latest revision); NEMA FB1 (latest revision); UL 514 (latest revision).
    f. Conduit seal fittings:
        1) Conduit seals shall prevent the passage of gases, liquids and vapors past the location of the seal installation in the conduit.

2) Conduit seals shall be suitable for installation in both vertical and horizontal conduit locations.
3) Conduit seals shall be visible and accessible for inspection after installation is complete.
4) Conduit seals shall be rated for the following locations:
a) Wet locations
b) Classified hazardous location materials NEC Class 1 Division 1.
c) Temperature ranges from 0 minus 20 degrees centigrade through 90 degrees centigrade.
5) Conduit seals, sealing compound and sealing compound dam shall be the products of the same Manufacturer.

4. RMC fittings as manufactured by:
a. For threaded enclosure, termination connection.
1) Thomas & Betts - 106 Series bonding locknut, 5302 Series sealing ring with stainless steel retainer.
b. For non-threaded enclosure, termination connector.
1) Thomas & Betts - 370 Series watertight threaded sealing hub, 106 Series threaded bonding locknut, Sta-Con Series enclosure bonding jumper and 3870 Series threaded ground bushing.
2) Emerson-OZ/Gedney-CHMT/CHT watertight threaded hub with bonding lock-nut and GH50G Series enclosure bonding jumper.
c. For RMC-to-RMC conduit-to-conduit coupling
1) Thomas & Betts/Erickson - 674 (threaded) Series
2) Emerson-OZ/Gedney Type TPC (threaded) Series
3) Threaded RMC conduit couplings, product of the same Manufacturer as the RMC conduit.
d. For RMC Conduit Seals
1) Emerson-OZ/Gedney-EYA and EYAM (threaded) Series
2) Appleton-EYF and EYM (threaded) Series

C. Electrical Metallic Tubing (EMT)
1. Rigid metal round tubing, “thin wall” steel construction, with non-threaded ends.
a. The conduit and conduit fittings shall comply with the Requirements for an equipment grounding conductor pursuant to applicable Codes.
b. The conduit shall be watertight and airtight without cracks and pinholes.
2. EMT shall be allowed for conduit size ranges from 0.5-inch through 4.0-inches.
3. Comply with ANSI C80.3, C80.4, and ANSI C33.98 (latest revisions); UL 594 and UL 797 (latest revisions); CEC Section 12500 (latest revision).
4. EMT fittings:
a. Connectors and couplings for terminating, connecting and coupling to EMT conduit shall be non-threaded steel fabrication.
b. EMT termination connector fittings shall be as follows:
1) Set screw type “concrete tight” when installed in dry interior locations.

2) Compression types “raintight” and “concrete tight” when installed in wet or damp locations, outdoors and in concrete or masonry construction.

c. Fittings shall comply with ANSI C33.84 (latest revision); UL 514 (latest revision); NEMA FB-1.

5. EMT fittings as manufactured by:

a. For threaded and non-threaded enclosure, termination connector
1) Thomas & Betts-TC721A (set screw type) Series (with locknuts).
2) Emerson-OZ/Gedney-TC500I (set screw type) Series (with locknuts).
3) Thomas & Betts-5123 (compression type) Series (with two locknuts).
4) Emerson-OZ/Gedney-TC600I (compression type) Series (with locknut).
5) Thomas & Betts-4240 (compression type) Series (90-degree angle with lock-nut).
6) Emerson-OZ/Gedney-TWL (compression type) Series (90-degree angle with lock nut).

b. For EMT-to-EMT conduit-to-conduit coupling:
1) Thomas & Betts-TK121A (set screw type) Series (with locknut).
2) Emerson-OZ/Gedney-5000 (set screw type) Series (with locknut).
3) Thomas & Betts-5120 (compression type) Series.
4) Emerson-OZ/Gedney-TC600 (compression type) Series.

c. For EMT to RMC conduit to conduit combination coupling:
1) Thomas & Betts-HT221 (set screw type) Series.
2) Emerson-OZ/Gedney-ESR (set screw type) Series.
3) Thomas & Betts-530 (compression type) Series.
4) Emerson-OZ/Gedney-ETR (compression type) Series.

D. Flexible Metal Conduit (FMC)

1. Round flexible conduit, fabricated from a single continuous steel strip. The steel shall be factory formed into continuous interlocking convolutions to form a complete lock between steel strips and provide raceway flexibility.

2. Metal to metal grounding contact shall be maintained throughout the length of the FMC conduit.

3. FMC shall be allowed for conduit size ranges from 0.5 inch through 3.0-inches.

4. FMC shall comply with ANSI-C.33.84 and ANSI C33.92; NEMA FB-1; CEC 12-1100.

5. FMC Fittings

a. FMC fittings shall be malleable iron construction or steel construction.

b. Fitting shall automatically cause the FMC raceway throat opening to be centered with respect to the fitting throat opening.

c. Straight and angled connector termination fittings shall be threaded on one end and shall include a threaded locknut, suitable for connection to threaded and unthreaded enclosures.

d. The attachment of the fittings to FMC shall be angled saddle type, to engage and interlock with the FMC spiral groove, and shall be unaffected by vibration. Direct bearing screw type fittings shall not be used.

e. Direct FMC conduit-to-FMC conduit coupling of FMCs shall not be permitted.

f. Shall comply with ANSI C33.9, and ANSI C33.92 (latest revision); NEMA FB1 (latest revision); UL 514.

6. FMC fittings as manufactured by:

a. Straight Termination Connectors: Thomas & Betts-3110 Series (w/ locknut)
45 and 90 Degree Angel Connectors: Thomas & Betts-3130 Series (w/ locknut)

b. FMC to EMT conduit combination coupling: Thomas & Betts 503TB Series.

E. Rigid Non-Metallic Conduit (RNMC)

1. General

a. Conduit and fittings shall be 90-degree centigrade conductor rated. Fabricated from homogeneous material, free from visible cracks, holes or foreign inclusions, with integral "end-bell". The conduit and conduit fittings shall be watertight and airtight.

b. Conduit, conduit fittings and conduit fitting assembly "solvent cement" shall all be the product of the same Manufacturer. Conduit fittings shall be solvent cement welded watertight.

c. Conduit and fittings shall be identified with legible markings showing ratings, size and Manufacturers name.

d. RNMC and fitting shall be corrosion resistant, watertight.

e. Conduit shall be suitable for conductor operating temperatures from minus 20 degrees centigrade to 90 degrees centigrade.

f. RNMC shall comply with NEMA TC-2 (PVC 40 conduit, latest revision) NEMA TC-6 (EB conduit latest revision) and NEMA TC-3 (fittings, latest revision); UL 514 and UL 651 (latest revision).

2. Polyvinyl Chloride (PVC)-RNMC

a. PVC Schedule 40 heavy wall construction.

3. RNMC fittings connecting to metallic raceways shall be provided with a ground/bond jumper connection.

F. Expansion Joint, Deflection Joint and Seismic Joint conduit fittings.

1. Expansion Conduit Fitting - Fitting shall provide for a minimum of 2-inches straight line movement between two connecting conduits in each direction (total 4-inches conduit expansion and contraction) parallel to the respective conduit lengths. Fitting shall be watertight.

2. Deflection Conduit Fitting - Fitting shall provide for a minimum of 30 degrees angular deflection movement ("Shear" deflection) between two connecting conduits, in any direction perpendicular to the length of the respective conduits. Fitting shall be water-tight.

3. Combination Expansion/Deflection Conduit Fitting - Fitting shall provide the combined "expansion" and "deflection" movement capacity between two connecting conduits as described for separate "expansion" and "deflection" conduit fittings. Fitting shall be approved for installation concealed in both masonry/concrete construction and exposed non-masonry/concrete construction. Fitting shall be watertight.

4. Fittings shall comply with UL

5. Fittings as manufactured by:
    a. Conduit expansion fittings exposed or concealed locations as manufactured by:
        1) OZ/Gedney - AX8 Series for RMC conduit.
        2) OZ/Gedney - TX Series for EMT conduit.
        3) Appleton - XJ8 Series for RMC conduit and EMT conduits. Provide RMC to EMT combination conduit coupling fittings for each end of the expansion fitting.
    b. Combination expansion/deflection conduit fittings exposed or concealed conduit locations as manufactured by:
        1) OZ/Gedney - AXDX Series for RMC conduit.
        2) OZ/Gedney - AXDX Series for EMT conduit. Provide RMC to EMT combination conduit coupling fittings for each end of the expansion/deflection fitting.
    c. Conduit expansion/deflection fittings for FMC and LTFMC conduit.
        1) Provide a minimum of 12-inches of "slack" LTFMC in each FMC or LTFMC conduit at building and structure seismic or expansion joint conduit crossings.
        2) Note: Each FMC "slack" expansion/deflection location, shall be considered as not less than a 90-degree conduit bend location, for compliance with the maximum quantity of conduit bends allowed in a raceway.
6. Conduit Fitting Bonding Jumper
    a. The grounding/bonding path of metal conduit shall be maintained by the fitting.
    b. Provide a bonding jumper at each expansion, deflection and combination expansion deflection conduit fitting.
    c. The jumper shall be a bare flexible copper "braid". The copper braid electrical current carrying capacity shall be equal to the metal conduit.
    d. Provide a factory terminated ground clamp on each end of the braid with adjusting steel conduit grounding clamps and connect to each respective conduit end.
    e. The jumper braid length shall be 8-inches longer than the respective conduit fitting.
    f. Bonding jumper for FMC and EMT fittings as manufactured by:
        1) OZ/Gedney - BJ Series
        2) Appleton - XJB Series

G. Conduit Bodies Conduit Fitting
1. Conduit bodies shall provide conductor access with a removable conduit body cover and wiring area enclosed in metal housing. The conduit body shall facilitate pulling conductors.
2. In-line form "C" conduit bodies shall be prohibited.
3. The interior space "length" of 90 degree "elbow" conduit bodies shall not be less than six times the diameter size of the largest conduit connecting to the conduit body.
4. Conduit body covers shall be removable, gasketed; watertight "domed" metal covers "Mogul-Type" with threaded screw attachment to the conduit body.
5. Lubricated, reusable, wire roller guards inside the conduit body shall protect wire from insulation damage during wire "pulling".
6. Conduit body fittings shall comply with UL 514.

7. Conduit bodies as manufactured by:
    a. For RMC Conduit
        OZ/Gedney - LB 6X/Mogul (90-degree elbow) Series - threaded body.
        Appleton – LB/Mogul (90-degree elbow) Series - threaded body.
    b. For EMT Conduit
        Same as for RMC conduit. Provide EMT to RMC conduit combination coupling fitting for each outlet body connection.

2.02 CONDUIT SUPPORTS

A. General
    1. Conduit Supports, hangers and fasteners for metal conduit shall be steel, hot dip zinc galvanized.
    2. Conduit supports, hangers and fasteners for PVC coated conduit shall be PVC coated to match the conduit PVC coating.
    3. Threaded hardware shall be continuous, free running threads.
    4. Conduit support systems, including support channels, pipe clamps, braces, anchors, hardware, fasteners, shall be sized to support the full capacity circuit conductors' weight, plus the installed conduit weight, plus the conduit fitting weight and support hardware weight, plus a 300% additional weight capacity safety factor.
    5. Provide lock washer at each "bolted"/threaded connection.
    6. Conduit supports, fasteners, channels, braces, hardware, anchors, pipe clamps, and hangers as manufactured by Unistrut or Kindorf.
    7. Supports shall be free of "BURRS" and sharp edges.
    8. Metal supports cut in the field shall be zinc galvanized after cutting to prevent rust.

B. Conduit Hangers
    1. Threaded steel hanger rods.
        a. Hanger rods smaller than 0.375-inches in diameter shall not be used for support of individual conduits.
        b. Hanger rods smaller than 0.5-inches in diameter shall not be used for support of multiple conduits.
    2. Conduit hanger wires shall be not less than 12-gauge steel.
    3. Conduit hangers shall attach to structure fasteners with steel "Clevis" or "Swing" hangers and shall provide a minimum of 45 degrees of angular movement in any direction at the point of the conduit hanger attachment to the structure fasteners.
    4. Conduits individually suspended by conduit hangers shall fasten to the respective hangers with "Clevis" type pipe hangers. The pipe hangers shall be steel, adjustable to fit conduit size and shall completely enclose the conduit circumference.

C. Conduit Support Channels
    1. "C" channels shall be factory preformed with a minimum 12-gauge thickness metal. The channel shall be factory "punched" with regularly spaced slotted holes for fastener attachments along the length of the channel.

2. The “C” channel shall not deflect more than 0.1-inch between channel supports at maximum installed design load, including required safety factor.
3. Channels shall comply with ANSI-1008 (latest revision) and ASTM-A569 latest revision).
4. Channels shall provide “turned lips” at longitudinal edges to hold (lock-in) fasteners.
5. Conduit support channels suspended from conduit hangers shall attach to conduit hangers with treaded connections. Provide a minimum of two hangers (trapeze style) connected to each channel.
6. Non-suspended conduit support channels shall connect to structure fasteners with threaded connectors.

D. Fasteners, Seismic Earthquake Rated
1. Channel fasteners:
   a. Channel fasteners shall “prelocate” and lock into the channel “turned lips” and channel “walls”.
   b. A separate metal strap shall “tie” each conduit to each channel with conduit channel fasteners.
2. Structure fasteners:
   a. Structure fasteners for wall and floor mounted conduit attachments shall attach to existing masonry and concrete structures with structure fasteners using drilled, mechanical, expansion shield anchors.
   b. Structure fasteners for wall and floor mounted conduit attachments shall attach to new masonry and concrete structures with structure fasteners using steel threaded inserts precast into the structures.
   c. Structure fasteners shall attach to steel structural members with “swing-beam clamps”, with set-locking screw structure fasteners. Beam clamps shall include integral safety rod, strap or “J”-hook to secure the clamp to the beam flanges on both sides of the beam.
   d. Structure fasteners for wall and floor mounted conduit attachments shall attach to wood structural members with flush “through-bolted” wood beam/wood framing stud structure fasteners.
   e. Structure fasteners for wall mounted conduit attachments shall attach to steel framing studs and steel structural elements with spot welded steel structure fasteners or drilled and bolted structure fasteners.

E. Brace Connectors
1. Provide lateral brace connectors to resist horizontal, lateral and vertical movement of suspended conduits during seismic earthquakes.
2. The braces shall connect from each conduit support, attach as close to the conduit as possible, and attach to fixed rigid, nonsuspended building “main” structural elements with fixed anchoring.
3. Brace attachment connectors and fasteners shall be rigid preformed steel channels or flexible #10-gauge steel hanger wire.

4. Connect and attach the brace connectors to fixed structural elements in the same manner as conduit support hangers. The connection of braces to structural elements shall be independent of the conduit support hanger structure fasteners.

2.03 ELECTRICAL POWER WIRE AND CABLE

A. General

1. All wire and cable shall be single-conductor, annealed copper, insulated 600-volt, #12AWG minimum unless specifically noted otherwise on the Drawings.
2. Conductors #10AWG and smaller shall be solid. Conductors #8AWG and larger shall be stranded.
3. Insulation of conductor connected to circuit protection devices required to be "100%" rated, shall be 90-degree centigrade rated insulation.
4. Insulation of conductors installed outdoors, on grade or underground, insulation shall be rated for wet locations.
5. Insulation of conductors installed outdoors, installed exposed to the sun, installed in exposed conduits, insulation shall be rated for high-temperature 90 degrees centigrade.
6. Insulation of branch circuit conducts installed in light fixtures; insulation shall be rated for 90 degrees centigrade.

B. Conductor Insulation

1. 600 Volt AC and/or DC insulated conductors installed entirely inside conduits, or enclosed inside wireways, or enclosed inside raceways, insulation shall be rated as follows.
   a. Indoor above Grade locations either concealed or exposed.
      1) Dual rated THHN and THWN
      2) Individually rated THHN-2
      3) Individually rated THWN-2
      4) XHHW-2
   b. Outdoor above Grade either concealed or exposed.
      1) XHHW-2
      2) THWN-2
      3) THW-2
   c. Outdoor below Grade or outdoor on Grade.
      1) XHHW-2
      2) THWN-2
      3) THW-2
   d. All other enclosed raceway locations not described above.
      1) XHHW-2
      2) THWN-2
      3) THW-2

C. Insulation Color Coding and Identification

1. The following color code for branch circuits:
   a. Neutral . . . White (tape feeder neutrals with white tape near connections).

b. Normal Power

120/208 Volt

Ground Green
Phase A Black
Phase B Red
Phase C Blue

2. When individual neutral conductors are shown for each branch circuit, the color code for the neutral conductors shall be as follows:
   a. 120/208 volt; Phase A - White with Black stripe; Phase B - White with Red stripe; Phase C - White with Blue stripe.
3. Fire alarm conductors: Use 600-volt, type THHN-2/THWN-2 conductors and color-coded per Equipment Manufacturer's recommendations and approved and listed for use on fire alarm systems by the State Fire Marshal.

PART 3 - EXECUTION

3.01 TRENCHING, FOOTINGS, SLEEVES

A. Provide Trenching, Concrete Encasement of conduits, backfilling, and compaction for the underground electrical work, in accordance with applicable Sections of this Specification.

B. Sleeves

1. Provide sleeves for raceways, conduit and wire/cables passing through the following construction elements:
   a. Gypsum, Lath, and plaster walls and ceilings.
   b. Building structures (i.e., foundations, walls, floors, ceilings, beams, and roofs) with a fire rating exceeding 20-minutes.
2. Sleeves shall extend 1.5-inch above and below floors, except under floor standing electrical equipment. Sleeves shall be flush with wall ceiling foundations and partitions exposed to public view and extend approximately 0.5-inch past penetration in fire rated construction. Sleeves shall be installed at exact penetration locations and angles to accommodate wire/cable, raceway and conduit routings.
3. Joists, girders, beams, columns or reinforcing steel shall not be cut or weakened. Where construction necessitates the routing of conduit or raceways through structural members, framing or footings, written permission to make such installation shall first be obtained from the Owner's Representative. Such permission will not be granted, however, if any other method of installation is possible.
4. The layout and design of raceways and conduits located in or routed through masonry or reinforced beams or the Owner's Representative shall review walls before any work is performed. All sleeving shall be accomplished according to the instructions of the Owner's Representative and shall be accepted before any concrete is poured.
5. Provide a continuous clearance between the inside of a sleeve and exterior of wire/cables, conduits and raceways passing through the sleeve not less than the following:
   a. 0.5-inch clearance except as required otherwise.
   b. 1.0-inch clearance through outside walls below grade.

c. 3.0-inch clearance through seismic joints.

6. Sleeves set in fire rated construction shall be caulked between sleeve and building structure, additionally sleeves shall be caulked between the sleeve and the wire/cables, conduits/raceways passing through the sleeve. The caulking shall be a fireproof sealant, equal to the fire rating and temperature being penetrated. Clearance between components inside of sleeve and exterior of components passing through sleeve and between components inside the sleeve shall comply with Fireproof Sealant Manufacturer's recommendations.

7. Sleeve material:
   a. In floor construction: Schedule 40 black steel pipe, with upper surface to be sealed watertight.
   b. In concrete or masonry walls roofs or ceilings: Schedule 40 black steel pipe. When installed in roofs or outside walls, seal outer surface watertight.
   c. In fire rated construction; 24-gauge galvanized iron or steel.

3.02 GROUNDING

A. Grounding shall be executed in accordance with all applicable Codes and Regulations, both of the State of California and local authorities having jurisdiction.

B. The Contractor shall install the proper sized copper ground wire in all conduits having circuits operating at more than 100 volts to ground, for use as an equipment ground. The electrical metallic raceway system shall be grounded to this ground wire.

C. The maximum resistance to ground from any outlet shall not exceed 5 ohms.

D. In branch circuit conduits, a green insulated, copper ground wire, sized in accordance with the following table, shall be installed. Install ground wire in each conduit with phase conductors.

1. Branch

Circuit Protection	Ground Wire Size
20 amp	#12
30 to 60 amp	#10
70 to 100 amp	#8

E. Ground conductors for branch circuit wiring shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws, 6-32 or larger.

3.03 CONDUIT

A. General

1. The sizes of the conduits for the various circuits shall be as indicated on the Drawings, but not less than the conduit size required by Code for the size and quantity of conductors to be installed in the conduit.

2. Conduits shall be installed concealed from view. Install conduits concealed in walls, concealed below floors and concealed above ceilings, except as specifically noted other-wise.

3. The following systems shall be considered as circuits 100 volts and less, all other circuits shall be considered to be over 100 volts (power circuits) unless specifically noted

otherwise: Fire alarm, energy management control, telephone, public address, data, computer, television, intercom, intrusion alarm and nurse call.

4. Conduits shall be provided complete with conduit bends, conduit fittings, outlet boxes, pullboxes, junction boxes, conduit anchors/supports, grounding/bonding for a complete and operating conductor/wire raceway system.
5. Metal and nonmetal conduits shall be provided mechanically continuous between termination connection points. Metal conduit shall be provided electrically continuous between termination connection points.
6. Individual conduit paths and home runs shown on the Drawings shall be maintained as separate individual conduits for each homerun and path.
7. Conduits, conduit fittings and installation work occurring in classified hazardous materials locations shall comply with applicable Code Class 1 Division 1 Requirements, unless specifically noted otherwise.
8. Transitions between conduits constructed of different materials and occurring in above grade locations shall be allowed only at outlet boxes, junction boxes, pull boxes and equipment enclosures unless specifically indicated otherwise. Provide outlet boxes and junction boxes.
9. Metal conduit terminating to nonmetal enclosures; terminating into metal enclosures with “concentric.ring” knockouts; terminating into metal enclosures with knockout reducing washers, including but not limited to equipment housings, outlet boxes, junction boxes, pull boxes, cable trenches, manholes, shall be provided with a ground/ bonding lug integrated with the conduit termination conductor fitting construction, by the Fitting Manufacturer. The lug shall provide for connection of a grounding/bonding conductor (insulated or uninsulated). The grounding lug shall be located on the fitting, inside the termination enclosure.
10. The type of conduit, type of conduit fittings, and type of conduit supports and method of conduit installation shall be suitable for the conditions of use and conditions of location of installation based on the Manufacturer’s recommendations; based on the applicable Codes and based on the Requirements of the Contract Documents.

B. RMC Installation Locations

RGS, IMC Conduits and RGS, IMC Fittings shall be installed in the following locations:

1. Embedded in floors, walls, ceilings, roofs, foundations, and footings constructed with concrete.
2. Embedded in walls and foundations constructed with brick and masonry.
3. Interior of buildings, within 9-feet of finish floor lines for exposed conduit locations.
4. Exterior of building for exposed conduit locations.
5. Damp or wet locations exposed or concealed locations.
6. Exposed on roofs.
7. RMC conduit and RMC fittings may be installed in any location where EMT and FMC conduit is permitted to be installed.

C. EMT Installation Locations

EMT Conduit and EMT Fittings may be installed in the following locations, for circuit conductors operating below 600 volts to ground; locations containing only “non-hazardous materials”; only dry locations:

1. Concealed in hollow non masonry/non-concrete, metal stud frame and wood stud frame walls and floors.
2. Concealed above ceilings.
3. Exposed inside interior enclosed crawl spaces.
4. Exposed interior locations placed 9-feet or higher above finished floors (except as described in paragraph below at lower heights).
5. Exposed on walls and ceilings (any height) in the following dedicated function areas, interior enclosed room locations:
    a. Indoor enclosed electrical equipment rooms and closets.
    b. Indoor enclosed data and telecommunication terminal rooms and closets.
6. Any location where FMC is described to be installed, except as the final connection to rotating or vibrating equipment.

D. FMC Installation Locations

FMC conduit and FMC fittings may be installed in the following locations for circuit conductors operating below 600 volts to ground; locations containing only “non-hazardous materials”; only dry, interior locations:

1. Concealed in hollow non-masonry metal stud frame and wood stud frame fully enclosed walls.
2. Concealed above fully enclosed ceiling spaces.
3. FMC conduit shall be installed in continuous lengths between termination points. FMC shall not be “spliced” or coupled directly to FMC or any other conduit type under any circumstance.
4. The maximum continuous length of FMC that shall be installed between termination end points is 15-feet. Circuits requiring continuous conduit lengths exceeding 15-feet between termination end points shall be installed using either RMC or EMT conduits. FMC lengths shorter than 16-inches are prohibited.
5. The minimum size FMC conduit shall be as shown on the Drawings but not be less than the following:
    a. FMC lengths of 6-feet or less, minimum FMC conduit size shall be 0.50-inch.
    b. FMC lengths exceeding 6-feet, minimum FMC conduit size shall be 1.0-inch.

E. RNMC Installation Locations

RNMC Conduit and RNMC Fittings shall be installed in the following locations containing only “non-hazardous material”:

1. Underground, concealed below earth grade, unless specifically noted or specified otherwise.
2. Exposed on utility service poles, for pole risers at 9-feet or higher above finish grade, Schedule 80 PVC only.

3. RNMC type “EB” conduit(s) shall be concrete encased along the entire length of the conduits for all installation locations.
4. Non-metal type raceways and RNMC type conduit shall not be installed inside buildings.

F. Conduit Installation

1. Conduit Supports
   a. Securely and rigidly support all raceways/conduits from the building structure. Raceways/Conduits shall be supported independent of all piping, air ducts, equipment ceiling hanger wires, and suspended ceiling grid systems. Secure conduit to structural element by means of UL listed and approved hangers, fasteners, “C” channels and pipe clamps.
   b. Provide conduit supports spaced along the length of the conduit as follows:
      1) RMC and EMT conduit, maximum not to exceed 96-inches on center; within 24-inches of each conduit bend and conduit termination location.
      2) FMC and LTFMC conduit, maximum not to exceed 24-inches on center; within 6-inches of each conduit bend and conduit termination location.
   c. Suspended conduit methods:
      1) Individual, suspended raceways/conduits separated by more than 12-inches from any other conduit and suspended from ceilings and roofs shall be supported as follows:
         a) Conduits smaller than 1.5-inch by means of hanger rods or hanger wires.
         b) Conduits 1.5-inch and larger by means of hanger rods.
         c) The conduit shall attach to the hangers with pipe clamps.
      2) Suspended raceways/conduits positioned within 24-inches of any other conduit shall be grouped and supported by hanger rods using trapeze type conduit support channels ("C" channels). Conduits shall individually attach to common channels side-by-side, with pipe clamps.
   d. Non-suspended conduit methods:
      1) Individual raceway/conduits placed against wall /ceiling/floors, placed inside hollow wall/ceiling construction or structure framing (i.e., “dry- wall” or plaster hollow wall construction), shall be secured by means of individual pipe clamps and fasteners attached to the framing studs or other structural members and the conduit/raceway.
      2) Provide common “C" channel supports for all multiple raceway/conduits placed against vertical or horizontal surfaces and positioned within 24-inches of other raceways/conduits. Attach channels to the framing studs or other structural members. Attach the conduits/raceway individually to common channels, side-by-side, with pipe clamps.
      3) The use of toggle bolts is prohibited.
   e. Provide conduit anchoring, conduit support and conduit bracing systems conforming to Earthquake Seismic Requirements. The conduit support/anchoring system capacity shall include the weight of the conduits, conduit fittings, conduit supports and conductors/wires/cables installed in the conduits plus a 300% safety factor. Submit Shop Drawing details showing each typical conduit anchor, conduit support and conduit brace location. Submit structural calculations performed by and signed

by a Professional Structural Engineer (P.E.) with a P.E. license, registered in the State of California, U.S.A.

2. Conduit separation:
   a. Conduit installed underground or below building slab without full concrete encasement: Shall be separated from adjacent conduits of identical systems (i.e. signal to signal, data to data, power to power, control to control etc.) by a minimum of 3-inches. Conduits of non-identical systems (i.e. signal to power; data to power; power to control; signal to control, etc.) shall be separated by a minimum of 12-inches.
   b. Conduit installed underground with full concrete encasement; shall be separated from adjacent conduits of similar systems (100 volt and less) by a minimum of 2-inches; conduits for non-power systems (100 volts and less to ground) shall be separated by a minimum of 6-inches from power circuits (over 100 volts to ground); conduits for power circuits shall be separated from adjacent conduits of similar power systems (over 100 volts to ground) by a minimum of 3-inches.
   c. Separation of conduits entering termination points or crossing other conduits may be reduced as required within 60-inches of the termination or crossing points.
   d. Conduits shall be separated from hot water piping, exhaust flues/ chimneys, steam piping, boilers, furnaces, ovens by a minimum of 12-inches.
3. Conduit concrete encasement:
   a. Conduits which are run underground exterior to building slab shall be continuously concrete encased except, 15 amp and 20-amp power branch circuit conduits under-ground do not require concrete encasement.
   b. PVC rigid-non-metallic-type EB conduit, of any size and any location shall be continuously concrete encased the full length of the conduit installation, including under building slab.
   c. Concrete for encasement of underground conduits shall be 2000-PSI 28-days cure strength with a mix of cement, sand, water and maximum of ¾-inch gravel. Concrete encasement of conduits shall be continuous without voids. The encasement shall extend 3-inches past the edges of all conduits on all sides of the circuit. Provide ten pounds of red oxide cement coloring uniformly mixed with each cubic yard of concrete for conduit encasement.
   d. Conduits of any size and type (including 15 amp and 20-amp power branch circuits) located under roads, paved areas and “transit-system” right of way shall be concrete encased.
4. Underground conduits:
   a. Three or more underground conduits larger than 1-inch in size and occupying the same trench shall be separated and supported on factory fabricated, non-metallic, duct/conduit support spacers. The spacers shall be modular, keyed interlocking type, "built-up" to accommodate quantity, size orientation and spacing of installed conduits. The spacers shall maintain a constant distance between adjacent conduit supports and hold conduits in place during trench backfill operations. Minimum support spacer installation interval along with length of the conduits shall be as follows:
      1) Concrete encased conduits, not less than 8-feet on center.

2) Non-concrete encased conduits, not less than 5-feet on center.

b. Provide trenching, excavation, shoring and Backfilling required for the proper installation of underground conduits. Tops of backfill shall match finish grade.

c. Bottoms of trenches shall be cut parallel to "finish grade" elevation. Make trenches 12-inches wider than the greatest diameter of the conduit.

d. Back-filling Trenches for Conduits without Concrete Encasement Requirements
   1) Conduits which are not required by the Contract Documents to be concrete encased and are located exterior to building slab, shall be set on a 3-inch bed of damp clean sand. Conduit trenches shall be backfilled to within 12-inches of finished grade with damp sand after installation of conduit is completed. Remainder of backfill shall be native soil.
   2) Conduits located under a building which are not required by the Contract Documents to be concrete encased, shall be completely backfilled and compacted with clean damp sand to the same level as the building foundation pad.
   3) Provide a continuous yellow 12-inches wide flat plastic tracer tape, located 12-inches above the conduits in the trench. The tracer tape shall be imprinted with "Warning-Electric Circuits" a minimum of 24-inches on center.

e. Backfilling trenches for conduits under paved areas:
   1) In addition to the Requirements of conduit concrete encasement, conduits under walkways, roads, parking lots, driveways, and buildings shall be cast in place concrete "slurry mix" backfill. The slurry mix shall cover each side and top of conduits and conduit concrete encasement. The slurry mix shall be continuous to the underside of the finish subgrade surface.

f. Backfilling trenches for conduits with concrete encasement Requirements by the Contract Documents:
   1) Trenches with all conduits concrete encased shall be backfilled with clean damp sand when located under building pads.
   2) Trenches with all conduits concrete encased and not located under a building pad and not located under paved areas shall be backfilled with clean damp sand or native soil.

g. Backfill material:
   1) Sand and native soil backfill of trenches shall be machine vibrated in 6-inch lifts to provide not less than 90% compaction of backfill.
   2) Soil backfill shall have no stones, organic matter of aggregate greater than 3-inches.
   3) Concrete and slurry mix (2000-PSI) shall be machine vibrated during installation to remove "air-voids".
   4) The slurry mix shall consist of concrete, clean rock, clean sand and clean water mixture. Maximum shrinking of slurry mix shall not exceed 5% wet to dry.

h. Do not backfill until Owner's Representative has approved Installation and As-Built Drawings are up to date. Promptly install conduits after excavation has been done, so as to keep the excavations open as short a time as possible. Excess soil from trenching shall be removed from the site.

i. Install underground conduit, except under buildings, not less than 24-inches below finished grade in non-traffic areas and 30-inches below finished grade in traffic areas, including roads and parking areas. Not less than 48-inches below finished

grade under public/private transit system right of way and railroad right of way. Dimensions shall be measured to the top of the conduit.

j. Conduit crossing existing underground utilities shall cross below the bottom depth of the existing utilities. If the top portion of the existing utility depth below finish grade exceeds 72-inches and the specified separation and depths are maintained when crossing over the top of the existing underground utility, the conduit may cross above the existing underground utility.

k. Provide long radius horizontal bends (minimum radius of 36-times the conduit diameter) in underground conduits where the conduit is in excess of 100-feet long.

l. Conduits installed below grade and on grade below buildings, shall not be smaller than 0.75-inch. Conduits for circuits exceeding 600 volts shall not be smaller than 5.0-inches.

m. Underground conduits entering a building shall be sloped. The conduit direction of slope shall be away from the building and shall prevent water in the conduit from "gravity draining" towards the building. The conduit slope "high point" shall originate from the building, out to the first exterior pullbox, manhole etc. exterior conduit termination "low point". The minimum slope angle shall be a constant 8-inches (or greater) of fall for each 100-feet of conduit length.

n. Dewatering:

1) Provide pumping to remove, maintain and dispose of all water entering the excavation during the time the excavation is being prepared, for the conduit laying, during the laying of the conduit, and until the backfill at the conduit zone has been completed. These provisions shall apply on a continuous basis. Water shall be disposed of in a manner to prevent damage to adjacent property. Trench water shall not be drained through the construction. Ground water shall not be allowed to rise around the pipe until joining compound has firmly set.

2) The Owner's Representative shall be notified 48 hours prior to commencement of dewatering.

5. Raceway/Conduits, which are installed at this time and left empty for future use, shall have 0.25-inch diameter polyvinyl rope left in place for future use. The pull rope shall be 500-pounds minimum tensile strength. Provide a minimum of 5-feet of slack at each end of pull ropes.

6. Provide openings in building structures for conduit penetrations:

a. New construction shall be provided with conduit sleeves, to provide conduit penetrations.

b. Existing construction shall be drilled (core drill masonry and concrete) and provide conduit sleeves installed after drilling, to provide conduit penetrations.

c. Where the structure penetrations for underground conduits penetrating through foundations will not comply with the (restriction/penetration) shown in the Contract Documents, install the conduits below and clear of the foundation lowest point.

7. Conduit bends risers and offsets:

a. The minimum bend radius of "factory or field" fabricated conduit bends shall not be less than the following. The bend radius shall be measured at the surface, inside radius of the conduit wall:

1) FMC and LTFMC conduit - conduit minimum bend radius 12-times the conduit diameter.
2) RMC and EMT conduit minimum bend radius - conduit for power circuits over 100-volts and less than 600-volts, 8-times conduit diameter. Conduit for power circuits over 600-volt, 12-times conduit diameter. Conduit for low voltage, signal and fiber optic circuits, 10-times conduit diameter.
3) RNMC conduit - conduit minimum bend radius 36-times the conduit diameter. Under building reduce minimum bend radius to 10-times the conduit diameter. Conduit bends and offsets in RNMC with less than 36-times conduit diameter bend/offset radius shall be RNMC PVC Schedule 80 or PVC coated RGS.

b. Bends and offsets in conduits shall be kept to an absolute minimum. The total summation of all bends and offsets permitted in a conduit segment, occurring between two conduit termination/connection end points, shall not exceed the following, including conduit fittings:
1) RMC and EMT conduit - 360 angular degrees
2) FMC and LTFMC conduit - 180 angular degrees
3) RNMC conduit - 270 angular degrees

c. Each field fabricated conduit offset, bend and elbow which are not the standard product of the Raceway/Conduit Manufacturer shall be mandrel tested. The test shall be conducted after the conduit installation is complete and prior to pulling-in any wire, in the same manner as for underground conduits.

d. Factory manufactured angle connector conduit fittings shall be installed in exposed conduit locations only. Installation in locations normally concealed from view shall not be permitted. Not more than one factory manufactured angle connector shall be permitted in any length of conduit between conduit termination end points.

e. RNMC conduit risers from below grade shall be PVC coated RGS. Conduit risers, bends or offsets entering into a building shall be PVC coated RGS.

f. If three or more conduit-bends of the same conduit size and same conduit material type, installed, as part of the contract work, fail to comply with the required minimum conduit bend radius or conduit angular degree limits. The following corrective actions shall occur:
1) The Contractor shall remove all the non-complying conduit bends and the respective wire in the conduit from the project site. Provide new conduit and wire, complying with the Contract Documents.
2) Where the conduit bends similar to the non-complying conduit bends are installed concealed in walls, floors, above ceilings or below grade, the Contractor shall expose the conduit bends to allow visual observation.
3) The Contractor shall remove the non-complying conduit bends and dispose of the project site. The Contractor shall provide new conduit bends and conductors complying with the Contract Documents.
4) All the costs to correct the deficient material and work along with costs to repair the direct, indirect, incidental damages and Contract delays shall be the sole responsibility of the Contractor and shall be included in the bid price.

8. Expansion joint, deflection joint and seismic joint fittings.
   a. Provide a conduit expansion fitting for each conduit length and conduit type as follows (Note - The installation of specified combination expansion/deflection fittings at seismic joints shall satisfy this Spacing Requirement also):

	Conduit Type	Conduit	Fitting Length Spacing
1)	RMC and EMT	Exposed exterior locations	200-feet
2)	RMC and EMT	Interior weather protected locations	400-feet

   b. Provide a conduit combination expansion/deflection fitting for each conduit, crossing the following elements:
      1) At each building or non-building structure seismic joint.
      2) At each building on non-building structure expansion joint.
      3) At each conduit penetration of a "sound-rated" wall, floor or ceiling.
9. Provide two locknuts and an insulated throat bushing at each metal conduit terminating at enclosures, including but not limited to outlet boxes, junction boxes, terminal cabinets, switchgear, transformers, switchboards, distribution panels and panelboards.
10. Provide metallic or plastic closure caps on all conduit ends during construction, until installation of conductors in the respective conduit.
11. Conduit run exposed, shall be run at right angles or parallel to the walls or structures. All changes in directions, either horizontally or vertically, shall be made with conduit outlet bodies as manufactured by Crouse Hinds, OZ or equal. Conduits run on exposed beams or trelliswork shall be painted to match surrounding surfaces.
12. Conduit exposed on roof:
    a. Conduits installed exposed on roofs shall be installed on conduit sleepers. Place the conduit sleepers a maximum of 5-feet on center along the entire length of the conduit; under conduit expansion/deflection fittings; under each junction box and within 24-inches of each conduit bend.
    b. Provide a conduit support "C" channel continuous along the top length of the sleeper and rigidly bolted to the sleeper. Conduits shall be loosely fastened to each sleeper "C" channel with pipe clamps to allow for relative movement between the sleeper and conduit.
    c. Conduits shall not block or interfere with roof hatches, doors, ventilation openings, dampers, equipment access panels/doors, roof water drainage.
    d. Conduit sleepers shall be fabricated from "clear" solid redwood 4-inches by 4-inches (nominal) size. Sleeper length shall extend a minimum of 9-inches past the conduits attached to the sleeper, but in no case shall the length of the sleeper be less than 24-inches.
    e. Provide a pad under each sleeper; sleepers shall not be installed in direct contact with the roofing. Sleeper pads shall extend a minimum of 6 inches past each side of the sleeper. The sleeper pad shall be semi-rigid mineral surfaced composition board, not less than 0.375-inch thickness, bituminous impregnated, manufactured for application on the specific roofing material. Remove roofing "ballast" (gravel) under pad, prior to installation of sleeper pad. Do not puncture roof membrane.
    f. Position the "length" of the conduit sleepers' perpendicular to the roof slope, to prevent obstruction of roof drainage water flow. Where the conduit routing

prevents placing the conduit sleeper parallel to the roof slope, provide two separate sleeper pads for the conduit sleeper, with a continuous 3-inches wide water drainage gap between the sleepers. Align the water drainage gap to allow unimpeded water travel along the roof slope drainage flow line between the pads.

g. Sleepers and sleeper pads shall be set in non-hardening mastic, a minimum of 0.25-inch thickness. Mastic shall be inorganic, non-hardening, and complying with ASTM-D1227. Mastic shall be applied with continuous uniform coverage, minimum 0.25-inch thickness, on all the surfaces of each conduit sleeper and on the sleeper pad contact surface with the roof.

13. Rigid steel conduit or electrical metallic tubing shall not be strapped or fastened to equipment subject to vibration or mounted on shock absorbing bases.

14. RMC conduit threads:
    a. Machine cut threads on RMC conduit required for field fabrication shall comply with NPS and ANSI-B1.20.1.
    b. The length of bare metal exposed during thread fabrication shall be completely covered by conduit couplings and fittings. Additionally, the thread length shall insure that conduit joints will reach "torque" tightness and become secure before conduit ends "butt" together and before conduit ends "butt" into the "shoulders" of other conduit fittings.
    c. Running threads or right/left-handed threads shall not be used to connect RMC.

15. RNMC conduit:
    a. Joints and fittings shall be solvent welded to RNMC conduit. Joints and fittings shall be watertight and airtight after fabrication.

18. Tighten each conduit fittings and fitting appurtenance, to the "torque" (allowable tolerance ±5%) value recommended by the Fitting Manufacturer and applicable Code. If three or more conduit fittings are found to not be in compliance with the Manufacturer's "torque" (tightness) recommendations, the following corrective actions shall occur:
    a. The Contractor shall tighten "re-torque" the defective fittings and all similar conduit fittings installed as part of the Contract Documents in the presence of the Owner's Representative.
    b. If the respective conduit fittings similar to the deficient "torque tightness" fittings are installed concealed in walls, floors, above ceilings or below grade, the Contractor shall expose the fitting, to allow retightening each similar conduit fitting to the Manufacturers recommended "torque" values.
    c. All the cost to repair the direct, indirect, incidental damages and Contract delays resulting from complying with these Requirements shall be the sole responsibility of the Contractor and shall be included in the bid price.

G. Conduit Bodies
    1. Conduit bodies shall be installed in exposed conduit locations only or above accessible ceilings.
    2. Conduit bodies shall be accessible for removing body cover and pulling wire through the conduit body.
    3. Conduit bodies shall not be installed inside enclosed walls.

H. Preparation of Reuse of Existing Conduits

1. Prepare existing conduits shown to be reused as part of Contract Work as follows: Complete the required work prior to installing any conductors or cables in respective existing conduits.
    a. “Rod” out existing raceways to be used under this contact, with approved test and flexible mandrels to remove all obstructions to clear debris from inside conduits.
    b. Use test mandrels at least 12-inches long, 0.25-inch less than diameter of duct at center, tapering to 0.5-inches less than duct size at ends.
2. If test mandrels cannot be pulled through raceways, Contractor shall perform the following to clear the existing raceways:
    a. Force rigid or semi-rigid rods through the raceways to clear the obstructions from one to both ends of the raceway.
    b. Force a power-driven rotating router device through the conduit from one or both ends of raceways. Device shall incorporate small diameter cutting blades. Repeat the “router” process in incremental stages to a cutting blade diameter approximately ⅛-inch smaller than the raceway inside diameter.
3. After clearing the raceway of obstructions, pull a test mandrel or brush through the race way to clear the remaining debris from the raceway.

3.04 WIRE AND CABLE

A. Branch Circuit and Fixture Joints for #10AWG and smaller wire shall be made with UL-approved connectors listed for 600 volts, approved for use with copper and/or aluminum wire. Connector to consist of a cone-shaped, expandable coil spring insert, insulated with a nylon shell and two wings placed opposite each other to serve as a built-in wrench or shall be molded one-piece as manufactured by 3M-"Scotchlok".

B. Branch Circuit Joints of #8AWG and larger shall be made with screw pressure connectors made of high strength structural aluminum alloy and UL-approved for use with both copper and/or aluminum wire as manufactured by Thomas & Betts. Joints shall be insulated with plastic splicing tape, tapered half-lapped and at least the thickness equivalent to 1.5-times the conductor insulation. Tapes shall be fresh and of quality equal to Scotch.

C. Use UL listed pulling compound for installation of conductors in conduits.

D. Correspond each circuit to the branch number indicated on the panel schedule shown on the Drawings except where departures are approved by the Owner’s Representative.

E. All Wiring, including low voltage, shall be installed in conduit.

END OF SECTION 26 05 33
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PANELBOARDS AND TERMINAL CABINETS

PART 1 - GENERAL

1.01 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the Drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other Specification Sections and Drawings for related work required to be included as work under Division 26.
2. General Provisions and Requirements for electrical work.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. Provide Manufacturers catalog data for panels, cabinets and circuit breakers.

B. Provide Shop Drawing showing panel circuit arrangements, size, voltage, ampacity, over-current protective devices, etc.

C. Provide nameplate engraving schedule.

1.03 SEISMIC EARTHQUAKE AND WIND LOADING WITHSTAND, TESTING AND CERTIFICATION (ADDITIONAL REQUIREMENTS)

A. General

1. The complete panels and terminal cabinets' assemblies; including circuit protection devices, meter, housings/enclosures, accessories, supports/anchors etc., shall be designed, manufactured and tested.
   a. Wind loading all outdoor equipment locations.
   b. Earthquake Seismic and CBC/IBC Seismic withstand all indoor and all outdoor equipment locations.
2. Shall withstand, survive and maintain continuous non-interrupted energized operation during the seismic event occurrences and wind event occurrences. Continued normal energized operation after the wind event and seismic event occurrences have abated.
3. Shall include demonstrations of successful operation and run test after completion of seismic event shake-table simulation. Acceptance test seismic qualification shall employ triple axis shake-table simulation of the Required Response Spectrum (RRS) seismic event motion, certified and approved by the AHJ.
4. Provide three dimensional finite element analysis demonstrating anchorage and operational withstand of wind loading not less than as follows and as required by AHJ:
   a. 110MPH-West Coast States USA and Hawaii, per ASCE/SEI 7-16.
5. Seismic test shall be performed by a third party independent Test Laboratory. Wind analysis and seismic testing and reports shall be certified, signed and "stamped" by PE Professional Engineer licensed and in good standing in the State, Civil Engineer or Structural Engineer.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. Shall be flush or surface mounting as indicated with group -mount circuit protection devices as shown on panel schedule, hinged lockable doors, index cardholders and proper bussing.

1. Panelboards shall comply with the latest versions:
    a. NEMA – PB1.
    b. UL – 50 and 67.
    c. CEC
    d. ASTM-B187.
2. Where indicated on the Drawings shall be furnished with subfeed breakers and/or additional conductor lugs, split bussing, contactors, time switches, relays, etc., as required.
    a. Branch circuit panels up through forty-two circuits shall be single section, to accommodate all of the circuits and components.
    b. Distribution panels shall be single section or multi-section, to accommodate all of the circuits and components.
3. Panels shall be “Service-Entrance” equipment rated when the panel main incoming supply feeder originates from one of the following:
    a. Originates outdoors exterior of the building in which the respective panel is located.
    b. Originates from an electrical supply source not located in the same building as the respective panel.

B. Housing and Painting, Panels and Terminal Cabinets

1. Shall be finished with one coat of rust inhibitor zinc chromate and coat of primer sealer after a thorough cleaning.
2. Finish color paint as selected by Owner’s Representative where exposed to public view (e.g., corridors, covered passages, offices, etc.). Prime coated panelboard shall be painted to match surroundings after installation in public areas.
3. Manufacturer’s standard color in electrical rooms/closets, janitors, HVAC and storage rooms.
4. Shall be fabricated of sheet steel of the following minimum gauges.
    a. Full height hinged, locking door. Trim #12-gauge steel; enclosure - Code gauge steel.
    b. Panels installed in indoor dedicated electrical equipment rooms and dedicated electrical equipment closets, omit full height hinged locking panel door. Dead front cover behind omitted panel door shall remain.
5. NEMA-1 Metal Housing, for indoor locations.
6. NEMA-3R Metal Housing, tamper resistant, for outdoor locations.
7. Furnish all panels and terminal cabinets with the manufacturers flush locks and keys except where indicated otherwise herein. Keys and locks shall be interchangeable for all panels. Provide two latches and two locks for door heights exceeding 36-inches.
8. Fasten the trim to panel and terminal cabinets by means of concealed, bolted or screwed fasteners accessible only when the door is open.

C. Panels 208/120 volt, three phase, 4-wire, S/N or 120/240 volt, single phase, 3-wire, S/N.

Branch circuit panel as manufactured by:

1. Cutler Hammer "Pow-R-Line 1 or 2"Series
2. General Electric "A" Series
3. Square D "NF/NQ" Series
4. Siemens "P1/P2" Series

D. Branch circuit panels for 480/277 volt, three phase, 4-wire, S/N.

Panelboard as manufactured by:

1. Cutler Hammer "Pow-R-Line 2" Series
2. General Electric "A" Series
3. Square D "NF" Series
4. Siemens "P1/P2" Series

E. Distribution panels as manufactured by:

1. Cutler Hammer "Power-R-Line 3 or 4" Series
2. General Electric "Spectra" Series
3. Square D "I-Line" Series
4. Siemens "P4/P5" Series

F. Top and bottom gutter space shall not be less than 6-inches high. Provide 6-inches additional gutter space in all panels where double lugs are required or where cable ampere size exceeds bus ampere size.

G. Panel Dimensions.

1. Panels with buss sizes 50 amp thru 400 amp
   a. Shall be 20-inches wide. Surface or flush mounting as indicated.
   b. Recess mounted type shall have a 20-inches wide (maximum) recess metal enclosure with overlapping edge trim plate cover extending 1-inch on all sides of enclosure.
   c. Depth shall be 5.75-inches nominal. Height of panel as required for devices.
2. Panels with buss sizes greater than 400 amp.
   a. Narrow panels 24-inch (maximum) wide by 6.5-inches (maximum) deep units. Wide panels 25-inch to 44-inches (maximum) wide by 8-inches to 15-inches (maximum) deep units. Nominal 90-inch panel height.
   b. The wider units shall be used only at locations where the narrow unit is not available with the quantity or size of large-ampere frame branch/subfeed circuit protective devices shown on the panel schedules, or where the main breaker size exceeds the narrow panel maximum.
   c. Distribution panels shall be floor standing and also supported from behind the panels at walls.

2.02 PANEL CIRCUIT BREAKERS, CIRCUIT PROTECTION DEVICES

A. Circuit Breakers General, for Distribution Panels and Panelboards

1. NEMA-AB1 and AB3, comply with latest revision.

2. UL-1087, UL-489 and IEC-60.947.2 rated devices, comply with latest revision.
3. 5Hz AC closing and 3Hz AC trip and clear.
4. Main circuit breakers for distribution panels exceeding 400 amp and larger;
    a. Shall be Insulated Case Circuit Breaker type ICCB.
5. Main circuit breakers for branch circuit panelboards 400 amp buss and smaller;
    a. Shall be Current Limiting Circuit Breaker type-CLCB for non-emergency panelboards.
    b. Shall be Molded Case Circuit Breaker type-MCCB for emergency panelboards.
6. Branch circuit breakers and feeder circuit breakers smaller than 100-amp trip shall be Molded Case Circuit Breakers type-MCCB and/or Current Limiting Circuit Breakers type-CLCB.
7. All circuit breakers 100 amp and larger trip shall employ sensors and solid state digital electronic automatic trip system. Short-time and long-time; Time/current curve shaping field adjustable functions and adjustable instantaneous trip. Typical for Molded Case Circuit Breaker type-MCCB, Insulated Case Circuit Breaker type-ICCB and Current Limiting Circuit Breaker type-CLCB.

B. Manufacturer
1. Circuit breakers as manufactured by the following companies only are acceptable:
    a. Cutler Hammer
    b. General Electric Co.
    c. Square D Co.
    d. Siemens

C. Configuration
1. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the Drawings.
2. Circuit numbers of breakers shall be black-on-white micarta tabs or other previously approved method. Circuit number tabs, which can readily be changed from front of panel, will not be accepted. Circuit number tabs shall not be attached to or be a part of the breaker.
3. Panelboard circuit protection devices shall be bolt on type for connection to panel bus. Removable and installable without disturbing adjacent devices.
4. Provide conductor wire terminations (lugs) on each circuit protection device for incoming main feeder, branch circuits and outgoing feeder circuits. Dual rated copper/aluminum and compatible with the respective conductor size, type and quantity.
5. Where 2-pole or 3-pole breakers occur in the panels, they shall be common trip units. Single pole breakers with tie-bar between handles will not be accepted.
6. Branch circuit panels shall be field convertible for bottom entry main incoming feeder or top entry main incoming feeder.

7. Each panel section, the feeder and branch circuit protection devices (3-phase and/or 1-phase) shall be “twin-mount”, side-by-side double row construction for the following circuit sizes:
    a. 480/277 volt, 60-amp circuit size and smaller.
    b. 240 volt – 208/120 volt, 100-amp circuit size and smaller.

D. Lock-Off and Lock-On

1. All circuit breakers shall be pad-lockable in the "off" position.
2. Where branch circuit breakers supply the power to motors and signal systems, the breakers shall also be furnished with lockout clips, mounted in the “on” position. The breakers shall be able to trip automatically with lockout clips in place.
3. Provide lock-on clips on branch circuit breakers supplying fire alarm equipment and fire alarm panels. Provide identification of the dedicated "fire alarm" circuit function and operation. Color-code the circuit breakers to comply with AHJ Requirements.
4. Locking facilities shall be riveted or mechanically attached to the circuit breaker (submit sample for approval. Other means of attachment shall not be accepted without prior written approval of the Owner's Representative.

E. Switch and Fuse Feeder Protective Devices for Distribution Panels

1. Locations where the Drawings show distribution panels employing switch-fuse circuit protection devices.
2. Fusible Switches: Quick-make, quick-break type with rejection clips for use with Class “R” fuses Current Limiting Fuses (CLF). Switches with ratings up to and including 100-amp at 240 volts shall be twins mounted. Switches rated through 60-amp and 480 volts shall be twins mounted. Provisions for padlocking in the “on” and/or “off” positions. Switches shall be removable from front of panel without disturbing adjacent units or panel bus structure.
3. Fuses shall be time delay current limiting types, UL Class RK-1 unless otherwise indicated on the Drawings. Provide one spare set of fuses of each size and type in each Distribution Panel.
4. Provide auxiliary contact on switch for remote status (on-off) signaling and monitoring. Provide conductor lugs to accept conductor temperature rating, sizes and quantities shown on Drawings.
5. Switch and fuse devices shall be permitted only in distribution panels and only where specifically indicated on the Drawings for feeders.

2.03 PANEL BUSSING

A. Bus Material

1. Bussing shall be rectangular cross section tin-plated copper. As directed by Owner, aluminum panel busing shall not be permitted.
2. Bussing shall be non-tapped, full length of the enclosure.

B. Ground Bus

1. Each panel shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

2. Provide additional isolated ground bus in each panel with connecting isolated ground feeders and/or connecting isolated ground branch circuits.

C. Provisions

1. Provide space and all hardware and bus mounting attachments for future devices as indicated on the Drawings.

D. Neutral Bus

1. The ampere rating of the neutral bus of panels and distribution panels shall be a minimum of 100% greater ampere capacity than the ampere rating of the corresponding phase bus, where the panel is indicated to be provided with an “oversize-neutral” or “200%” neutral on the Drawings.

2.04 TERMINAL AND AUXILIARY CABINETS

A. Cabinets

1. Fabricated of code gauge sheet steel for flush mounting (except where noted as surface) of size indicated on the Drawings, and complete with hinged lockable doors, provide the quantity of 2-way Feed through conductor terminals required for termination of all conductors, plus 15% spares of each type.

2. Cabinet locks to operate from same key used for panelboards. The trim to cabinets shall be fastened by means of concealed bolted or screwed fasteners accessible behind door into cabinets. All cabinets shall have ⅝-inch plywood backing, finished with fireproof intumescent primer and finish coat paint. Provide equipment ground bus in each cabinet.

3. Cabinets shall be finished with one coat of zinc chromate and one coat of primer sealer after a thorough cleaning. Where exposed to public view (e.g., corridors, covered passages, offices, etc.) finish color paint to match surrounding and Manufacturer’s standard gray color in switchboard, janitors, heater, and storage rooms.

4. Provide grounded metal barriers inside cabinet to isolate and separate line voltage and low voltage from each other inside the cabinet.

B. Cabinet dimensions.

1. Unless indicated otherwise on Drawings.
   a. Shall be 20-inches wide. Surface or flush mounting as indicated.
   b. Recess mounted type shall have a 20-inches wide (maximum) recess metal enclosure with overlapping edge trim plate cover extending 1-inch on all sides of enclosure.

2. Depth shall be 5.75-inches nominal. Height of cabinet as required for devices, plus 25% spare unused interior space for future use, but not less than 36-inches high.

C. Terminals

1. Non-digital analog circuits; line and low voltage modular signal systems, 15-amp dual row with isolation barriers, screw-down terminals insulated strips, heavy duty.

a. As manufactured by: Molex, or ITT-Cannon, or General Electric.

2. Digital circuits; low voltage signal systems, ANSI/EIA/TIA Category-6, 110-Block or 66-Block gas-tight punch down style, heavy duty.
   a. As manufactured by: Leviton, or Ortronics, or AMP.

D. Identification (Additional Requirements)

1. Provide engraved nameplate on each cabinet indicating its designation and system (i.e., "Life Safety System - Panel 2LS", etc.).
2. Identify each terminal landing with unique circuit number and provide corresponding alphanumeric text-index card inside panel access door

PART 3 - EXECUTION

3.01 MOUNTING

A. Flush mounted panelboards and terminal cabinets shall be securely fastened to at least two studs or structural members. Trim shall be flush with finished surface.

1. Panels and cabinets installed flush (recess or semi-recess) into fire rated or smoke rated walls. The wall recess shall be fully wrapped inside the recess with fire/smoke rated materials. The wrap-materials shall provide the same fire and/or smoke protection rating as the respective wall.

B. Surface mounted panels and terminal cabinets shall be secured to walls by means of preformed galvanized steel channels securely fastened to at least two studs or structural members.

C. Panelboards and terminal cabinets shall be installed to insure the top circuit protective device (including top compartment control devices) are not more than 6-feet-6-inches above finish floor in front of the panel and the bottom device is a minimum of 12-inches above the floor. Manufacturer shall specifically indicate on Shop Drawing submittals each panel where these conditions cannot be met.

3.02 IDENTIFICATION (ADDITIONAL REQUIREMENTS)

A. Provide a red and white Bakelite nameplate with ½-inch high letters in each 277/480 volt panel fastened to face of dead-front plate, to read: "DANGER 480 (or as applicable) VOLTS KEEP OUT AUTHORIZED PERSONNEL ONLY".

B. Manufacturer shall stencil the panel/cabinet number identification on the inside of door to correspond with the designation on the Drawings.

C. Identification plates and numbers shall be attached with screws or twist lock fasteners. Adhesive attachment of any kind shall not be used.

3.03 SPARE CONDUITS (ADDITIONAL REQUIREMENTS)

Provide three 1-inch conduit only stubs from each panel and terminal cabinet into accessible ceiling space. Where floor level below panel or terminal cabinet is accessible, also provide an additional three 1-inch conduit only stubs into accessible floor space.

END OF SECTION 26 24 16

SECTION 28 46 20
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SCOPE

A. Work Included: All labor, materials, appliances, tools, equipment necessary for and incidental to performing all operations in connection with furnishing, delivery, and installation of the work of this Section, complete, as shown on the Drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other Specifications Sections and Drawings for related work required to be included as work under this Section.
2. General Provisions and Requirements for electrical work.

1.02 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. Submittal Documentation

1. See DSA Guideline: GL-2 for complete submittal.
2. Submit State Fire Marshal, AHJ and UL Listing numbers for each item of fire alarm system equipment and components.
3. Submit Manufacturer's standard catalog data for each fire alarm component. The submittal shall be arranged in the order of the Specification and shall list the Specification paragraph number, the name, the proposed model and Manufacturer for each item as well as a reference indicating the specific piece of data which can be easily located in the brochure. The Manufacturer's data sheets shall be marked to indicate the specific item being proposed in cases where the sheet covers several types or sizes of item. The data sheet shall completely describe the proposed item including listing numbers. Where modification to the equipment is necessary to meet the Operational Requirements of the Contract Documents, the brochure shall include complete Mechanical and Electrical Shop Drawings detailing the modification. The brochure shall include a listing of the outlet rough-in needed for every device and equipment item. The applicable symbol, which illustrates that rough-in item on the Drawing Plans, shall be shown in the submittal opposite the description of the rough-in to facilitate locating the data by Field Personnel. Submit elevation and dimensional information.
4. A listing of outlet rough-in needed for every device and equipment item. The applicable symbol which illustrates that rough-in item on the Job Plans shall be drawn on the proposal, opposite the description of the rough-in of facilitate locating the data by Field Personnel.

1.03 EQUIPMENT QUALIFICATIONS

A. General

1. The fire alarm system in the Contract Documents has been submitted for review, has been approved and "approval stamped" by the Fire Marshal of Record (AHJ) based on the Manufacturer's products and listing numbers described in the Contract Documents".

2. The fire alarm system equipment shall be limited to the products of Silent Knight Farenhyt Series. The Fire Alarm Manufacturer products described are required by and at the specific direction of the Owner and approved by the Owner.
3. The Fire Alarm System Installation Company shall be an authorized Distributor and Service Provider for the fire alarm system equipment specified in the Contract Documents and furnished as part of Contract Work. The Fire Alarm Installation Company shall be certified, and their staff shall be trained for the fire alarm system equipment furnished as part of Contract Work. Provide six copies of written documentation from the Fire Alarm System Manufacturer demonstrating compliance in good standing with the "Authorized Distributor," "Service Provider," "Certification" and "Training" Requirements.
4. A Fire Alarm System Technician authorized by the Manufacturer of the fire alarm system shall supervise the Contractors installation, testing, certification, and instruction of Owners' Personnel in the operation of the fire alarm system. The Technician shall be experienced with the specific system and licensed in the respective State for fire alarm systems.
5. NICET – National Institute for Certification in Engineering Technology:
    a. The Contractor's Fire Alarm Field Installation Personnel shall be NICET (Level-2 or greater) certified in fire alarm systems.
    b. Submit documentation showing compliance of NICET current valid certification for the Key Personnel.

PART 2 - PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. Basic Performance and Capabilities

1. System shall be fully programmable and configurable on site to accommodate system expansions and facilitate changes in operation.
2. All software programs shall be stored in non-volatile programmable memory within the FACP.
    a. Loss of primary and secondary power shall not erase the instructions stored in the memory.
    b. System programming shall be password protected.
3. Alarm, supervisory and trouble signals from analog addressable devices shall be encoded onto NFPA Class B Signaling Line Circuits (SLC).
4. Initiation Device Circuits (IDC) shall be wired NFPA Class B.
5. Notification appliance circuits shall be wired NFPA Class B.
6. A single ground or open on any system SLC, IDC or NAC shall not cause a system malfunction, loss of operating power or the ability to report an alarm.
7. Alarm signals arriving at the main FACP shall not be lost due to a power failure.
8. Per NFPA 72, the system shall be provided with sufficient battery capacity to operate the entire system upon loss of 120 VAC power in a normal supervisory mode for a period of 24-hours with 15-minutes of alarm indication at the end of this period.

9. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic. Batteries, once discharged, shall recharge at a rate that complies with NFPA 72 Section 10.6.10.3.

B. System Functional Operation

1. The actuation of any approved alarm initiating device shall automatically initiate the following functions:
   a. Alarm LED on the FACP shall flash.
   b. Local audible piezo electronic signal in the FACP shall sound.
   c. The alarm condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).
   d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC Section 907.6.5.3 (2022).
   e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the alarm occurrence.
   f. System output programs configured via Control-by-Event (CBE) programming to be activated by the particular point in alarm shall be executed, and the associated system output (alarm notification appliances and relays) shall be activated on either local outputs or points located on other network nodes.
2. The actuation of any approved supervisory alarm initiating device shall automatically initiate the following functions:
   a. Supervisory LED on the FACP shall flash.
   b. Local audible piezo electronic signal in the FACP shall sound.
   c. The supervisory condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).
   d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC Section 907.6.5.3 (2022).
   e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the supervisory alarm occurrence.
   f. System output programs configured via Control-by-Event (CBE) programming to be activated by the particular point in supervisory alarm shall be executed, and the associated system outputs (relays) shall be activated on either local outputs or points located on other network nodes.
3. Whenever a trouble condition is detected and reported the FACP shall automatically initiate the following functions:
   a. Trouble LED on the FACP shall flash.
   b. Local audible piezo electronic signal in the FACP shall sound.
   c. The trouble condition description, including the type of point and the location within the protected premises, shall be displayed on the LCD display at the FACP and any remote annunciator(s).
   d. System shall transmit the condition to a UL Listed Central Station Monitoring Facility. Supervising station shall be approved per CFC Section 907.6.5.3 (2022).

e. Printing and history storage equipment shall log the information associated with the condition, including the time and date of the trouble condition occurrence.

f. System output programs configured via Control-by-Event (CBE) programming to be activated by the particular point in trouble condition shall be executed, and the associated system outputs (relays) shall be activated on either local outputs or points located on other network nodes.

2.02 FIRE ALARM CONTROL PANEL (FACP)

A. The existing Silent Knight Farenhyt Series 2000ECS Series emergency voice evacuation control panel shall be modified, expanded to include carbon monoxide detection and reprogrammed and per Manufacturer Requirements to serve the new construction as shown on Plan and as specified herein.

B. Network Nodes

1. Network Nodes, if required, shall be Silent Knight Farenhyt IFP-2000 or IFP-2000ECS.
   a. All Network systems shall have at least one IFP-2000ECS node for compliance with CFC required Emergency Voice/Alarm Communication in K-12 Schools.
   b. All Network Nodes shall have the capability of being connected with either copper cable or fiber optic cable.

C. Power Supply

1. The power supplies for the fire alarm system shall be adequately sized to properly operate the fire alarm system equipment, including remotely connected, spare and future indicated equipment with all alarm devices in alarm condition. Provide 30% spare power supply capacity for future expansion. Provide transfer modules and multiple power supplies as required for proper operation. Power supplies shall be in integral part of the equipment housings.
2. Input voltage 120/240 volt or 120/208-volt 60Hz AC.
3. Lightning protection, surge transient voltage and RF noise filtering protection on each 60Hz AC input and output phases of the power supply shall be provided.
4. Supervised voltage types (i.e., 120V-60Hz AC, 24-volt AC, 24 Volt D.C., etc.) required by special connected equipment shall be supplied to evacuation alarm devices.
5. Battery Back-Up Operation
   a. Internal batteries and battery power supplies shall provide 72-hours continuous automatic normal operation of the entire fire alarm control panel and fire alarm systems connected to the fire alarm control panel after the failure of the incoming utility power. Sufficient battery capacity shall remain at the end of 72-hour period to provide 15-minutes of “alarm mode” continuous operation of all connected evacuation alarm devices both visual and audible types.
   b. Batteries shall be sealed lead-acid. Batteries shall be earthquake restrained. Batteries shall include catalytic conversion of out-gassing hydrogen gases.
   c. The battery charger shall be automatic, dual rate with capacity to recharge completely discharged batteries in not less than 18-hours. Charger shall be temperature compensated.

D. Signaling Line Circuit (SLC) Devices

1. Each SLC shall be capable to accommodating 159 addressable detectors and 159 addressable modules.
2. Provide SLC devices as indicated on the Construction Drawings. All devices shall be listed for compatibility with the IFP-2100 ECS.
    a. Carbon monoxide detector shall be Silent Knight IDP-FIRE-CO.
    b. SLC Isolation Module shall be Silent Knight IDP-ISO.
    c. Addressable Relay Module shall be Silent Knight IDP-Relay.
    d. Addressable Input Module shall be Silent Knight IDP-Monitor.
    e. Addressable Mini Input Module shall be Silent Knight IDP-Minimon.
    f. Addressable Manual Pull Station shall be Silent Knight IDP-Pull-DA.

E. Notification Appliance Circuit (NAC) Devices

1. NAC devices shall be the product of System Sensor. All devices shall be listed for compatibility with the IFP-2000 FACP.
    a. Wall mounted multi-candela strobe shall be System Sensor SR, red in color.
    b. Ceiling mount multi-candela strobe shall be System Sensor SCW, white in color.

F. Line-Voltage Isolation Relay

1. Line-Voltage Isolation Relay shall be System Sensor PR-1, Air Products PAM-1, MR101C or RIC-1.

G. System Wire/Cable

1. All Fire Alarm System Wire and Cable shall be installed in conduit, unless noted otherwise.
    a. Interior
        1) SLC cable shall be #16AWG, 2-conductor, unshielded, FPL, red jacket by Falcon Fine Wire #450216R, or equal.
            a) SLC cable shall be California State Fire Marshal (CSFM) listed.
        2) NAC Wire shall be #12 AWG THHN/THWN stranded color red and black.
        3) S-bus cable shall be #16AWG, 4-conductor, unshielded, FPL, red or black jacket by Falcon Fine Wire #450416R or equal.
            a) S-Bus cable shall be California State Fire Marshal (CSFM) listed.

2.03 REMOTE FIRE ALARM ANNUNCIATOR - FAAP

The existing remote annunciator panel shall be reprogrammed to account for new addressable devices being added to the fire alarm system.

PART 3 - EXECUTION

3.01 DIVISION OF WORK

A. While all work included under this Specification is the complete responsibility of the Electrical Contractor, the Division of actual work listed following shall occur.

1. All conduits with pull cords, all electrical pullboxes, grounding rods, all outlet boxes, terminal cabinets, backboards, etc., which form part of the rough-in work shall be

provided and installed completely by the Electrical Contractor. Coordinate as necessary for proper installation.

a. Equipment specific boxes provided by the System Manufacturer shall be provided by System Supplier/Installer and installed by the Electrical Contractor.

2. The balance of the system, including installation of initiating devices, notification appliances and equipment, making all connections, etc., shall be performed by the System Supplier/Installer.
3. All 120VAC power conductors and conduits associated with power circuits to all fire alarm system equipment locations shall be provided and installed by the Electrical Contractor.
4. An insulated stranded copper ground wire shall be provided from each control unit to the building grounding system, in compliance with CEC Article 250, by the Electrical Contractor.
5. Labeling of pullboxes and terminal cabinets shall be provided and installed by the Electrical Contractor.
6. HVAC Unit Shut-down
   a. Conduit for Code Required HVAC unit shut-down shall be provided and installed by the Electrical Contractor.
   b. Conductors for Code Required HVAC unit shut-down shall be provided, installed, and terminated by the Mechanical Contractor.
   c. Addressable Relay Modules for Code Required HVAC unit shut-down shall be provided and installed by the Fire Alarm System Supplier/Installer.

3.02 INSTALLATION

A. All work shall be completed in strict accordance with all applicable Codes and Ordinances, by a Silent Knight Select Farenhyt Engineered Systems Distributor.

B. Cable/Wire
   1. All cable/wire for the system specified herein shall be new, unless otherwise noted on Plans.
   2. System cable/wire and equipment installation shall be in accordance with good engineering practices as established by the California Electrical Code (CEC). Wiring shall meet all applicable Electrical Codes. All cable/wire shall test free from all grounds and shorts.
      a. All cable/wire shall be continuous between terminals with no splices.
   3. All cable/wire shall be labeled at all points of termination. All labeling shall be based on the room numbers as provided by the District or his Representative.
   4. Underground cables
      a. Any cable/wire pulled through manholes or pullboxes located below grade, shall be continuous between terminals with no splices under-ground. The cable/wire shall be intact with no cuts in the protective outer jacket.
      b. All cable/wire in underground vaults/boxes shall be neatly dressed in service loops attached to the sides of the vault/box. Cable/wire shall not come in contact with the ground.

3.03 SYSTEM PROGRAMMING

All programming shall be performed by a Manufacturer's trained and certified Technician currently employed by the System Supplier/Installer.

3.04 SYSTEM VERIFICATION

A. Subsequent to system start-up the system installer shall perform a 100% system pre-test to verify that the following features are functioning properly.

1. All notification appliances
2. All initiation devices
3. All control modules
4. All monitor modules
5. Communication link to monitoring service

3.05 SPECIAL INSTALLATION REQUIREMENTS

A. Equipment shall be weatherproof gasketed where installed in locations exterior to the building, or where indicated on the Drawings. Weatherproof equipment shall be tamper-resistant.

B. Fire alarm system shall be programmed per actual building and room designation

3.06 TESTING

A. The fire alarm system shall be tested in the presence of the local DSA Inspector and a Representative of the Manufacturer after the installation is complete.

1. Individually activate each manual initiating station and verify correct alarm operation and control panel response.
2. Individually test each automatic initiating device and verify correct alarm operation, control panel response and remote equipment operation.
3. The communication loops and the notification alarm circuits shall be opened in at least two locations per building to check for the presence of correct supervisory circuitry.

B. Test the battery back-up system by disconnecting the incoming normal power and allowing this alarm system to operate 24 hours on battery power. Sound the alarm system for 5-minutes at the end of 24 hours on battery power.

C. Perform all Electrical and Mechanical Tests required by the Equipment Manufacturer's certification form. Measure and adjust each automatic detection detector to the maximum stable sensitivity setting. Detector tests shall be performed with the detector at its operational location and under normal operational environmental conditions in the area. Bench settings are not acceptable. An operational check-out test and report shall be performed. Submit six copies of test report results. The tests and report shall include, but not be limited to:

1. A complete list of equipment installed and wired.
2. Indication that all equipment is properly installed and functions and conforms with these Specifications.
3. Test of individual zones as applicable.

4. Serial numbers of locations by zone and model number for each installed detector.
5. Voltage (sensitivity) settings for each ionization and photoelectric detector as measured in place with the HVAC system operating.
6. Technician's name, certificate number and date.
7. The completed manual and automatic monitoring and control system shall be tested to insure that it is operating properly. This test will consist of exposing the installed units to a standard fire test.
8. Acceptance of the system shall also require a demonstration of the stability of the system. This shall be adequately demonstrated if the system operates for a 90-day test period without any unwarranted alarms. Should an unwarranted alarm(s) occur, the Contractor shall readjust or replace the equipment and detector(s) and begin another 90-day test period. As required by the Architect, the Contractor shall recheck the detectors using the fire test after each readjustment or replacement of detectors. This test shall not start until the District has obtained beneficial use of the building under tests.

D. After the Testing has been completed to the satisfaction of CFC 907.9 – 907.9.4.1 the Inspectors, provide the NFPA Certificate of compliance to the District, the local Fire Official, the Architect and DSA.

E. Upon receipt of Certificate of Compliance, the Installer/Supplier shall supply the District with written operating, testing and maintenance instructions, Point-To-Point As-Built Drawings, and Equipment Specifications. Maintenance provisions, CFC 907.4.5.

3.07 RECORD DRAWINGS AND CLOSE-OUT DOCUMENTATION

A. System Supplier/Installer shall periodically update the Construction Manager's Master Set of Record Drawings kept on site.

B. Contractor shall provide the following at close-out.
1. Three electronic copies of Manufacturer's maintenance and operation manuals.
2. Three wet signed copies of system warranty.

C. Provide a Record Documents cabinet installed at the FACP location or other approved location with signage at FACP to indicate location. Cabinet shall be labeled SYSTEM RECORD DOCUMENTS and contain all Record and Testing Documentation. Contents shall be accessible to authorized Personnel only and include the following items:
1. Record Drawings/As-Builts
2. Equipment cut sheets and CSFM listing sheets.
3. System NFPA Certificate of Compliance.
4. Software and firmware control documentation.
5. Inspection and testing documentation.
6. Other items identified on the Drawings.

3.08 WARRANTY

The Contractor shall warrant the equipment and/or materials to be new and free from defects in material and workmanship, and will, within 3-years from the date of final acceptance, repair or

replace any equipment and/or materials found to be defective. This warranty shall not apply to any equipment or materials that have been subject to misuse, abuse, negligence or modification by District or Contractors other than the original Installer that provided this warranty.

END OF SECTION 28 46 20
122823/8741097

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT

RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

RUHNAU CLARKE ARCHITECTS

3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501 (951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 (760) 438 5899

STAMPS

AGENCY APPROVAL
File No.: 30-48 A#04-122954

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

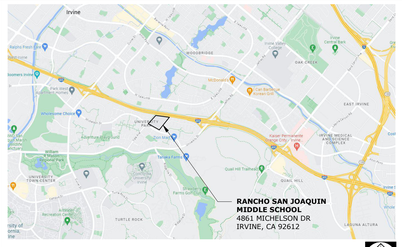
TYPICAL ABBREVIATIONS

@	AT	INT	INTERIOR	UOS	UNDERSIDE OF STRUCTURE
&	AND				
<	ANGLE	JH	JOIST HANGER		
#	POUND OR NUMBER	JT	JOINT	VC	VINYL COATED
		JST	JOIST	VCB	VENTED COVED BASE
ACP	ACOUSTICAL CEILING PANEL			VCT	VINYL COMPOSITION TILE
ACT	ACOUSTICAL CEILING TILE	L	LIGHT	VERT	VERTICAL
AD	AREA DRAIN	LAM	LAMINATE	VIF	VERIFY IN FIELD
AFF	ABOVE FINISHED FLOOR	LO	LOW	VSF	VINYL SHEET FLOORING
ALUM	ALUMINUM	LT	LIGHT	VTR	VENT THROUGH ROOF
AWP	ACOUSTICAL WALL PANEL	LVR	LOUVER	VWC	VINYL WALL COVERING
		LVT	LUXURY VINYL TILE		
BD	BOARD			W/	WITH
BLKG	BLOCKING	MACH	MACHINE	W/O	WITHOUT
BOS	BOTTOM OF STRUCTURE	MAX	MAXIMUM	WACP	WASHABLE ACOUSTIC CEILING PANEL
BOT	BOTTOM	MANF	MANUFACTURER		
BYND	BEYOND	MECH	MECHANICAL	WAF	WOOD ATHLETIC FLOORING
		MFR	MANUFACTURER		
CAB	CABINET	MH	MANHOLD	WD	WOOD
CBU	CEMENT BACKER UNIT	MIN	MINIMUM	WI	WOODWORKING INSTITUTE
CF	CUBIC FEET	ML	METAL LATH		
CIP	CAST IN PLACE	MO	MASONRY OPENING	WIN	WINDOW
CJ	CONTROL JOINT	MS	METAL STUD	WP	WALL PADDING
CL	CENTERLINE	MTD	MOUNTED	WWF	WELDED WIRE FABRIC
CLF	CHAIN LINK FENCE	MTL	METAL		
CLG	CEILING	MPS	METAL PANEL SYSTEM		
CLR	CLEAR				
CMU	CONCRETE MASONRY UNIT	NIC	NOT IN CONTRACT		
COL	COLUMN	NTS	NOT TO SCALE		
CONC	CONCRETE	NO	NUMBER		
CONT	CONTINUOUS				
CPL	CEMENT PLASTER	OC	ON CENTER		
CPT	CARPET	OD	OUTSIDE DIAMETER		
		OFCI	OWNER FURNISHED/ CONTRACTOR INSTALLED		
DBL	DOUBLE				
DDC	DOUBLE DETECTOR CHECK	OFOI	OWNER FURNUSHED/ OWNER INSTALLED		
DEMO	DEMOLISH OR DEMOLITION				
DET	DETAIL	OH	OPPOSITE HAND/ OVERHEAD		
DF	DRINKING FOUNTAIN				
DIA	DIAMETER	OPNG	OPENING		
DIM	DIMENSION	OPP	OPPOSITE		
DL	DOOR LOUVER	OZ	OUNCE		
DN	DOWN				
DP	DEMOUNTABLE PARTITION	P	PAINT OR PAINTED		
DR	DOOR	PA	PLANTING AREA		
DRF	DOOR FRAME	PCC	PRE-CAST CONCRETE		
DS	DOWN SPOUT	PFIN	PRE FINISHED		
DSA	DIVISION OF STATE ARCHITECT	PIV	POST-INDICATOR VALVE		
		PL	PLATE/PROPERTY LINE		
DWGS	DRAWINGS	PLAM	PLASTIC LAMINATE		
		PLAST	PLASTIC		
(E)	EXISTING	PLUMB	PLUMBING		
EA	EACH	PLWD	PLYWOOD		
EJ	EXPANSION JOINT	PT	PRESSURE TREATED		
EL	ELEVATION	PTD	PAINTED		
ELEV	ELEVATOR	PTN	PARTITION		
ENCL	ENCLOSURE	PVC	POLYVINYL CHLORIDE		
EPDM	ETHYLENE PROPYLENE DIENE M-CLASS (ROOFING)	R	RADIUS		
EQ	EQUAL	RB	RUBBER BASE		
EQUIP	EQUIPMENT	RCP	REFLECTED CEILING PLAN		
EW	EACH WAY	RD	ROOF DRAIN		
EWC	ELECTRIC WATER COOLER	REF	REFERENCE		
EXIST	EXISTING	REINF	REINFORCED		
EXT	EXTERIOR	RES	RESINOUS FLOORING		
		REQ	REQUIRED		
FC	FINISH CEILING	RM	ROOM		
FD	FLOOR DRAIN	RO	ROUGH OPENING		
FDC	FIRE DEPARTMENT CONNECTION	RQMT	REQUIREMENT		
		RS	ROLLER SHADE		
FE	FIRE EXTINGUISHER	RT	RUBBER TREAD		
FEC	FIRE EXTINGUISHER CABINET	SAF	SYNTHETIC ATHLETIC MATERIAL		
FF	FLOOR FINISH/FACTORY FINISH	SB	SPLASH BLOCK		
FFE	FURNISHINGS, FIXTURES, & EQUIPMENT	SC	SOLID CORE		
		SHT	SHEATHING		
FG	FINISH GRADE	SIM	SIMILAR		
FH	FIRE HYDRANT	SPEC	SPECIFICED OR SPECIFICATION		
FHC	FIRE HOSE CABINET				
FIN	FINISH	SS	STAINLESS STEEL		
FLR	FLOOR	SSM	SOLID SURFACE MATERIAL		
FND	FOUNDATION				
FO	FACE OF	STC	SOUND TRANSMISSION COEFFICIENT		
FOF	FACE OF FINISH				
FOM	FACE OF MASONRY	STD	STANDARD		
FOS	FACE OF STUD	ST	STAIN		
FR	FIRE RISER	STL	STEEL		
FRP	FIBERGLASS REINFORCED PANEL	STRUCT	STRUCTURE OR STRUCTURAL		
FS	FINISH SURFACE	SUSP	SUSPENDED		
FURN	FURNISH/FURNITURE	SV	SHEET VINYL FLOORING		
G	GROUT	T	TILE		
GA	GAUGE	TB	TACK BOARD		
GALV	GALVANIZED	TC	TOP OF CONCRETE CURB		
GB	GRAB BAR	TEL	TELEPHONE		
GL	GLASS	TEMP	TEMPORARY		
GLULAM	GLUE LAMINATED	T&G	TONGUE AND GROOVE		
GWB	GYPSUM WALLBOARD	TJ	TOOLED JOINT		
GWWB	WATER RESISTANT GWB	TO	TOP OF		
		TOC	TOP OF CONCRETE/TOP OF CANOPY		
H	HIGH				
HC	HOLLOW CORE	TOD	TOP OF DRAIN		
HDW	HARDWARE	TOP	TOP OF PARAPET		
HM	HOLLOW METAL	TOR	TOP OF ROOF		
HORIZ	HORIZONTAL	TOS	TOP OF SHEATHING		
HP	HIGH POINT	TOW	TOP OF WALL		
HR	HOUR	TS	TUBE STEEL		
HT	HEIGHT	TSB	TOP SET BASE		
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING	TPD	TOILET PAPER DISPENSER		
		TWP	TACKABLE WALL PANEL		
		TYP	TYPICAL		
ICB	INTEGRAL COVED BASE				
ID	INSIDE DIAMETER	UC	UNDERCUT/UNDER COUNTER		
IGU	INSULATED GLAZING UNIT				
ILO	IN LIEU OF	UNO	UNLESS NOTED OTHERWISE		
INSUL	INSULATION				

GENERAL NOTES

1. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR MEANS, METHODS, SEQUENCE, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, SUPERINTENDING OR COORDINATING ALL PORTIONS OF THE WORK OF CONSTRUCTION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ANY HEALTH OR SAFETY PRECAUTIONS REQUIRED BY ANY REGULATORY AGENCIES.
2. THE CONTRACTOR SHALL COMPLY WITH CALIFORNIA FIRE CODE, CHAPTER 33 FOR FIRE SAFETY DURING CONSTRUCTION.
3. CONTRACTOR WILL BE REQUIRED TO PROVIDE AND INSTALL ALL EQUIPMENT AND RELATED ITEMS AS SHOWN IN THESE DOCUMENTS AND AS SPECIFIED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL EXISTING CONDITIONS IN THE FIELD PRIOR TO BID AND TO DETERMINE THE WORK NECESSARY TO COMPLETE THE PROJECT.
4. ALL WORK SHALL CONFORM TO TITLE 24, CALIFORNIA CODE OF REGULATIONS (C.C.R.) AND SECTION 4-333.
5. STRUCTURAL MODIFICATIONS SHALL BE MADE BY ADDENDUM OR CONSTRUCTION CHANGE DOCUMENT (C.C.D.) APPROVED BY DSA PER SECTION 4-338, PART 1, TITLE 24.
6. A PROJECT INSPECTOR, EMPLOYED BY THE DISTRICT (OWNER) AND APPROVED BY THE DIVISION OF THE STATE ARCHITECT, SHALL PROVIDE CONTINUOUS INSPECTION OF THE WORK. THE DUTIES OF THE INSPECTOR IS DEFINED IN SECTION 4-342, PART 1, TITLE 24, C.C.R. THE INSPECTOR SHALL BE ESPECIALLY QUALIFIED IN MECHANICAL AND ELECTRICAL WORK AND HAVE SUCCESSFULLY COMPLETED THE REQUIRED DSA CERTIFICATION PROCESS FOR CLASS **3** INSPECTOR OF RECORD.
7. THE ARCHITECT OF RECORD SHALL HAVE THE RIGHT TO MAKE FINAL JUDGMENTS RELATIVE TO SUBMITTAL DRAWING REVISIONS IN ORDER TO ENSURE COMPLIANCE WITH ENGINEERING STANDARDS, APPLICABLE CODES, AND ARCHITECTURAL INTENT.
8. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LOCATIONS OF EXISTING CONDITIONS ON THE JOB SITE PRIOR TO THE START OF ANY WORK. NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND CONSTRUCTION DOCUMENTS. EXISTING CONDITIONS ARE INDICATED AS A RESULT OF INFORMATION SHOWN ON AVAILABLE DOCUMENTS. ANY DAMAGE TO EXISTING CONDITIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
9. THE EXISTENCE OR LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, OR STRUCTURE SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, EXISTING UTILITIES ARE AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF ALL UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES SHOWN OR NOT SHOWN HEREON.
10. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ADEQUACY AND SAFETY OF THE DESIGN/ERECTION OF BRACING, SHORING, TEMPORARY SUPPORTS AND SCAFFOLDING.
11. UNDER NO CIRCUMSTANCE SHALL WORKING DIMENSIONS BE SCALED FROM PLANS, SECTIONS, OR DETAILS ON THE DRAWINGS.
12. ALL STANDARDS, MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE STATE BUILDING CODES, ORDINANCES, REGULATIONS, AND LAWS.
13. WHERE ANY CONFLICT OCCURS BETWEEN THE REQUIREMENTS OF FEDERAL, STATE AND LOCAL LAWS, CODES, ORDINANCES, RULES AND REGULATIONS, THE MOST STRINGENT SHALL GOVERN.
14. ITEMS MARKED "TYP." OR "TYPICAL" SHALL APPLY IN ALL CASES UNLESS SPECIFICALLY INDICATED OTHERWISE.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF REQUIREMENTS BETWEEN THE DISCIPLINES (ARCHITECTURAL, STRUCTURAL, PLUMBING, MECHANICAL, AND ELECTRICAL, ETC.) AND BETWEEN DRAWING AND SPECIFICATION IN ORDER TO ENSURE THAT ALL ITEMS SHOWN IN RELATIONSHIP TO ONE ANOTHER OR SHOWN IN MULTIPLE LOCATIONS ARE IN AGREEMENT. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT REGARDING ANY DISCREPANCIES, ERRORS, OMISSIONS OR INCONSISTENCIES AND SHALL NOT PROCEED WITH THE WORK UNTIL CLARIFICATION HAS BEEN ISSUED BY THE ARCHITECT.
16. ALL WORK SHALL BE DONE IN ACCORDANCE WITH TITLE 24 CALIFORNIA CODE OF REGULATIONS (CCR)
17. GRADING PLANS DRAINAGE IMPROVEMENTS, ROAD & ACCESS REQUIREMENTS AND ENVIRONMENTAL HEALTH CONSIDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES. INSPECTOR OF RECORD (IOR CLASSIFICATION 1).
18. THE CALIFORNIA ENERGY CODE SECTION 10-103 REQUIRES ACCEPTANCE TESTING ON ALL NEWLY INSTALLED LIGHTING CONTROLS, MECHANICAL SYSTEMS, ENVELOPES, AND PROCESS EQUIPMENT AFTER INSTALLATION AND BEFORE COMPLETION. AN ACCEPTANCE TEST IS A FUNCTIONAL PERFORMANCE TEST TO HELP ENSURE THAT NEWLY INSTALLED EQUIPMENT IS OPERATING AND IN COMPLIANCE WITH THE ENERGY CODE.
19. LIGHTING CONTRLS ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN (ATT).
20. MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MECHANICAL ATT FOR PROJECTS SUBMITTED ON OR AFTER OCTOBER 1, 2021.
21. ENVELOPE AND PROCESS EQUIPMENT ACCEPTANCE TESTS SHALL BE PERFORMED BY THE INSTALLING CONTRACTOR, ENGINEER/ARCHITECT OF RECORD OR THE OWNER'S AGENT.
22. A LIST OF CERTIFIED ATT CAN BE FOUND AT: HTTPS://WWW.ENERGY.CA.GOV/PROGRAMS-AND-TOPICS/PROGRAMS/ACCEPTANCE-TEST-TECHNICIAN-CERTIFICATION-PROVIDER-PROGRAM/ACCEPTANCE.
23. THE ACCEPTANCE TESTING PROCEDURES MUST BE REPEATED, AND DEFICIENCIES MUST BE CORRECTED BY THE BUILDER OR ISNTALLING CONTRACTOR UNTIL THE CONSTRUCTION/INSTALLATION OF THE SPECIFIED SYSTEMS CONFORM AND PASS THE REQUIRED ACCEPTANCE CRITERIA.
24. PROJECT INSPECTORS WILL COLLECT THE FORMS TO CONFIRM THAT THE REQUIRED ACCEPTANCE TESTS HAVE BEEN COMPLETED.

REGIONAL MAP



SITE MAP

APPLICABLE CODES

PARTIAL LIST OF APPLICABLE CODES AS OF JANUARY 1, 2023
2022 CALIFORNIA ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R.
2022 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R.
2022 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R.
2022 CALIFORNIA MECHANICAL CODE (CMC) PART 4, TITLE 24 C.C.R.
2022 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R.
2022 CALIFORNIA ENERGY CODE, PART 6, TITLE 24 C.C.R.
2022 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 C.C.R.
2022 CALIFORNIA EXISTING BUILDING CODE (CEBC), PART 10, TITLE 24 C.C.R.
2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN), PART 11, TITLE 24 C.C.R.
2022 CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24 C.C.R.
TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS.

APPLICABLE STANDARDS
FOR A LIST OF APPLICABLE STANDARDS, INCLUDING CALIFORNIA AMENDMENTS TO THE NFPA STANDARDS, REFER TO CBC CHAPTER 35 AND CFC CHAPTER 80.

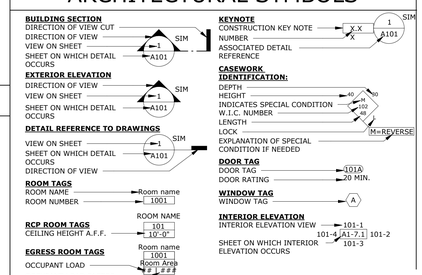
APPLICABLE AGENCIES

STATE OF CALIFORNIA

DEPARTMENT OF GENERAL SERVICES
DIVISION OF THE STATE ARCHITECT
10920 VIA FRONTERA ROAD, STE. 300
SAN DIEGO, CA 92127
TEL: (858) 674-5400

SHEET INDEX

ARCHITECTURAL SYMBOLS



CONTACT LIST

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Maintenance, Operations, and Transportation
100 Nightmist
Irvine, CA 92618
Phone: 949.936.5303
Contact: *Joe Chapin*
JoeChapin@iusd.org

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Ruhnau Clarke Architects
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Phone:951.684.4664
Contact: *Ben Gallardo*
bgallardo@ruhnauclarke.com
Contact: *Roger Clarke*
rclarke@ruhnauclarke.com

Structural
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Irvine, CA 92618
Phone: 949.462.3200
Contact: *Larry Kaprielian*
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Costa Mesa, CA 92627-4344
Phone: 949.515.4333
Contact: *Lawrence Zero*
zeroassoc@aol.com

Electrical
FBA
150 Paularino Avenue, Suite A120
Costa Mesa, CA 92626
Phone: 949.852.9995
Contact: *Alan Bravo*
abravo@fbaengr.com

SCOPE OF WORK

1. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING A1: ADMINISTRATION.
2. REMOVE AND REPLACE EXISTING HVAC UNIT AT BUILDING A2: MULTI-PURPOSE.
3. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING B: CLASSROOMS.
4. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING C: CLASSROOMS.
5. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING E: CLASSROOMS.
6. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING F: LIBRARY.
7. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING G: CLASSROOMS.
8. REMOVE AND REPLACE EXISTING MULTI-ZONE HVAC UNIT AT BUILDING H1: CLASSROOMS.

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

PROJECT No. :1-34-38
3/1/2024 9:24:04 AM

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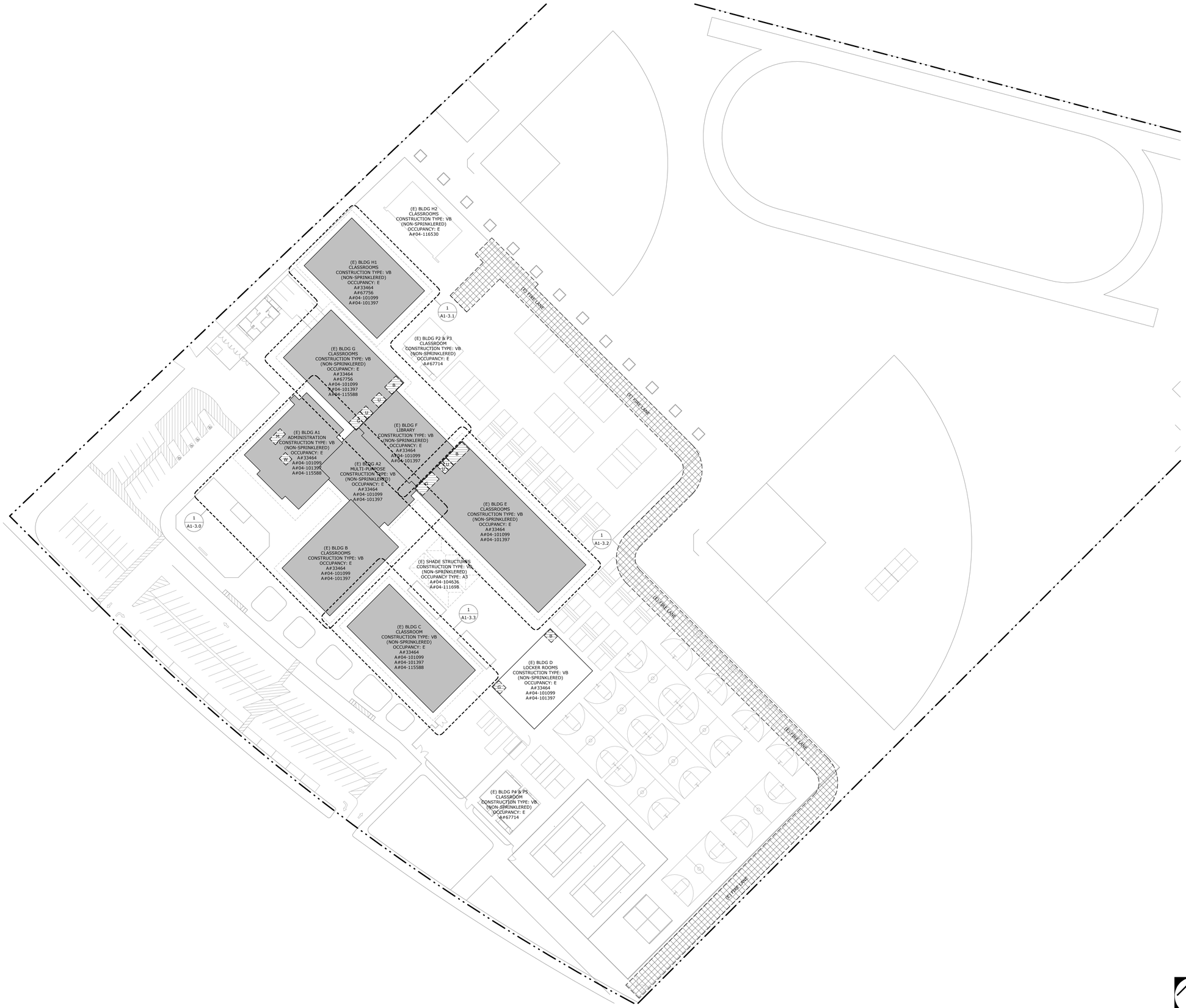
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

TITLE SHEET & SHEET INDEX

G-1

1-34-38



OVERALL SITE PLAN | SCALE: 1" = 40'-0" | 10

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3/1/2024 9:20:08 AM

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3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501 (951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 (760) 438 5899

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

OVERALL SITE PLAN **AS-2.0**

1-34-38

STAMPS

AGENCY APPROVAL
File No.: 30-48 A#04-122954

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

GENERAL NOTES

1. VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.

PARKING CALCULATION

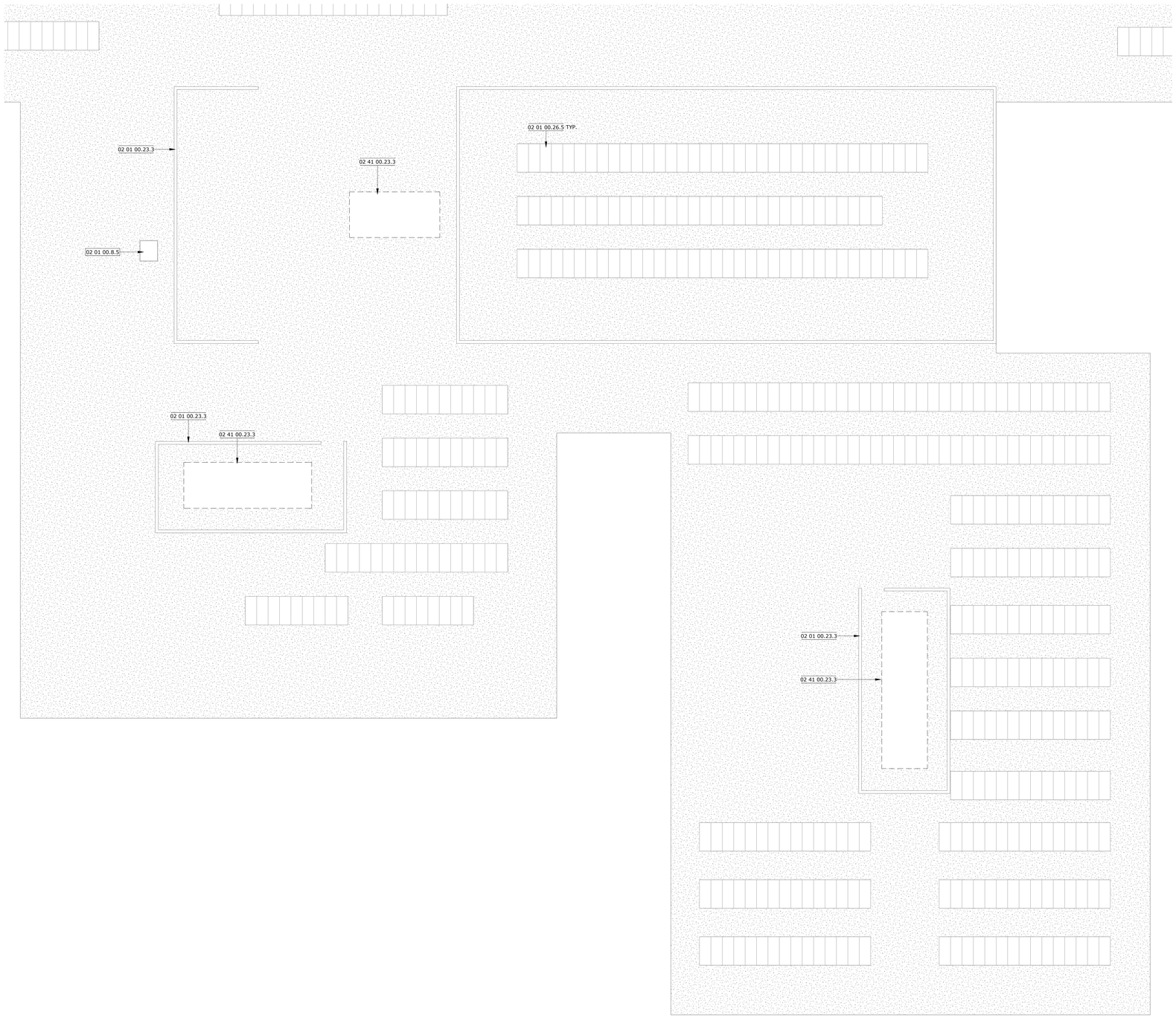
EXISTING PARKING LOT	STANDARD PARKING STALLS PROVIDED	87
	ACCESSIBLE PARKING STALLS REQUIRED - INCLUDING (1) VAN	4
	ACCESSIBLE PARKING STALLS PROVIDED - INCLUDING (1) VAN	4
	TOTAL PARKING PROVIDED INCLUDING ACCESSIBLE STALLS	91

KEYNOTES

LEGEND

- SITE PROPERTY LINE
- BUILDING TO HAVE MECHANICAL SCOPE OF WORK. SEE MECHANICAL DRAWINGS.
- W — EXISTING WOMEN'S RESTROOM
- B — EXISTING BOY'S RESTROOM
- M — EXISTING MEN'S RESTROOM
- G — EXISTING GIRL'S RESTROOM
- U — EXISTING SINGLE-USE RESTROOM

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:



STAMPS

LICENSED ARCHITECT — ROGER D. CLARKE — No. C-24530 — Exp.10-31-25 — STATE OF CALIFORNIA

AGENCY APPROVAL
File No: 30-48 A\#04-122954

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DATE: 04/09/2024

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

GENERAL NOTES

1. FIRE PROTECTION DURING DEMOLITION AND CONSTRUCTION SHALL BE IN ACCORDANCE TO 2022 CBC AND 2022 CFC.

KEYNOTES

02 01 00.8.5	EXISTING ROOF HATCH TO REMAIN, PROTECT IN PLACE
02 01 00.23.3	EXISTING MECHANICAL SCREEN, PROTECT IN PLACE
02 01 00.26.5	EXISTING SOLAR PANELS TO REMAIN, PROTECT IN PLACE
02 41 00.23.3	DEMO AND REPLACE EXISTING MECHANICAL UNITS PER MECHANICAL DRAWINGS

LEGEND

EXISTING ROOF, PROTECT IN PLACE

NORTH

ROOF PLAN - BUILDING A1, A2 & B

SCALE: 1/8" = 1'-0" 1

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

PROJECT No. :1-34-38
3/1/2024 9:20:04 AM

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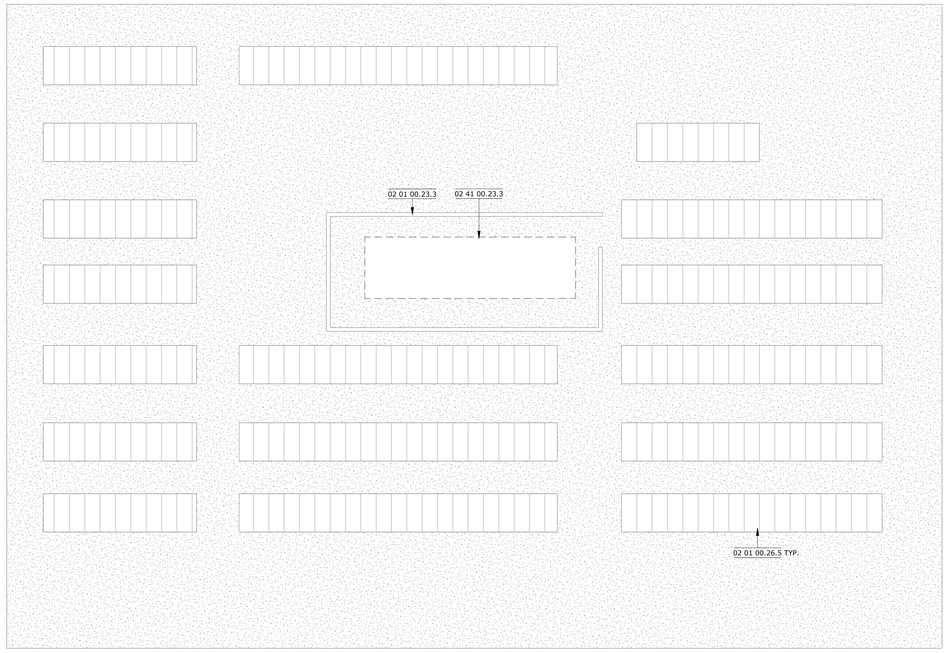
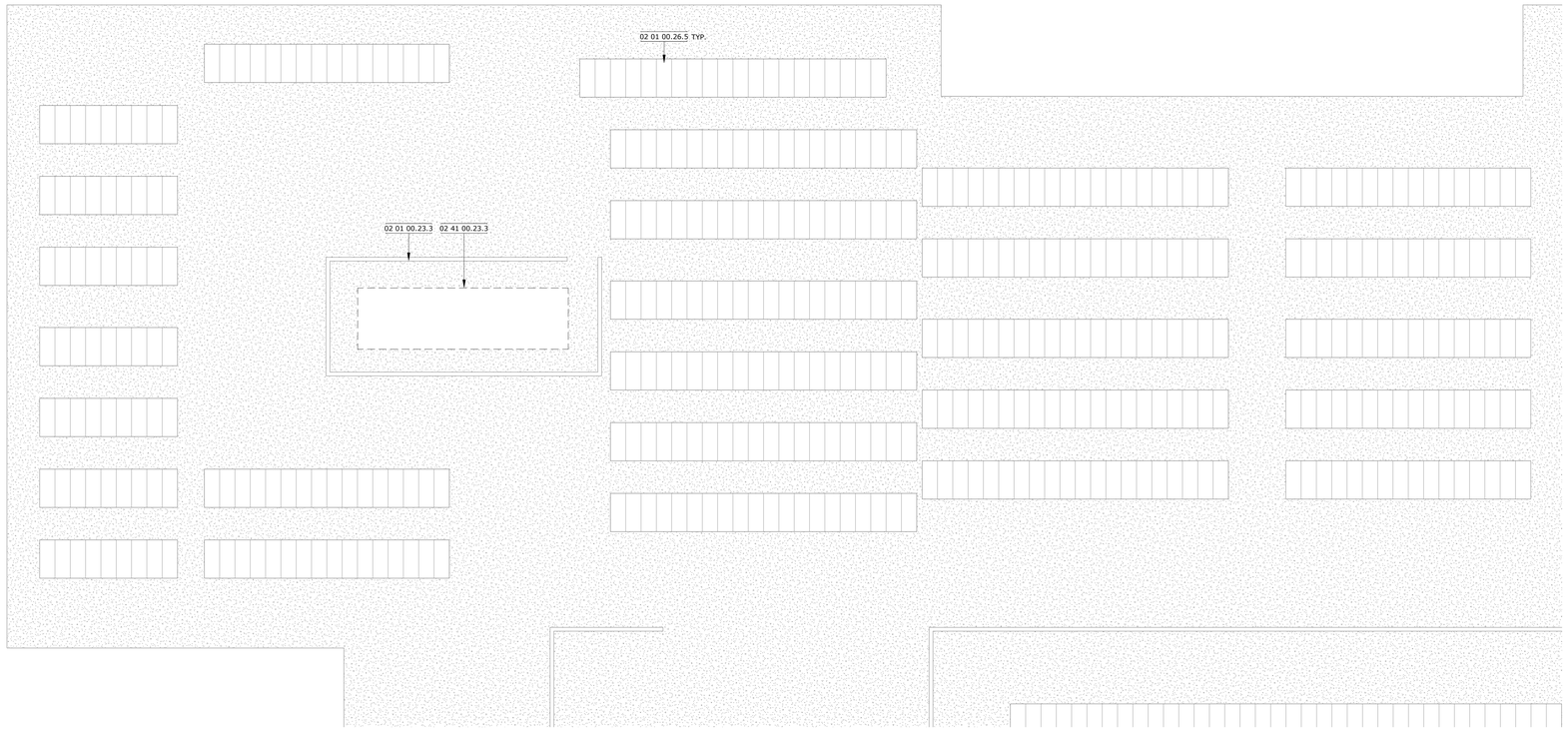
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

ROOF PLAN

A1-3.0

1-34-38





STAMPS

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CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

GENERAL NOTES

1. FIRE PROTECTION DURING DEMOLITION AND CONSTRUCTION SHALL BE IN ACCORDANCE TO 2022 CBC AND 2022 CFC.

KEYNOTES

02 01 00.23.3	EXISTING MECHANICAL SCREEN, PROTECT IN PLACE
02 01 00.26.5	EXISTING SOLAR PANELS TO REMAIN, PROTECT IN PLACE
02 41 00.23.3	DEMO AND REPLACE EXISTING MECHANICAL UNITS PER MECHANICAL DRAWINGS

LEGEND

EXISTING ROOF, PROTECT IN PLACE

ROOF PLAN - BUILDING H1, G & F

SCALE: 1/8" = 1'-0" | 1

PROJECT No. :1-34-38
3/1/2024 9:20:06 AM

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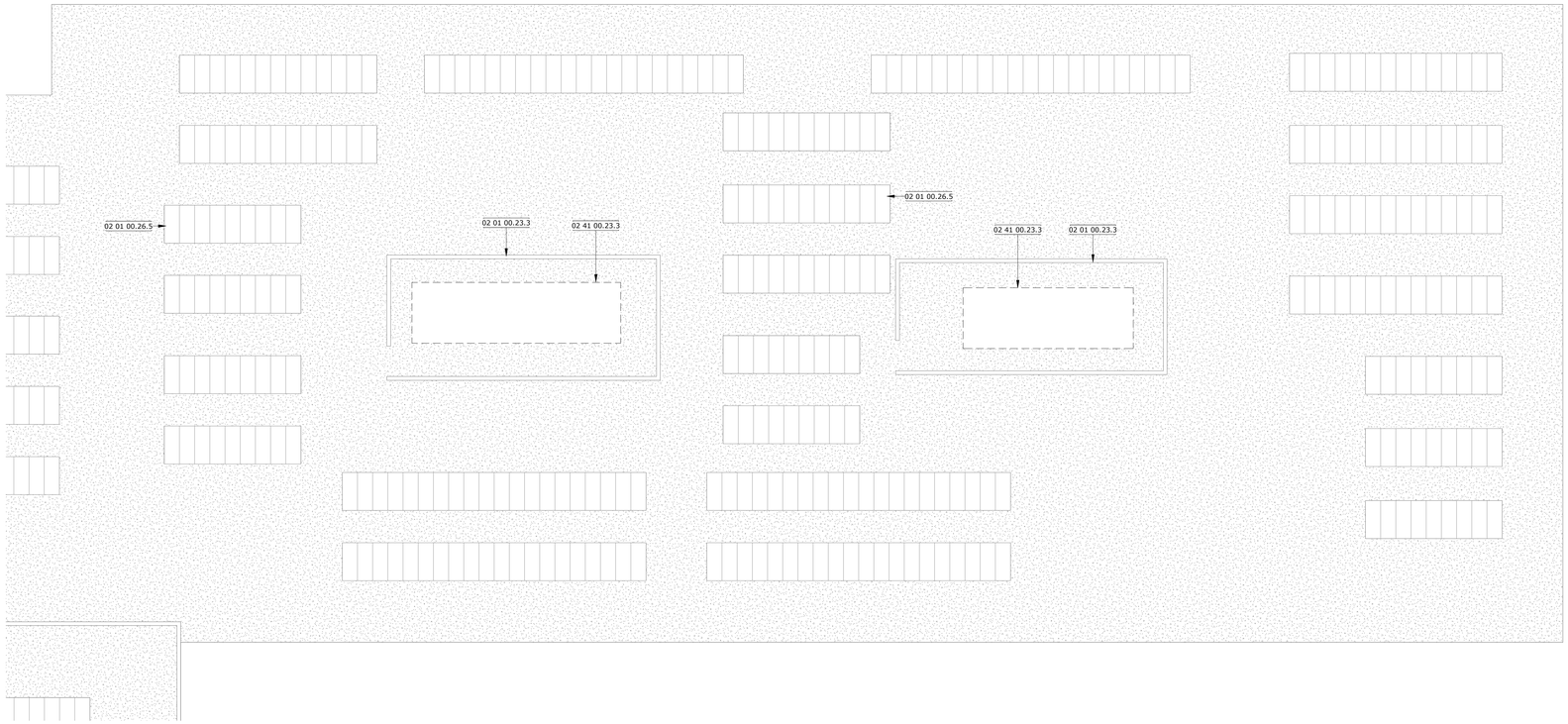
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

ROOF PLAN

A1-3.1

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:



ROOF PLAN - BUILDING E | SCALE: 1/8" = 1'-0" | 1

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STAMPS

RUHNAU CLARKE ARCHITECTS

CONSULTANT BRANDING

GENERAL NOTES

1. FIRE PROTECTION DURING DEMOLITION AND CONSTRUCTION SHALL BE IN ACCORDANCE TO 2022 CBC AND 2022 CFC.

KEYNOTES

02 01 00.23.3	EXISTING MECHANICAL SCREEN, PROTECT IN PLACE
02 01 00.26.5	EXISTING SOLAR PANELS TO REMAIN, PROTECT IN PLACE
02 41 00.23.3	DEMO AND REPLACE EXISTING MECHANICAL UNITS PER MECHANICAL DRAWINGS

LEGEND

EXISTING ROOF, PROTECT IN PLACE

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

PROJECT No. :1-34-38
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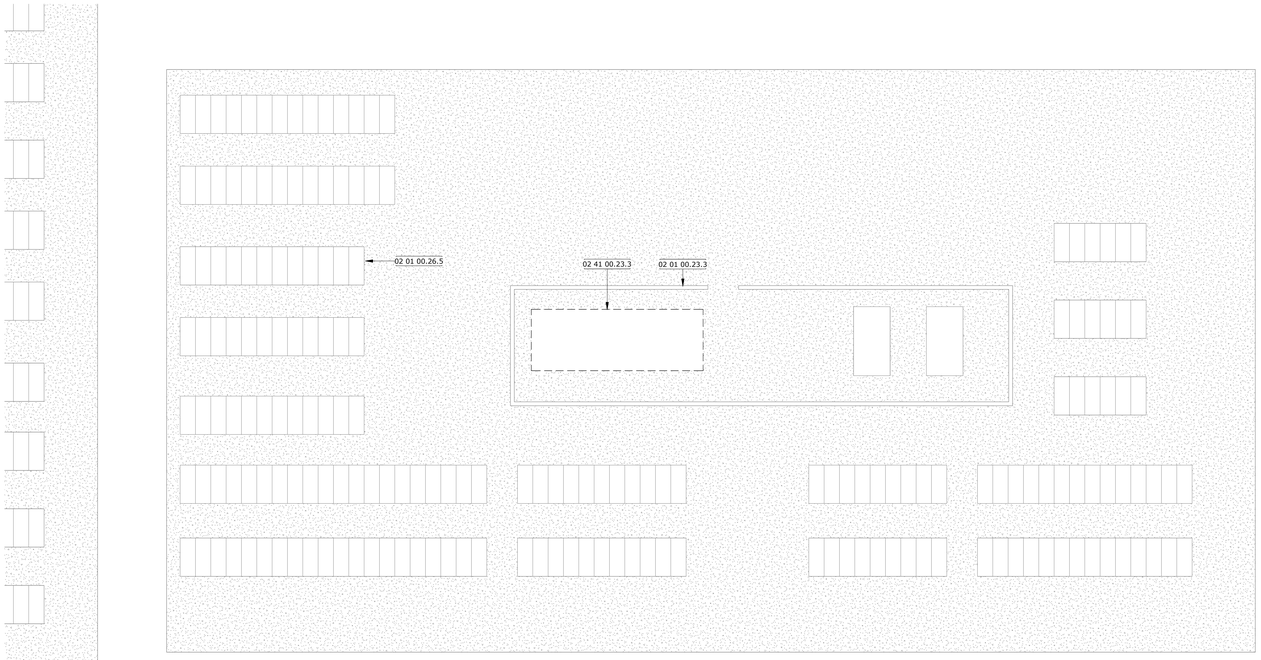
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

ROOF PLAN

A1-3.2



STAMPS

AGENCY APPROVAL
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CONSULTANT BRANDING

RUHNAU
CLARKE
ARCHITECTS

GENERAL NOTES

1. FIRE PROTECTION DURING DEMOLITION AND CONSTRUCTION SHALL BE IN ACCORDANCE TO 2022 CBC AND 2022 CFC.

KEYNOTES

02 01 00.23.3 EXISTING MECHANICAL SCREEN, PROTECT IN PLACE
02 01 00.26.5 EXISTING SOLAR PANELS TO REMAIN, PROTECT IN PLACE
02 41 00.23.3 DEMO AND REPLACE EXISTING MECHANICAL UNITS PER MECHANICAL DRAWINGS

LEGEND

EXISTING ROOF, PROTECT IN PLACE

ROOF PLAN - BUILDING C

SCALE: 1/8" = 1'-0"

1

PROJECT No. :1-34-38
3/1/2024 9:20:07 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

ROOF PLAN

A1-3.3

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

LEGEND AND SYMBOLS

ABBREVIATIONS

A	AMPERES, AUTO
AAV	AUTOMATIC AIR VENT
AAV	AUTOMATIC AIR VENT
AB	ANCHOR BOLT
ABV	ABOVE
AC	ALTERNATING CURRENT
ACCA	AIR CONDITIONING CONTRACTORS OF AMERICA
ADA	AMERICAN WITH DISABILITIES ACT
A.G.	ABOVE GRADE
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AP	ACCESS PANEL
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
ALLOW	ALLOWABLE
ALT	ALTERNATE
ALUM	ALUMINUM
AO	ANALOG OUTPUT
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
BDD	BACKDRAFT DAMPER
BF	BELOW FLOOR/SLAB
BFV	BUTTERFLY VALVE
B.G	BELOW GRADE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C/C	COILING COIL
CCR	CALIFORNIA CODES AND REGULATIONS
CCV	COOLING CONTROL VALVE
CD	CEILING DIFFUSER, CONDENSATE DRAIN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CHW	CHILLED WATER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CIRC	CIRCUMFERENCE
CLG	CEILING
CLR	CLEAR
CO	CLEANOUT
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUATION
COP	COEFFICIENT OF PERFORMANCE (BTU OUTPUT/BTU INPUT)
COTG	CLEANOUT TO GRADE
CPA	CONTROL POINT ADJUST. (4-20 MA)
CR	CONDENSATE RETURN
CUR	CURRENT TRANSDUCER (W/ 4-20 MA)
CW	DOMESTIC WATER
D	DRAIN
DB	DRY BULB
DC	DIRECT CONNECT
DCW	DOMESTIC COLD WATER
DDC	DIRCT DIGITAL CONTROL
DET	DETAIL
DHW	DOMESTIC HOT WATER
DI	DIGITAL INPUT
DIA	DIAMETER
DL	DEMAND LIMIT (4-20 MA)
DN	DOWN
DTF	DOWN THROUGH FLOOR
DWG	DRAWING
DX	DIRECT EXPANSION
E	EAST, EXISTING
EA	EACH, EXHAUST AIR
ECD	ECONOMIZER CONTROL DAMPER
EAT	ENTERING AIR TEMPERATURE
EER	ENERGY EFFICIENT RATIO (BTU OUTPUT/WATT INPUT)
ELEC	ELECTRICAL
ELEV	ELEVATION
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EXIST	EXISTING
EXH	EXHAUST
EXP	EXPANSION
F	FAN
FD	FLOOR DRAIN
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIN	FINISHED
FLA	FULL LOAD AMPERES
FLR	FLOOR
FS	FLOOR SINK
FT.	FOOT, FEET
FW	FILTERED WATER
°F	DEGREES FAHRENHEIT
GA	GAGE
GALV	GALVANIZED
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
GW	GREASE WASTE
H	HAND
HB	HOSE BIBB
HCV	HEATING CONTROL VALVE
HORIZ	HORIZONTAL
HP	HIGH PRESSURE, HEAT PUMP, HORSEPOWER, HIGH POINT
HS	HAND SWITCH
HT	HEIGHT
HTG	HEATING
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HW	DOMESTIC HOT WATER
HWR	HOT WATER RETURN
HX	HEAT EXCHANGER
HZ	HERTZ
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH, INCHES
IP	CURRENT TO PNEUMATIC TRANSDUCER (4-20 MA INPUT, 3-15 PSIG OUTPUT)
KBH	THOUSAND BTUS PER HOUR
KW	KILOWATT
KWH	KILOWATT-HOUR
L	ANGLE, LAVATORY
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LP	LOW POINT
LWT	LEAVING WATER TEMPERATURE
M	MOTOR
MA	MIXED AIR
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MS	MOTOR (MAGNETIC) STARTER
N	NORTH, NEW
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
N.C.	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO	NUMBER
NTS	NOT TO SCALE
O	OFF
O.C.	ON CENTER
OPER	OPERATING
OPNG	OPENING
OSA	OUTSIDE AIR
P	PUMP, PRESSURE
PAR	PARAGRAPH
PD	PRESSURE DROP, PRESSURE DIFFERENTIAL
PH	PHASE
PI	PRESSURE INDICATOR
POC	POINT OF CONNECTION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PVC	POLYVINYL CHLORIDE
Q	FLOW RATE
R	RADIUS
RA	RETURN AIR
RAD	RADIUS
RD	ROOF DRAIN
RED	REDUCER
REINF	REINFORCING
REQ'D	REQUIRED
RG	RETURN GRILLE
RR	REFRIGERANT RELIEF PIPING
RS	REFRIGERANT SUCTION
RLA	REACTIVE LOAD AMPERES
RPM	REVOLUTIONS PER MINUTE
S	SOUTH
SA	SUPPLY AIR
SD	SANITARY DRAIN
SECT	SECTION
SF	SUPPLY FAN
SHT	SHEET
SIM	SIMILAR
SL	SLOPE
SPEC	SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOC. SPECIFICATION
SPCD	STATIC PRESSURE CONTROL DAMPER
SS	STAINLESS STEEL, SANITARY SEWER
S/S	START/STOP
SR	SUPPLY REGISTER
STD	STANDARD
STL	STEEL
STM	STEAM
SV	SOLENOID VALVE
SW	SOFT WATER
T	TREAD, TANK, THERMOSTAT
TCV	TEMPERATURE CONTROL VALVE
TE	TEMPERATURE ELEMENT
TEMP	TEMPERATURE
TI	TEMPERATURE INDICATOR
T&PRV	TEMP. & PRESS. RELIEF VALVE
TP	TRAP PRIMER
TT	TEMP. TRANSMITTER (4-20 MA)
TWR	TOWER
TYP	TYPICAL
UR	URINAL
UTR	UP THROUGH ROOF
V	VOLT, VOLTAGE
VAC	VOLTS ALTERNATING CURRENT
VAR	VARIES
VDC	VOLTS DIRECT CURRENT
VERT	VERTICAL
VTR	VENT THRU ROOF
W	WEST, WASTE
W/	WITH
WB	WET BULB
WC	WATER COLUMN, WATER CLOSET
WH	WALL HYDRANT
WHA	WATER HAMMER ARRESTOR
WMS	WIRE MESH SCREEN
WT	WATERTIGHT, WEIGHT
YB	YARD BOX
Ø	DIAMETER
"	INCH, INCHES
'	FOOT, FEET

GENERAL SYMBOLS

- AC 1 — EQUIPMENT TAG, DESCRIPTION, AIR CONDITIONING UNIT MARK NUMBER 1
- A M-7 — DETAIL REFERENCE, DETAIL A DRAWING M-7
- 5 M-3 — SECTION REFERENCE, SECTION 5, DRAWING M-3
- POINT OF NEW CONNECTION TO EXISTING WORK
- 4 — KEYNOTE, NOTE 4

MECHANICAL SYMBOLS

- NEW DUCTWORK, EQUIPMENT, OR STRUCTURE
- EXISTING PIPING, EQUIPMENT, OR STRUCTURE
- EXISTING PIPING, EQUIPMENT, OR STRUCTURE TO BE DEMOLISHED
- SUPPLY AIR DUCT UNDER POSITIVE PRESSURE
- SUPPLY AIR DIFFUSER/GRILLE
- RETURN AIR REGISTER/GRILLE
- EXHAUST AIR REGISTER/GRILLE
- PIPE OR DUCTWORK ELBOW UP
- PIPE OR DUCTWORK ELBOW DOWN
- PIPE TEE UP
- PIPE TEE DOWN
- 3-WAY PNEUMATIC CONTROL VALVE
- 2-WAY PNEUMATIC CONTROL VALVE
- BALL VALVE
- BUTTERFLY VALVE
- BALANCING VALVE
- PIPE REDUCER
- PIPE UNION
- OR — STRAINER W/CAPPED BALL VALVE
- VALVE
- PIPE/DUCT CAP
- PIPE BLIND FLANGE

OTHER DEVICES

- TI — THERMOMETER
- TW — THERMOMETER WELL, ONLY
- T x — THERMOSTAT, WHERE X IS ASSOCIATED EQUIPMENT
- FE — FLOW ELEMENT
- TE — TEMPERATURE ELEMENT
- PE — PRESSURE ELEMENT
- PDE — PRESSURE DIFFERENTIAL ELEMENT
- FILTER
- SD — SMOKE DETECTOR
- FD — FIRE DAMPER
- F/SD — COMBINATION FIRE/SMOKE DAMPER
- CENTRIFUGAL PUMP
- PNEUMATIC DAMPER

COORDINATION:

1. THESE DRAWINGS ARE DIAGRAMATIC AND SHOW IN GENERAL WHERE THE DUCTWORK, PIPING AND OTHER WORK SPECIFIED IN THE 23 00 00 SECTIONS OF THE SPECIFICATIONS IS TO BE LOCATED. THE DRAWINGS DO NOT NECESSARILY INDICATE ANY AND ALL OFFSETS AND CONFIGURATIONS REQUIRED FOR COORDINATION WITH THE SPACE REQUIREMENTS OF THE OTHER TRADES. THE CONTRACTOR IS RESPONSIBLE FOR THE CORRECT PLACING, LOCATION, AND CONNECTION OF THIS WORK IN RELATION TO THE WORK OF OTHER TRADES. IN CASE OF CONFLICT FOR DUCTWORK AND OR PIPING, ETC. PLACEMENT AND STRUCTURAL MEMBERS, BRING IT TO THE ATTENTION OF THE ARCHITECT FOR COORDINATION WITH THE STRUCTURAL ENGINEER.
2. THE CONTRACTOR SHALL EXAMINE ALL MECHANICAL, ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND OTHER DRAWINGS THAT HAVE BEEN PREPARED FOR THIS PROJECT, AND ACCEPT SUCH CONDITIONS, AND MAKE ALLOWANCES FOR THEM IN PREPARING THE BID.

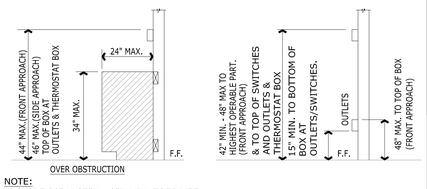
MECHANICAL GENERAL NOTES

1. MECHANICAL CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES AND SHALL WORK HARMONIOUSLY TO MEET PROJECT COMPLETION DATE.
2. INTERFERENCES OR OBSTRUCTIONS BETWEEN TRADES OCCURRING DURING CONSTRUCTION SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND ALL WORK SHALL CEASE IN THAT AREA UNTIL RESOLVED BY THE ENGINEER AND/OR ARCHITECT.
3. ALL WORK SHALL BE PERFORMED IN A NEAT WORKMANLIKE MANNER IN ACCORDANCE WITH GOOD CONSTRUCTION PRACTICES.
4. THE MECHANICAL CONTRACTOR MUST VERIFY AND COORDINATE ALL FLOOR, WALL, AND ROOF OPENINGS WITH THE GENERAL CONTRACTOR PRIOR TO INSTALLATION OF EQUIPMENT AND DUCTWORK. SEE STRUCTURAL DRAWINGS. ALL OPENINGS, PATCHING, ETC., AND WATERPROOFING BY GENERAL CONTRACTOR.
5. ALL CONNECTIONS BETWEEN A.C. UNITS/FANS, AND DUCTWORK SHALL HAVE FIREPROOF, HEAVY DUTY FLEX CONNECTIONS WITH 3" MINIMUM CLEARANCE. PROVIDE GALVANIZED SHEET METAL PROTECTIVE COVER ALL AROUND FLEX CONNECTION WHERE APPLICABLE.
6. ALL WEATHER EXPOSED EQUIPMENT, DUCTWORK, ETC., SHALL BE COMPLETELY WEATHERPROOFED.
7. MECHANICAL CONTRACTOR MUST PROVIDE TRANSITION FITTINGS FOR ROOF PENETRATIONS FROM ROUND TO SQUARE OR WHATEVER NECESSARY FOR SUPPLY AND RETURN DUCT APPLICATIONS.
8. THE AIR CONDITIONING CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACQUISITION AND PAYMENT OF ALL PERMITS AND INSPECTIONS REQUIRED AND RELATED FEES FOR THIS INSTALLATION. ALL WORK SHALL COMPLY WITH APPLICABLE STATE AND LOCAL CODES.
9. THESE PLANS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO REPRESENT THE ACTUAL SITE CONDITIONS. CONTRACTOR SHALL VERIFY CONDITIONS PRIOR TO COMMENCING WORK, DO NOT SCALE THESE PLANS, REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSION AND SCALES.
10. SHEET METAL DUCT WORK SHALL BE GALVANIZED STEEL SHEET OF THICKNESS AS RECOMMENDED, CONSTRUCTED AND DETAILED IN LATEST SMACNA CONSTRUCTION STANDARDS..
11. MECHANICAL CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE OF EACH ITEM OF EQUIPMENT WITH ELECTRICAL CONTRACTOR BEFORE ORDERING.
12. PROVIDE OPERATIONS AND MAINTENANCE MANUALS FOR ALL EQUIPMENT.
13. UPON COMPLETION OF NATURAL GAS PIPING AND CONTROLS, MECHANICAL CONTRACTOR SHALL START ALL GAS FIRED EQUIPMENT. LOCK EQUIPMENT CONTROLS SUCH THAT ALL UNITS ARE RUNNING AT FULL LOAD CAPACITY. TAKE GAS PRESSURE READINGS AT EACH PIECE OF EQUIPMENT WITH WATER TUBE MANOMETER AT THE UNIT GAS MANIFOLD DOWNSTREAM OF THE UNIT GAS COCK. PROVIDE A WRITTEN REPORT TO THE ARCHITECT ITEMIZING THE RECORDED PRESSURES AT EACH UNIT.
14. PROVIDE SHOP DRAWING SUBMITTAL DATA ON ALL PRE-MANUFACTURED EQUIPMENT..
15. PLEASE SEE SPECIFICATION SECTION 23 05 53 FOR HVAC EQUIPMENT LABELING.
16. MATERIALS EXPOSED WITHIN DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM-E84.
17. UNLESS SPECIFCALLY SHOWN ON THESE PLANS NO STRUCTURAL MEMBERS SHALL BE CUT, DRILLED NOR NOTCHED WITHOUT PRIOR WRITTEN PERMISSION FROM THE STRUCTURAL ENGINEER AND THE DISTRICT STRUCTURAL ENGINEER FROM THE DIVISION OF THE STATE ARCHITECT.
18. PROVIDE AND INSTALL GAS COCKS ON ALL GAS-FIRED EQUIPMENT.
19. GAS PIPING EXPOSED TO THE EXTERIOR SHALL BE PAINTED WITH TWO COATS PRIME AND TWO COATS COLOR (SELECTED BY ARCHITECT).
20. PER CAL GREEN 2022 SECTION 5.504.3, AT THE TIME OF ROUGH INSTALLATION AND DURING STORAGE ON THE CONSTRUCTION SITE UNTIL FINAL STARTUP OF THE HEATING, COOLING AND VENTILATING EQUIPMENT, ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, SHEETMETAL OR OTHER METHODS ACCEPTABLE TO THE ENFORCING AGENCY TO REDUCE THE AMOUNT OF DUST, WATER AND DEBRIS WHICH MAY ENTER THE SYSTEM.

PIPING MATERIAL

NATURAL GAS PIPING (ABOVE GRADE)	-	SCHEDULE 40 BLACK STEEL PIPE CONFORMING TO ASTM A120-82 OR A53-93a. FITTINGS: 150 PSI SCREWED MALLEABLE IRON FOR 2-1/2" AND SMALLER, SCHEDULE 40 WELDED FITTINGS FOR 3" OR LARGER
CONDENSATE PIPING	-	TYPE "M" COPPER

DEVICE MOUNTING HEIGHT



NOTE:
PROVIDE 30"Wx27"Hx19"D MIN. TOE/KNEE CLEARANCE FOR FRONT APPROACH OVER OBSTRUCTION

MECHANICAL ANCHORAGE NOTES

APPLICABLE CODE: 2022 CBC

MEP Component Anchorage Note

All mechanical, plumbing, and electrical components shall be anchored and installed per the details on the DSA-approved construction documents, the following components shall be anchored or braced to meet the force and displacement requirements prescribed In the 2022 CBC Sections 1617a.1.18 through 1617a.1.26 and ASCE 7-16 chapters 13, 26, and 30:

1. All permanent equipment and components,
2. Temporary, movable or mobile equipment that is permanently attached (e.g., hard wired) to the building utility services such as electricity, gas or water, "permanently attached" shall include all electrical connections except plugs for 110/220 volt receptacles having a flexible cable.
3. Temporary, movable or mobile equipment which is heavier than 400 pounds or has a center of mass located 4 feet or more above the adjacent floor or roof level that directly support the component is required to be restrained in a manner approved by dsa.

The following mechanical and electrical components shall be positively attached to the structure but need not demonstrate design compliance with the references noted above. these components shall have flexible connections provided between the component and associated ductwork, piping, and conduit; flexible connections must allow movement in both transverse and longitudinal directions:

A. Components weighing less than 400 pounds and having a center of mass located 4 feet or less above the adjacent floor or roof level that directly support the component.
B. Components weighing less than 20 pounds, or In the case of distributed systems, less than 5 pounds per foot, which are suspended from a roof or floor or hung from a wall.

The anchorage of all mechanical, electrical and plumbing components shall be subject to the approval of the design professional In general responsible charge or structural engineer delegated responsibility and acceptance by DSA. the project inspector will verify that all components and equipment have been anchored in accordance with the above requirements.

APPLICABLE CODE: 2022 CBC

Piping, Ductwork, and Electrical Distribution System Bracing Note

Piping, ductwork, and electrical distribution systems shall be braced to comply with the forces and displacements prescribed in ASCE 7-16 section 13.3 as defined in ASCE 7-16 sections 13.6.5, 13.6.6, 13.6.7, 13.6.8; and 2022 CBC, sections 1617A.1.24, 1617A.1.25 and 1617A.1.26.

The method of showing bracing and attachments to the structure for the identified distribution system are as noted below. when bracing and attachments are based on a preapproved installation guide (e.g., HCAI OPM for 2013 CBC or later), copies of the bracing system installation guide or manual shall be available on the jobsite prior to the start of and during the hanging and bracing of the distribution systems.The Structural Engineer of Record shall verify the adequacy of the structure to support the hanger and brace loads.

Mechanical Piping (MP), Mechanical Ducts (MD), Plumbing Piping (PP), Electrical Distribution Systems (E):

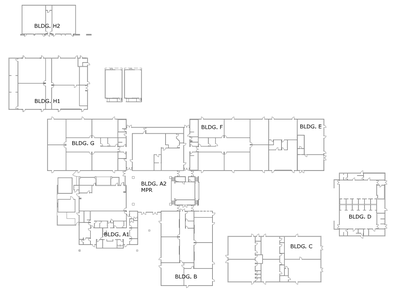
(MP) (MD) (PP) E Option 1: Detailed on the approved drawings with project specific notes and details.

MP MD PP E Option 2: Shall comply with HCAi Preapproval (OPM #) _____.

NOTE: SMACNA SUPPORT DETAILS ARE NOT AN APPROVED OPTION FOR THIS PROJECT.

MECHANICAL SHEET INDEX

KEYPLAN



RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

MULTIZONE & CUSTOM AC UNITS

		MZ A1	MZ B1	MZ C1	MZ E1	MZ F1	MZ G1	MZ H1	AC A2 MPR
UNIT INFO	MAKE & MODEL	SEASONS-4 LAO25 / 6MJK22-0262-TN4.0	SEASONS-4 LAO35 / 6MJK28-0353-TN3.5	SEASONS-4 LAO25 / 6MJK22-0262-TN4.0	SEASONS-4 LAO25 / 6MJK22-0262-TN4.0	SEASONS-4 LAO35 / 6MJK28-0393-TN3.5	SEASONS-4 LAO45 / 6MJK28-0453-TN4.0	SEASONS-4 LAO35 / 6MJK28-0393-TN2.5	SEASONS-4 SAO20 / 6SJI16-0232-TN2.5
	LOCATION/ SERVICE	BLDG. A1 ROOF ADMIN	BLDG. B ROOF CLASSROOM	BLDG. C ROOF CLASSROOM	BLDG. E ROOF CLASSROOM	BLDG. F ROOF CLASSROOM	BLDG. G ROOF CLASSROOM	BLDG. H ROOF CLASSROOM	BLDG. A1 ROOF MPR
	EER	10.5	11.7	10.6	10.5	11.5	10.7	11.0	11.0
	AFUE	80%	80%	80%	80%	80%	80%	80%	80%
	ZONES	10	9	5	6	10	9	6	1
COOLING COIL	TOTAL COOLING (BTUH)	318,006	430,237	319,973	322,802	470,758	546,889	473,146	285,279
	SENSIBLE COOLING (BTUH)	254,913	346,032	244,931	265,547	400,339	434,571	385,364	220,548
	DX COIL EAT (°F DB/WB)	83.1°F/65.0°F	80.3°F/63.8°F	82.7°F/65.6°F	81.3°F/64.3°F	79.4°F/62.6°F	80.4°F/63.8°F	79.8°F/63.4°F	82.5°F/64.5°F
	DX COIL EAT (°F DB/WB)	50.8°F/49.5°F	50.7°F/49.5°F	51.0°F/49.9°F	52.5°F/50.9°F	50.8°F/49.3°F	50.6°F/49.2°F	50.9°F/49.6°F	51.0°F/50.0°F
SUPPLY AIR	SUPPLY AIR (CFM)	7,300	10,825	7,160	8,525	12,945	13,485	12,365	7,000
	OUTSIDE AIR (CFM)	4,125-7,300	3,480-10,825	3,765-7,160	3,625-8,525	3,375-12,945	4,605-13,485	3,180-12,365	3,180-7,000
	SUPPLY AIR ESP	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	SUPPLY BLOWER BHP / HP	4.8 / 7.5	7.4 / 10.0	4.6 / 7.5	5.7 / 7.5	9.4 / 10.0	10.0 / 15.0	8.8 / 10.0	5.2 / 7.5
	SUPPLY BLOWER DRIVE	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD
RETURN AIR	RETURN AIR (CFM)	3,175	8,400	5,540	5,275	9,570	10,345	9,185	5,600
	RETURN AIR ESP	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.25
	RETURN BLOWER BHP / HP	0.9 / 1.5	2.4 / 4.3	1.8 / 2.0	1.7 / 2.0	0.9 / 1.5	3.0 / 5.0	2.5 / 3.0	2 @ 0.58 2 @ 1.0
	RETURN BLOWER DRIVE	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	DIRECT DRIVE W / VFD	ADJUSTABLE SHEAVE W / VFD
GAS HEATING	GAS HEATING TYPE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE	TUBULAR DUCT FURNACE
	GAS INPUT (BTUH)	400,000	350,000	250,000	400,000	350,000	400,000	250,000	250,000
	GAS OUTPUT (BTUH)	320,000	280,000	200,000	320,000	280,000	320,000	200,000	200,000
	TEMP. RISE (°F)	40.6	24.0	25.9	34.8	20.0	22.0	20.2	26.5
	STAGING	MODULATING	MODULATING	MODULATING	MODULATING	MODULATING	MODULATING	MODULATING	MODULATING
FILTERS	TYPE	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13	4" PLEATED MERV 13
	QTY. / SIZE	12 / 16"x25"	12 / 16"x25"	12 / 16"x25"	12 / 16"x25"	12 / 16"x25"	12 / 16"x25"	12 / 16"x25"	10 / 16"x20"
ELECTRICAL	VOLTAGE	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz	460v-3ph-60hz
	TOTAL COOLING AMPS	71.1	92.7	72.0	81.8	105.3	127.3	103.2	67.2
	TOTAL HEATING AMPS	19.7	25.5	20.6	20.6	28.2	32.8	26.1	20.3
	UNIT MCA	77	98	78	90	111	136	109	73
	UNIT MOCP	90	110	100	110	125	150	125	90
	MAX. OPER. WEIGHT (LBS.	6,000	10,000	6,000	6,800	10,000	10,500	10,000	5,000
	ATTACH. DETAILS	1 M0-0.2	1 M0-0.2	1 M0-0.2	1 M0-0.2	1 M0-0.2	1 M0-0.2	1 M0-0.2	1 M0-0.2

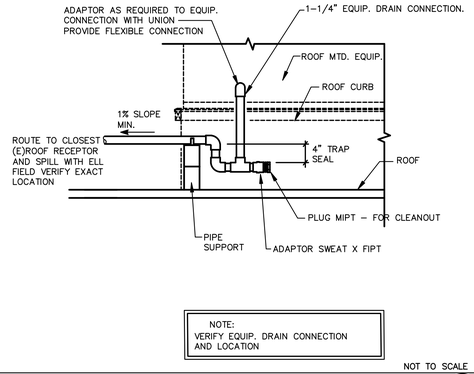
NOTES:
1. ALL UNITS WILL REUSE EXISTING CURBS
2. ALL UNITS WILL BE PROVIDED WITH A FACTORY INSTALLED SMOKE DETECTOR IN THE SUPPLY AIR PLENUM/DUCT
3. UNIT FOOTRINT SHALL BE IDENTICAL TO EXISTING UNIT BEING REPLACED

AIR MOVING SYSTEMS SUPPLYING IN EXCESS OF 2000 CFM TO ENCLOSED SPACES WITHIN BUILDINGS SHALL BE EQUIPPED WITH AUTOMATIC SHUTOFF. SHUTOFF SHALL STOP THE AIR MOVING EQUIPMENT WHEN SMOKE IS DETECTED IN ROOMS SERVED BY THE SYSTEM.

MULTIZONE & CUSTOM AC UNITS DIMENSION COMPARISON CHART

		MZ A1	MZ B1	MZ C1	MZ E1	MZ F1	MZ G1	MZ H1	AC A2 MPR
UNIT INFO	LOCATION/ SERVICE	BLDG. A1 ROOF ADMIN	BLDG. B ROOF CLASSROOM	BLDG. C ROOF CLASSROOM	BLDG. E ROOF CLASSROOM	BLDG. F ROOF CLASSROOM	BLDG. G ROOF CLASSROOM	BLDG. H ROOF CLASSROOM	BLDG. A1 ROOF MPR
	EXISTING UNIT WT. (LBS.)	6,000	10,000	6,000	6,800	10,000	10,500	10,000	5,000
	NEW UNIT WT. MAX. (LBS.)	6,000	10,000	6,000	6,800	10,000	10,500	10,000	5,000
	EXISTING MAX. UNIT DIMENSION	269" L x 90" W x 77" H	330" L x 96" W x 85" H	269" L x 90" W x 77" H	269" L x 90" W x 77" H	330" L x 96" W x 85" H	330" L x 96" W x 85" H	330" L x 96" W x 85" H	149" L x 63" W x 89" H
	NEW UNIT WT. DIMENSION	269" L x 96" W x 101" H	330" L x 96" W x 101" H	269" L x 96" W x 101" H	269" L x 96" W x 101" H	330" L x 96" W x 101" H	330" L x 96" W x 101" H	330" L x 96" W x 101" H	189.5" L x 96" W x 90" H

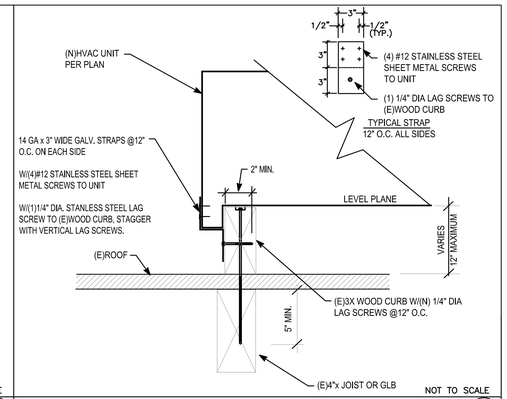
NOTES:
1. THE EXISTING UNITS HAVE BEEN MEASURED IN THE FIELD BY THE MFR, AND THE NEW UNITS ARE DESIGNED TO FIT ON THE EXISTING CURB.
2. EXISTING UNIT AC-A1 MPR IS LARGER THAN THE AS BUILT PLANS INDICATE. THE NEW UNIT DIMENSIONS MATCH EXISTING.



NOTE:
VERIFY EQUIP. DRAIN CONNECTION AND LOCATION

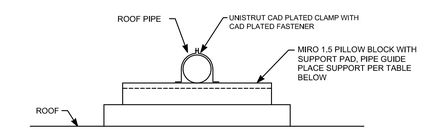
NOT TO SCALE

CONDENSATE DRAIN DETAIL 5



NOT TO SCALE

HVAC UNIT INSTALLATION DETAIL 1



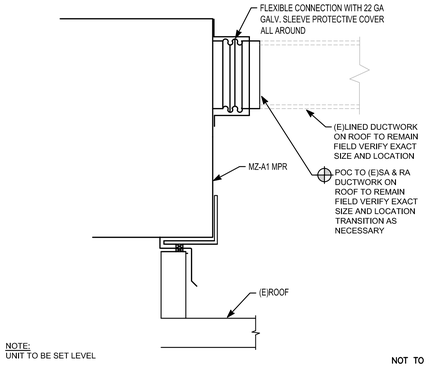
PIPE SUPPORT TABLE

PIPE SIZE	MAX. SPACING
3/4"	4'
I"	6'
I I/4"	6'
I I/2"	6'

NOTES:
1. PIPING SHALL BE SUPPORTED AT ALL ELBOWS AND TEES, AND SHALL BE SPACED AS SPECIFIED IN TABLE.
2. PIPING SHALL BE SLOPED AND ROUTED TO PREVENT TRAPPING CONDENSATE (EXCEPT AT DIRT LEGS) AND TO FACILITATE CONDENSATE DRAINAGE.

NOT TO SCALE

PIPE ON ROOF SUPPORT DETAIL 6



NOTE:
UNIT TO BE SET LEVEL

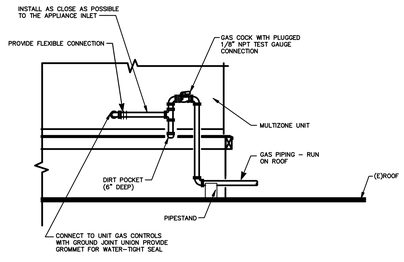
NOT TO SCALE

HORIZONTAL RTU INSTALLATION 2

NOT TO SCALE

NOT USED 3

NOTE:
INSTALL SEDIMENT TRAP ON ALL APPLIANCES THAT DO NOT HAVE AN INTERNAL SEDIMENT TRAP OR RANGES.



NOT TO SCALE

GAS CONNECTION TO MZ UNIT 4

REGISTERED PROFESSIONAL ENGINEER — No. M 27634 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — No. C-31126 Exp 10-31-25 — STATE OF CALIFORNIA

STAMPS

ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627
Telephone: (949) 515-4333
JOB NO. 2023-032
CONSULTANT BRANDING

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024
AGENCY APPROVAL
File No. 30-48 A# 04-122954

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/27/24

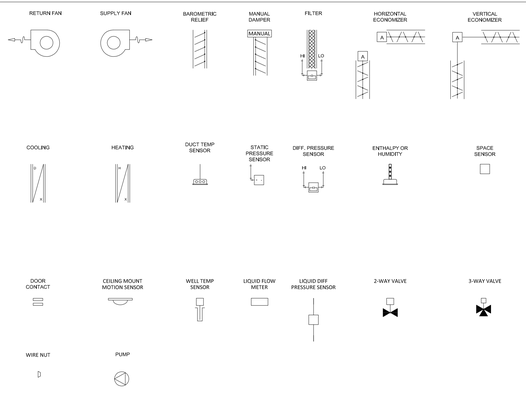
PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
DELTA # _____ DATE _____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # _____ DATE _____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # _____ DATE _____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # _____ DATE _____ ☐ ADD ☐ AFO ☐ CCD ☐ REV

COMMON ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AC	AIR CONDITIONING
ACU	AIR CONDITIONING UNIT
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
AUTO	AUTOMATIC
AUX	AUXILIARY
BAI	BACNET ANALOG INPUT
BAO	BACNET ANALOG OUTPUT
BBI	BACNET BINARY INPUT
BBO	BACNET BINARY OUTPUT
BI	BINARY INPUT
BO	BINARY OUTPUT
C	COMMON
CHW	CHILLED WATER
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
COND	CONDENSER
CW	CONDENSER WATER
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
DA	DISCHARGE AIR
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
EA	EXHAUST AIR
EF	EXHAUST FAN
EVAP	EVAPORATOR
F	FAHRENHEIT
FCU	FAN COIL UNIT
HOA	HAND/OFF/AUTO
HP	HEAT PUMP
HRU	HEAT RECOVERY UNIT
HTEX	HEAT EXCHANGER
HW	HOT WATER
HWP	HOT WATER PUMP
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
MAX	MAXIMUM
MIN	MINIMUM
MISC	MISCELLANEOUS
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTDOOR AIR
RA	RETURN AIR
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SF	SUPPLY FAN
SP	STATIC PRESSURE
TEMP	TEMPERATURE
UH	UNIT HEATER
UV	UNIT VENTILATOR
VAV	VARIABLE AIR VOLUME
VAVTU	VARIABLE AIR VOLUME TERMINAL UNIT
VVT	VARIABLE VOLUME & TEMPERATURE
W/	WITH
W/O	WITHOUT
WSHP	WATER SOURCE HEAT PUMP

SYMBOL LEGEND



GENERAL INFORMATION

COMMUNICATION BUS SPECIFICATION
1. A 24 AWG 2-conductor-shielded-stranded cable (plenum rated as required) must be daisy chained from controller to controller. It should be color coded (red, black, white).
2. The communication cable operates at up to 5 VDC. Verify with the local code authority and specs regarding conduit requirements.
3. No "T" tap or "star" type connections are permitted.
4. Terminate the shields on the designated terminal at each device.
5. 30 controller's maximum per communication bus segment. 60 controller's maximum per network router.
6. A repeater is required every 2000 ft. or 30 devices. Maximum of 4 repeaters per bus for a total of 10,000 ft.

POWER TO VVT AND VAV DAMPER ACTUATORS/CONTROLLERS
1. Each zone requires a 24 VAC, 40 VA transformer (more in some cases depending on the valve or electric heater requirements)

2. It is recommended that each zone have its own transformer, however zones may be grouped up to 100 VA and still remain in UL Class 2 conformance.
3. Be careful of voltage drop. The damper will operate in a power range of 22 to 26 VAC. The damper will not operate at voltages less than 22 vac.

GENERAL NOTES
1. The 2 conductor communication cable and sensor cables must always be in a separate jacket from one another. Never run the se cables in the same conduit as, or
   bundle them with, AC power wiring of any voltage. Do not strap these cables along any conduits that contain AC power wiring of any voltage.
   Do not run these cables in rings or conduit with fire, life, safety, security, network, telephone, power, or other wiring. When running communication and sensor wiring parallel to other cabling or conduit maintain a 12 in. distance.
2. Ethernet and/or Internet connection to I-Vu are supplied and maintained by building owner/operator.

INSTALLATION COORDINATION NOTES
1. Installer shall coordinate all power and data connection requirements with the GC onsite.
2. Install all components in accordance with the specification, applicable codes and manufacturer 's literature

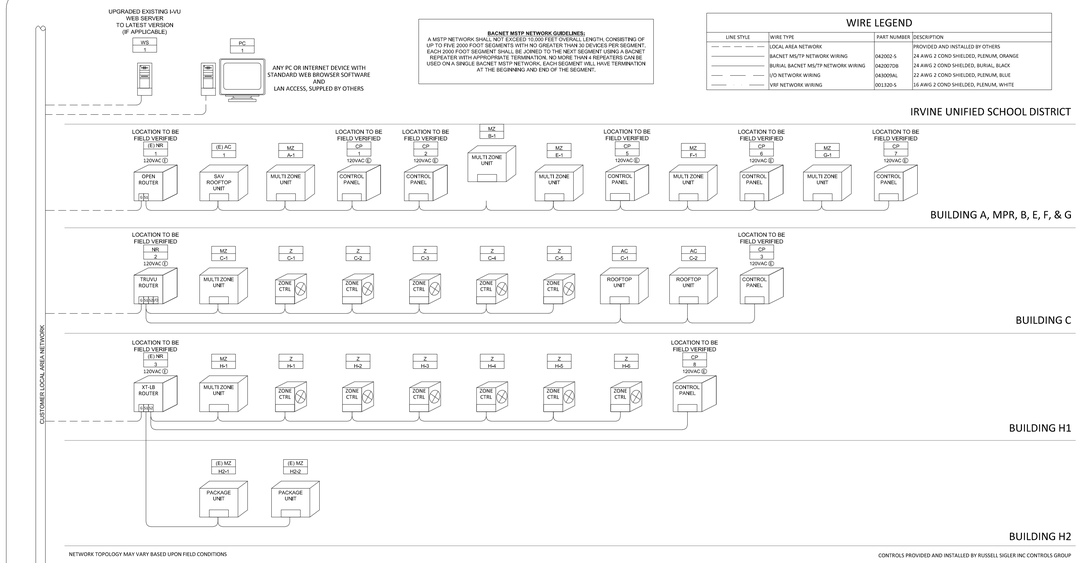
NOTES

No.	Revision/Issue	Date
-	Design	11/02/23

Firm Name and Address
Russell Sigler, Inc.
Brea, California

Project Name and Address
IUSD Rancho San Joaquin MS
4861 Michelson Drive
Irvine, CA 92612

Drawing Title: Legend
Mechanical Engineer: Zero & Associates
Drawn By: F. Delacruz
Page: 1



BACNET MS/TP NETWORK GUIDELINES:
A MS/TP NETWORK SHALL NOT EXCEED 10,000 FEET OVERALL LENGTH, CONSISTING OF UP TO FIVE 2000 FOOT SEGMENTS WITH NO GREATER THAN 32 DEVICES PER SEGMENT. EACH 2000 FOOT SEGMENT SHALL BE JOINED TO THE NEXT SEGMENT USING A BACNET REPEATER WITH APPROPRIATE TERMINATION. NO MORE THAN 4 REPEATERS CAN BE USED ON A SINGLE BACNET MS/TP NETWORK. EACH SEGMENT WILL HAVE TERMINATION AT THE BEGINNING AND END OF THE SEGMENT.

WIRE LEGEND

LINE STYLE	WIRE TYPE	PART NUMBER	DESCRIPTION
	LOCAL AREA NETWORK		PROVIDED AND INSTALLED BY OTHERS
	BACNET MS/TP NETWORK WIRING	042002-5	24 AWG 2 COND SHIELDED, PLENUM, ORANGE
	BURIAL BACNET MS/TP NETWORK WIRING	042007DB	24 AWG 2 COND SHIELDED, BURIAL, BLACK
	I/O NETWORK WIRING	043009AL	22 AWG 2 COND SHIELDED, PLENUM, BLUE
	VRF NETWORK WIRING	001320-5	16 AWG 2 COND SHIELDED, PLENUM, WHITE

NETWORK TOPOLOGY MAY VARY BASED UPON FIELD CONDITIONS

CONTROLS PROVIDED AND INSTALLED BY RUSSELL SIGLER INC CONTROLS GROUP

BACS RISER DIAGRAM (1 OF 2)

SCALE: NONE

NOTES

No.	Revision/Issue	Date
-	Design	11/02/23

Firm Name and Address
Russell Sigler, Inc.
Brea, California

Project Name and Address
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4861 Michelson Drive
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Drawing Title: BACS Riser Diagram 1 of 2
Mechanical Engineer: Zero & Associates
Drawn By: F. Delacruz
Page: 2

REGISTERED PROFESSIONAL ENGINEER — No. M 27634 — 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — REGISTERED PROFESSIONAL ENGINEER — Exp. 10-31-25 — STATE OF CALIFORNIA

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CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

SEQUENCE OF OPERATION (MULTIZONE UNITS)

SYSTEM DESCRIPTION:
SYSTEM CONSISTS OF A MULTIZONE AIR-HANDLING UNIT (AHU) EQUIPPED WITH AN ECONOMIZER, DX COOLING, HEATING COIL AND A ZONE MIXING-DAMPER FOR EACH BUILDING ZONE SERVED BY THE AHU. EACH ZONE WILL HAVE ITS OWN ZONE SENSOR.

SUPPLY FAN CONTROL
OCCUPIED - THE SUPPLY FAN WILL START WHENEVER THE CONTROLLER'S INTERNAL OCCUPANCY SCHEDULE INDICATES THAT THE SYSTEM IS IN AN OCCUPIED MODE. SUPPLY FAN SHALL RUN AT A CONSTANT VOLUME.

UNOCCUPIED - THE SUPPLY FAN WILL STOP WHENEVER THE CONTROLLER INTERNAL OCCUPANCY SCHEDULE INDICATES THAT THE SYSTEM IS IN AN UNOCCUPIED MODE. HOWEVER, IF THE SPACE TEMPERATURE EXCEEDS THE UNOCCUPIED HIGH SETPOINT OR FALLS BELOW THE UNOCCUPIED LOW SETPOINT, THE CONTROLLER WILL START THE SUPPLY FAN. THE SUPPLY FAN WILL ALSO START IN THE UNOCCUPIED MODE IF THE TIMED OVERRIDE FUNCTION IS ACTIVE.

ECONOMIZER
ECONOMIZER SHALL CLOSE WHEN FAN IS OFF OR DURING A LOSS OF POWER. DURING OCCUPIED HOURS WHEN FAN IS ENERGIZED, THE ECONOMIZER SHALL OPEN TO ADJUSTABLE MINIMUM POSITION. WHEN OUTSIDE AIR TEMPERATURE IS BELOW 71F AND OCCUPIED SPACE REQUIRES COOLING, ECONOMIZER SHALL OPEN. IF ECONOMIZER AIR IS NOT SUFFICIENT TO MEET THE DEMAND IN THE OCCUPIED SPACE, UNIT SHALL ENABLE AVAILABLE MECHANICAL COOLING STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

DX COOLING - COLD DECK
OCCUPIED - WHENEVER THE SUPPLY FAN IS RUNNING, AND THE OCCUPIED SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT FOR ANY ZONE, AND AT LEAST ON ZONE IS 100% OPEN (ADJUSTABLE), THE CONTROLLER SHALL ACTIVATE DX COOLING STAGES (2) TO MAINTAIN THE COLD DECK TEMPERATURE SETPOINT OF 55°F (ADJUSTABLE). THE STAGES WILL BE ACTIVATED SEQUENTIALLY AND ALLOW FOR A CONFIGURABLE TIME DELAY BETWEEN EACH STAGE. ONCE ACTIVATED, EACH STAGE WILL NOT BE DEACTIVATED UNTIL THE CONTROLLER ALGORITHM HAS CALCULATED A DECREMENT OF A FULL STAGE.

UNOCCUPIED - WHENEVER THE SUPPLY FAN IS OFF, THE DX COOLING STAGES WILL BE OFF. IF, HOWEVER, THE SUPPLY FAN HAS STARTED, THE CONTROLLER WILL STAGE DX COOLING, AS APPLICABLE, UNTIL SPACE TEMPERATURE FOR ALL ZONES HAS RETURNED TO THE REQUIRED UNOCCUPIED SPACE TEMPERATURE COOLING SETPOINT.

HEATING COIL - HOT DECK
OCCUPIED - WHEN THE SUPPLY FAN IS RUNNING, AND THE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT FOR ANY ZONE, THE CONTROLLER WILL MODULATE THE HEATING TO MAINTAIN THE HOT DECK SETPOINT OF 115°F (ADJUSTABLE).

UNOCCUPIED - WHENEVER THE SUPPLY FAN IS OFF, THE HEATING COIL VALVE WILL CLOSE. IF, HOWEVER, THE SUPPLY FAN HAS STARTED, THE CONTROLLER WILL MODULATE THE HEATING VALVE, AS APPLICABLE, UNTIL THE SPACE TEMPERATURE FOR ALL ZONES HAS RETURNED TO THE REQUIRED UNOCCUPIED SPACE TEMPERATURE HEATING SETPOINT.

ZONE DAMPERS (EACH ONE)
OCCUPIED
COOLING - WHEN THE SUPPLY FAN IS RUNNING, AND THE ZONE SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT, THE CONTROLLER WILL MODULATE THE ZONE DAMPER (MIXING COLD AND HOT AIR STREAMS AS NECESSARY) TO MAINTAIN THE ZONE COOLING SETPOINT.
HEATING - WHEN THE SUPPLY FAN IS RUNNING, AND THE ZONE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT, THE CONTROLLER WILL MODULATE THE ZONE DAMPER (MIXING COLD AND HOT AIR STREAMS AS NECESSARY) TO MAINTAIN THE ZONE HEATING SETPOINT.

UNOCCUPIED
COOLING - WHEN THE SUPPLY FAN IS RUNNING, AND THE ZONE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED HEATING SETPOINT, THE CONTROLLER WILL MODULATE THE ZONE DAMPER (MIXING COLD AND HOT AIR STREAMS AS NECESSARY) TO MAINTAIN THE ZONE UNOCCUPIED COOLING SETPOINT.

HEATING - WHEN THE SUPPLY FAN IS RUNNING, AND THE ZONE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT, THE CONTROLLER WILL MODULATE THE ZONE DAMPER (MIXING COLD AND HOT AIR STREAMS AS NECESSARY) TO MAINTAIN THE ZONE UNOCCUPIED HEATING SETPOINT.

SEQUENCE OF OPERATION (EXHAUST FANS)

EXHAUST FANS
EXHAUST FANS SHALL RUN BASED ON AN OCCUPIED TIME SCHEDULE (CONFIGURABLE) OR VIA INTERLOCK SCHEDULE (SEE EF SCHEDULE FOR INTERLOCKS).

EXHAUST FAN STATUS WILL BE MONITORED THROUGH A CURRENT SENSING SWITCH. IF THE CURRENT SWITCH DOES NOT DETECT FAN STATUS AFTER A START COMMAND HAS BEEN SENT TO THE ASSOCIATED EXHAUST FAN, AN ALARM WILL BE GENERATED TO THE I-VU WEB SERVER.

SEQUENCE OF OPERATION (HEAT PUMP UNITS)

INDOOR FAN
DURING OCCUPIED PERIODS, FAN SHALL OPERATE CONTINUOUSLY. DURING UNOCCUPIED PERIODS, FAN SHALL OPERATE WHEN THE SPACE TEMPERATURE EXCEEDS THE UNOCCUPIED HEATING OR COOLING SETPOINTS, THE FAN OPERATES AT ONE SPEED ONLY AND PROVIDES ON/OFF OPERATION.

HEATING MODE
WHEN SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT, UNIT SHALL OPERATE IN THE HEATING MODE. UNIT SHALL STAGE AVAILABLE HEAT STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

COOLING MODE
WHEN SPACE TEMPERATURE IS ABOVE OCCUPIED COOLING SETPOINT, UNIT SHALL OPERATE IN THE COOLING MODE. UNIT SHALL ENABLE AVAILABLE COOLING STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

SEQUENCE OF OPERATION (2 SPEED AC UNITS)

INDOOR FAN
DURING OCCUPIED PERIODS, THE FAN SHALL OPERATE CONTINUOUSLY. DURING UNOCCUPIED PERIODS, THE FAN SHALL OPERATE WHEN THE SPACE TEMPERATURE EXCEEDS THE UNOCCUPIED HEATING OR COOLING SETPOINTS. THE FAN OPERATES AT 1 OF 2 SPEEDS DEPENDING ON THE MODE OF OPERATION AND LOAD CONDITIONS. DURING VENT ONLY MODE AND LOW LOAD CONDITIONS, THE FAN OPERATES AT LOW SPEED. IF LOAD CONDITIONS INCREASE OR IF THERE IS A CALL FOR HEATING, THE FAN OPERATES AT HIGH SPEED.

HEATING MODE
WHEN SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT, UNIT SHALL OPERATE IN THE HEATING MODE. UNIT SHALL STAGE AVAILABLE HEAT STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

COOLING MODE
WHEN SPACE TEMPERATURE IS ABOVE OCCUPIED COOLING SETPOINT, UNIT SHALL OPERATE IN THE COOLING MODE. UNIT SHALL ENABLE AVAILABLE COOLING STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

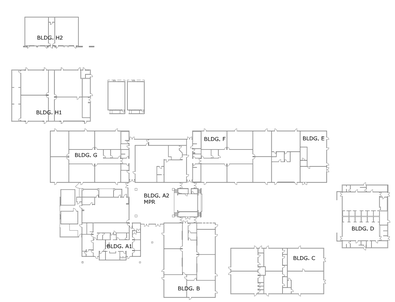
ECONOMIZER
ECONOMIZER SHALL CLOSE WHEN FAN IS OFF OR DURING A LOSS OF POWER. DURING OCCUPIED HOURS WHEN FAN IS ENERGIZED, THE ECONOMIZER SHALL OPEN TO ADJUSTABLE MINIMUM POSITION. WHEN OUTSIDE AIR TEMPERATURE IS BELOW 71F AND OCCUPIED SPACE REQUIRES COOLING, ECONOMIZER SHALL OPEN. IF ECONOMIZER AIR IS NOT SUFFICIENT TO MEET THE DEMAND IN THE OCCUPIED SPACE, UNIT SHALL ENABLE AVAILABLE MECHANICAL COOLING STAGES TO SATISFY DEMAND IN THE OCCUPIED SPACE.

POWER EXHAUST
THE EXHAUST FAN SHALL MODULATE TO MAINTAIN THE ROOM PRESSURE SETPOINT (AS DETERMINED BY AIR BALANCER).

ALL CLASSROOM THERMOSTATS WILL HAVE CO2 SENSORS.

CONTROL CONDUIT AND WIRING TO BE FURNISHED AND INSTALLED BY HVAC CONTROLS CONTRACTOR (TYP.)

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 INSTALLED WHEN CONDUIT WILL BE INSTALLED ON ROOFS. REUSE EXISTING CONDUIT PATH WHEN POSSIBLE.



RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA	CHECKED BY:RCA
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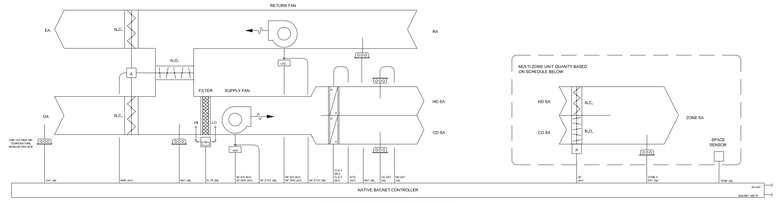


(MOD.H/2C) ROOFTOP MULTI ZONE UNIT W/ ECONOMIZER & RETURN FAN CONTROL DETAIL – (MZ-A-1, AC-A-1-MPR, MZ-B-1, MZ-C-1, MZ-E-1, MZ-F-1, MZ-G-1, & MZ-H-1)

SCALE NONE | 1

MULTI ZONE UNIT/ ZONE SCHEDULE

MULTI UNIT ZONE TAG	MZ DAMPER TAG	ZONE SENSOR		
		TEMP	CO2	MOTION
MZ-A-1	Z-A-1	X		
	Z-A-2	X		
	Z-A-3	X		
	Z-A-4	X		
	Z-A-5	X		
	Z-A-6	X		
	Z-A-7	X		
	Z-A-8	X		
	Z-A-9	X		
	Z-A-10	X		
AC-A-1-MPR	NONE	X		
MZ-B-1	Z-B-1	X		
	Z-B-2	X		
	Z-B-3	X		
	Z-B-4	X		
	Z-B-5	X		
	Z-B-6	X		
	Z-B-7	X		
	Z-B-8	X		
	Z-B-9	X		
MZ-C-1	Z-C-1	X		
	Z-C-2	X		
	Z-C-3	X		
	Z-C-4	X		
	Z-C-5	X		

MULTI UNIT ZONE TAG	MZ DAMPER TAG	ZONE SENSOR		
		TEMP	CO2	MOTION
MZ-E-1	Z-E-1	X		
	Z-E-2	X		
	Z-E-3	X		
	Z-E-4	X		
	Z-E-5	X		
	Z-E-6	X		
MZ-F-1	Z-F-1	X		
	Z-F-2	X		
	Z-F-3	X		
	Z-F-4	X		
	Z-F-5	X		
	Z-F-6	X		
	Z-F-7	X		
	Z-F-8	X		
	Z-F-9	X		
	Z-F-10	X		
MZ-G-1	Z-G-1	X		
	Z-G-2	X		
	Z-G-3	X		
	Z-G-4	X		
	Z-G-5	X		
	Z-G-6	X		
	Z-G-7	X		
	Z-G-8	X		
	Z-G-9	X		

MULTI UNIT ZONE TAG	MZ DAMPER TAG	ZONE SENSOR		
		TEMP	CO2	MOTION
MZ-H-1	Z-H-1	X		
	Z-H-2	X		
	Z-H-3	X		
	Z-H-4	X		
	Z-H-5	X		
	Z-H-6	X		

MULTI ZONE UNIT/ ZONE SCHEDULE

SCALE NONE | 2

NOTES

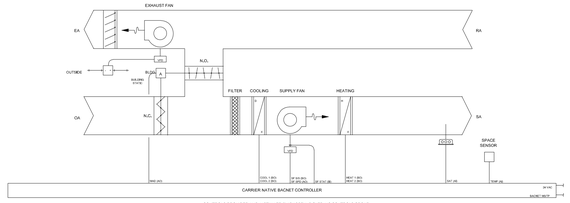
Carrier

No.	Revision/Issue	Date
-	Design	11/02/23

Firm Name and Address
Russell Sigler, Inc.
Brea, California

Project Name and Address
IUSD Rancho San Joaquin MS
4861 Michelson Drive
Irvine, CA 92612

Drawing Title: AHU Control Detail 1 of 2
Mechanical Engineer: Zero & Associates
Drawn By: F. Delacruz | Page: **3**



(1H/2C) ROOFTOP PACKAGE UNIT – (AC-C-1 & AC-C-2)

SCALE NONE | 1

EXTERIOR LIGHTING SCHEDULE

LIGHTING NAME	SWITCH LOCATION	CONTROLLER POINTS		
		AO	DI	NOTE
MAIN EXTERIOR LIGHTING	BLDG A, MECH RM	X		
BLDG. H EXTERIOR LIGHTING	BLDG H, - FIELD VERIFY	X		

EXTERIOR LIGHTING DETAIL – (MAIN BUILDING & H2)

SCALE NONE | 2

BUILDING "D" SHALL RUN AS A STAND ALONE BUILDING AND WILL NOT BE TIED INTO THE BMS

(1H/1C) HEAT PUMP UNIT – (HP-DC-1, HP-DC-2, HP-D-1, & HP-D-2)

SCALE NONE | 3

NOTES

Carrier

No.	Revision/Issue	Date
-	Design	11/02/23

Firm Name and Address
Russell Sigler, Inc.
Brea, California

Project Name and Address
IUSD Rancho San Joaquin MS
4861 Michelson Drive
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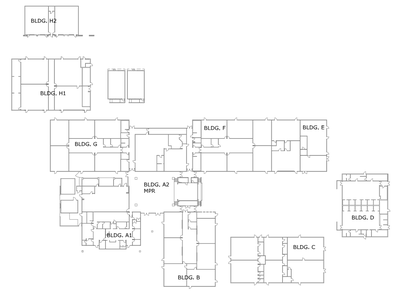
Drawing Title: AHU Control Detail 2 of 2
Mechanical Engineer: Zero & Associates
Drawn By: F. Delacruz | Page: **4**



REGISTERED PROFESSIONAL ENGINEER — No. M 27634 — 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — ROGER CLARKE — Exp. 10-31-25 — STATE OF CALIFORNIA

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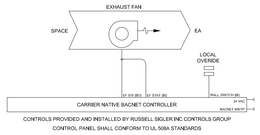

SCHEDULED/ INTERLOCKED EXHAUST FAN CONTROLS DETAIL – (SEE SCHEDULE BELOW) | SCALE NONE | 1

EXHAUST FAN SCHEDULE

EXHAUST FAN TAG	BUILDING SERVED	CONTROL PANEL	CONTROL TYPE	
			INTERLOCK	SCH
.....	.....			
.....	.....			
.....	.....			
.....				
EF-A-5	BLDG. A	CP-2	MZ-A-1	
EF-A-6	BLDG. A	CP-2	MZ-A-1	
EF-A-7	BLDG. A	CP-2	MZ-A-1	
EF-A-8	BLDG. A	CP-2	MZ-A-1	
EF-A-9	BLDG. A	CP-2	MZ-A-1	
EF-A-10	BLDG. A	CP-2	MZ-A-1	
EF-C-2	BLDG. B	CP-3	AC-C-1	
EF-C-3	BLDG. B	CP-3	AC-C-1	
EF-C-4	BLDG. B	CP-3	AC-C-1	
EF-C-5	BLDG. B	CP-3	AC-C-2	
EF-C-6	BLDG. B	CP-3	MZ-C-1	
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EXHAUST FAN SCHEDULE

EXHAUST FAN TAG	BUILDING SERVED	CONTROL PANEL	CONTROL TYPE	
			INTERLOCK	SCH
EF-E-1	BLDG. E	CP-5	MZ-E-1	
EF-E-2	BLDG. E	CP-5	MZ-E-1	
EF-E-3	BLDG. E	CP-5	MZ-E-1	
EF-E-4	BLDG. E	CP-5	MZ-E-1	
EF-F-1	BLDG. F	CP-6		X
EF-F-2	BLDG. F	CP-6		X
EF-F-3	BLDG. F	CP-6		X
EF-F-4	BLDG. F	CP-6		X
EF-G-1	BLDG. G	CP-7		X
EF-G-2	BLDG. G	CP-7		X
EF-G-3	BLDG. G	CP-7		X
EF-G-4	BLDG. G	CP-7		X
EF-H-1	BLDG. H	CP-8		X
EF-H-3	BLDG. H	CP-8		X

EXHAUST FAN SCHEDULE | SCALE NONE | 2

\- | SCALE NONE | 3

NOTES

Carrier

No.	Revision/Issue	Date
-	Design	11/02/23

Firm Name and Address
Russell Sigler, Inc.
Brea, California

Project Name and Address
IUSD Rancho San Joaquin MS
4861 Michelson Drive
Irvine, CA 92612

Drawing Title
EF & DC Control Detail

Mechanical Engineer
Zero & Associates

Drawn By: F. Delacruz | Page: **5**

REGISTERED PROFESSIONAL ENGINEER — No. M 27634 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — ROGER CLARKE — No. 18472 — STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

STAMPS

AGENCY APPROVAL
File No. 30-48 A# 04-122954

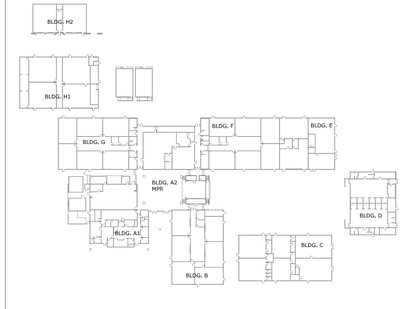
Z&A
ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627

Telephone: (949) 515-4333

JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS



PROJECT No. : 1-34-38

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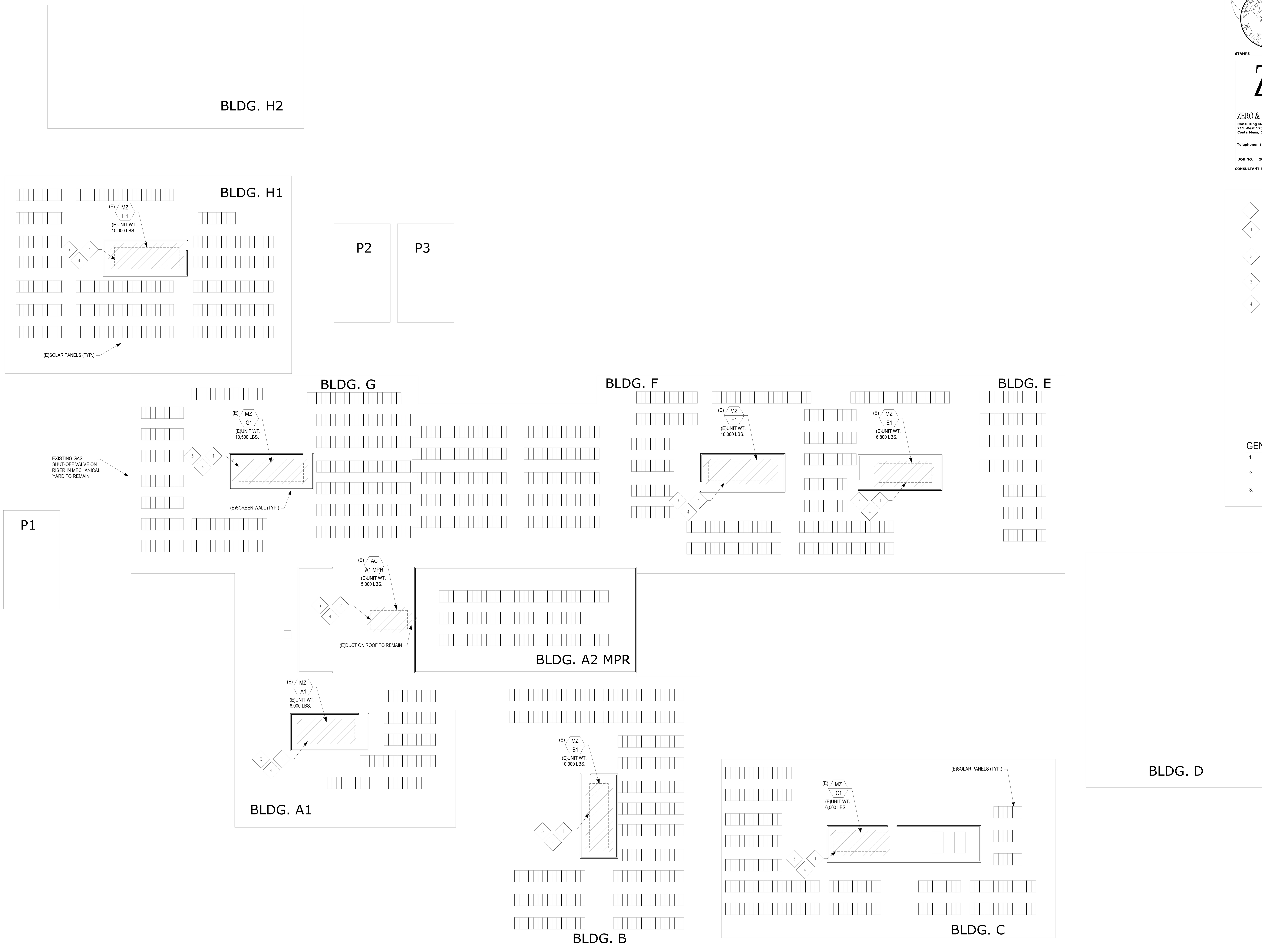

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RUHNAU CLARKE ARCHITECTS

DEMOLITION KEYNOTES

1. CAREFULLY DEMOLISH EXISTING ROOF MOUNTED MULTIZONE AIR CONDITIONER TO BE REPLACED LIKE FOR LIKE. EXISTING CURB TO REMAIN AND BE REUSED. EXISTING DUCT DROPS TO REMAIN AND BE REUSED.
2. CAREFULLY DEMOLISH EXISTING ROOF MOUNTED HORIZONTAL AIR CONDITIONER TO BE REPLACED LIKE FOR LIKE. EXISTING CURB/PLATFORM TO REMAIN AND BE REUSED. EXISTING DUCTWORK ON ROOF TO REMAIN AND BE REUSED.
3. DEMOLISH TRAP AND CONDENSATE PIPING TO MULTIZONE UNIT BACK TO (E)ROOF RECEPTOR. TO BE REPLACED WITH NEW.
4. DISCONNECT EXISTING GAS PIPING AND SOC TO UNIT, TO BE REPLACED WITH NEW.

GENERAL DEMOLITION NOTES:

1. PRIOR TO DEMOLITION OF HVAC UNITS INDICATED, PROVIDE AN AIR BALANCE REPORT OF THE AREAS SERVED. SEE SHEETS M2-1.0 THRU M2-1.3 FOR EXISTING LAYOUT.
2. NOT ALL ROOFTOP HVAC EQUIPMENT INDICATED ON PLANS. ANY EQUIPMENT NOT INDICATED TO BE DEMOLISHED IS TO REMAIN AND BE REUSED.
3. SEE ARCHITECTURAL DEMOLITION PLANS FOR ADDITIONAL INFORMATION.

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

HVAC DEMOLITION ROOF PLAN - OVERALL
SCALE: 1/16" = 1'-0" 1

PROJECT No. : 1-34-38

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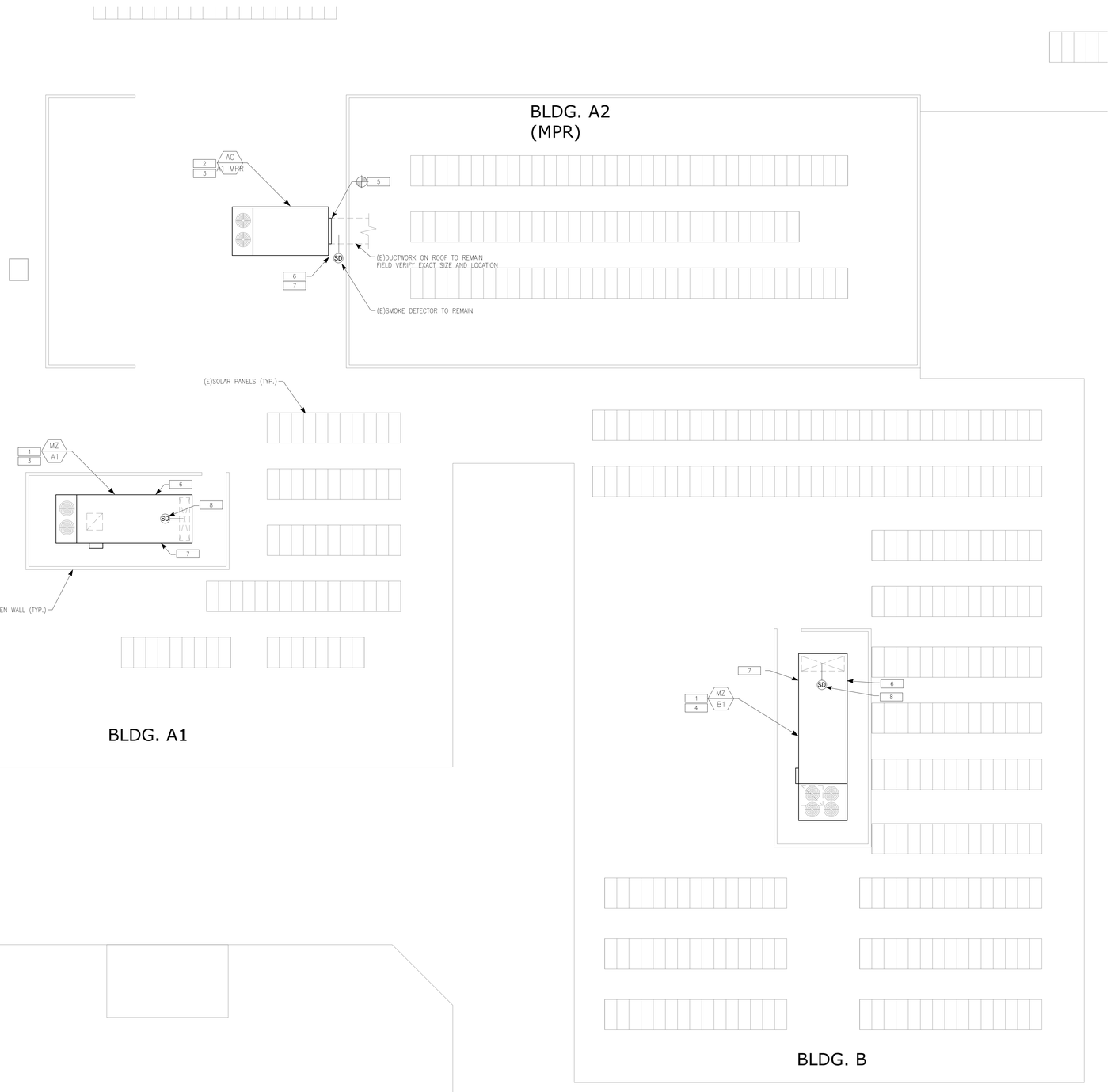
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

HVAC DEMOLITION PLAN

M1-2.0

1-34-38



NOTES:
1. NOT ALL ROOF TOP EQUIPMENT INDICATED. ALL HVAC EQUIPMENT NOT INDICATED TO REMAIN.

2. (E)GAS SHUT OF VALVE LOCATION INDICATED ON SHEET M1-2.0

HVAC ROOF PLAN - BUILDING A1, A2 & B

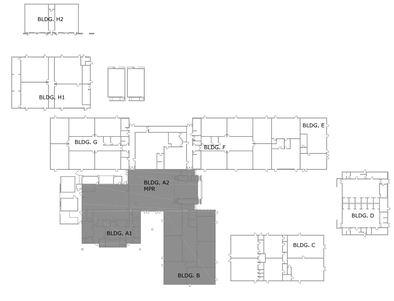
SCALE: 1/8" = 1'-0" | 1

HVAC KEYNOTES

1. INSTALL MULTIZONE AIR CONDITIONING UNIT ON ROOF. REUSE EXISTING CURB AND FOOTPRINT. SEE DETAIL 1/MO-0.2
2. INSTALL NEW HORIZONTAL AIR CONDITIONING UNIT ON ROOF. REUSE EXISTING PLATFORM AND FOOTPRINT. SEE DETAIL 2/MO-0.2 1/MO-0.2
3. AIR BALANCE ROOMS SERVED BY MULTIZONE UNIT BOTH PRIOR TO AND AFTER INSTALLATION. FOR DIFFUSER/GRILLE LOCATIONS AND AIR QUANTITIES SEE SHEET 1/M2-1.0
4. AIR BALANCE ROOMS SERVED BY MULTIZONE UNIT BOTH PRIOR TO AND AFTER INSTALLATION. FOR DIFFUSER/GRILLE LOCATIONS AND AIR QUANTITIES SEE SHEET 1/M2-1.3
5. POC SUPPLY AND RETURN AIR DUCT TO EXISTING DUCTWORK LOCATED ON ROOF.
6. PROVIDE NEW SOC AND GAS CONNECTION TO UNIT, SEE DETAIL 4/MO-0.2
7. PROVIDE NEW CONDENSATE DRAIN PIPING TO UNIT, SEE DETAIL 5/MO-0.2
8. FACTORY INSTALLED SMOKE DETECTOR IN SUPPLY AIR DUCT

HVAC CONTROLS

PROVIDE SIGLERS CONTROLS COMPATIBLE WITH THE CURRENT IUSD ENERGY MANAGEMENT SYSTEM. INTEGRATE CONTROLS AND PROVIDE GRAPHICS, TRENDS, REPORTS AND ALARMING.



REGISTERED PROFESSIONAL ENGINEER No. M 27634 6-30-25 MECHANICAL STATE OF CALIFORNIA

LICENSED ARCHITECT ROGER CLARKE No. 18484 10-31-25 STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

STAMPS

AGENCY APPROVAL
File No. 30-48 A# 04-122954

ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627
Telephone: (949) 515-4333
JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

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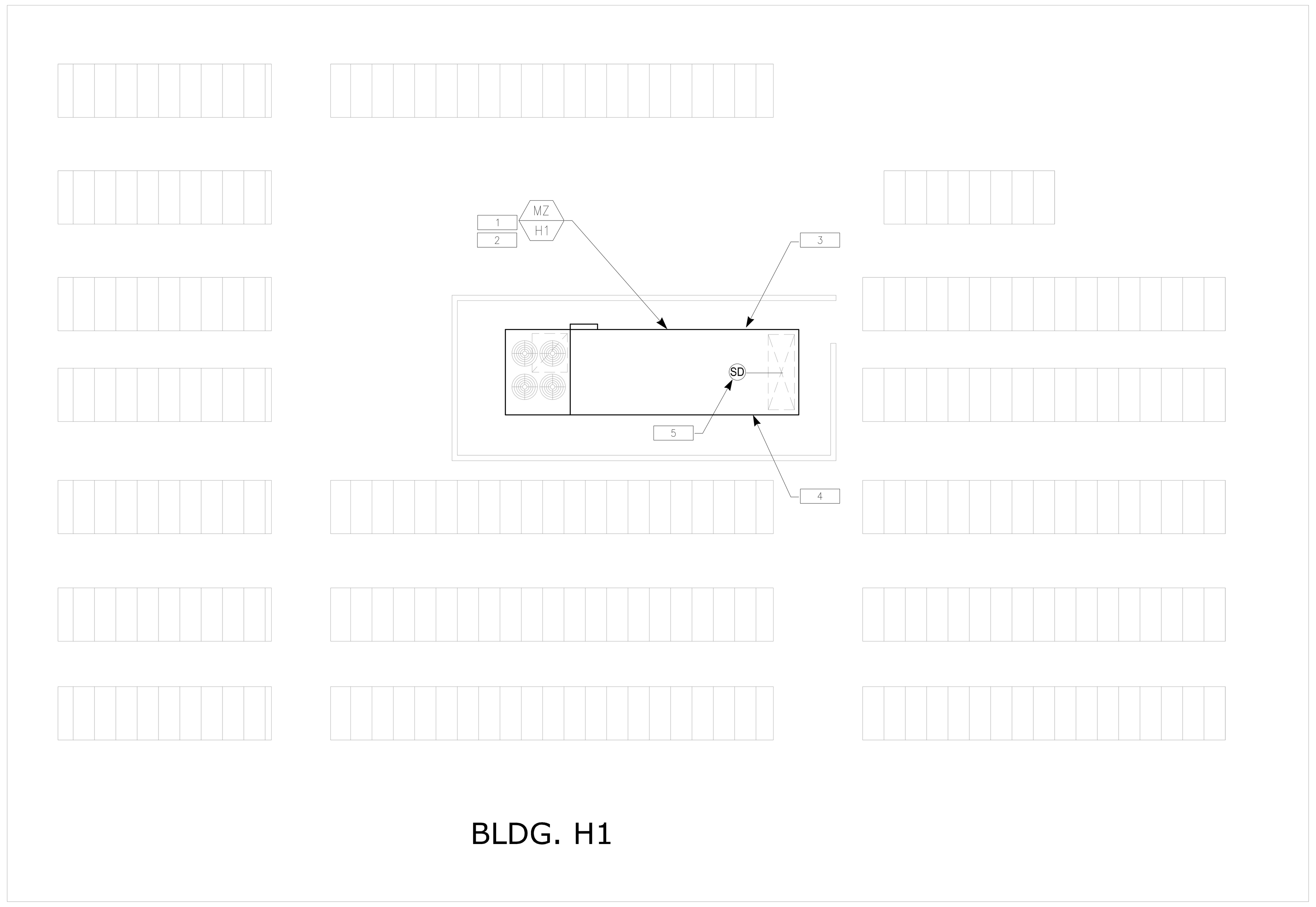
DELTA # ____ DATE ____	☐ ADD	☐ AFO	☐ CCD	☐ REV	
DELTA # ____ DATE ____	☐ ADD	☐ AFO	☐ CCD	☐ REV	
DELTA # ____ DATE ____	☐ ADD	☐ AFO	☐ CCD	☐ REV	

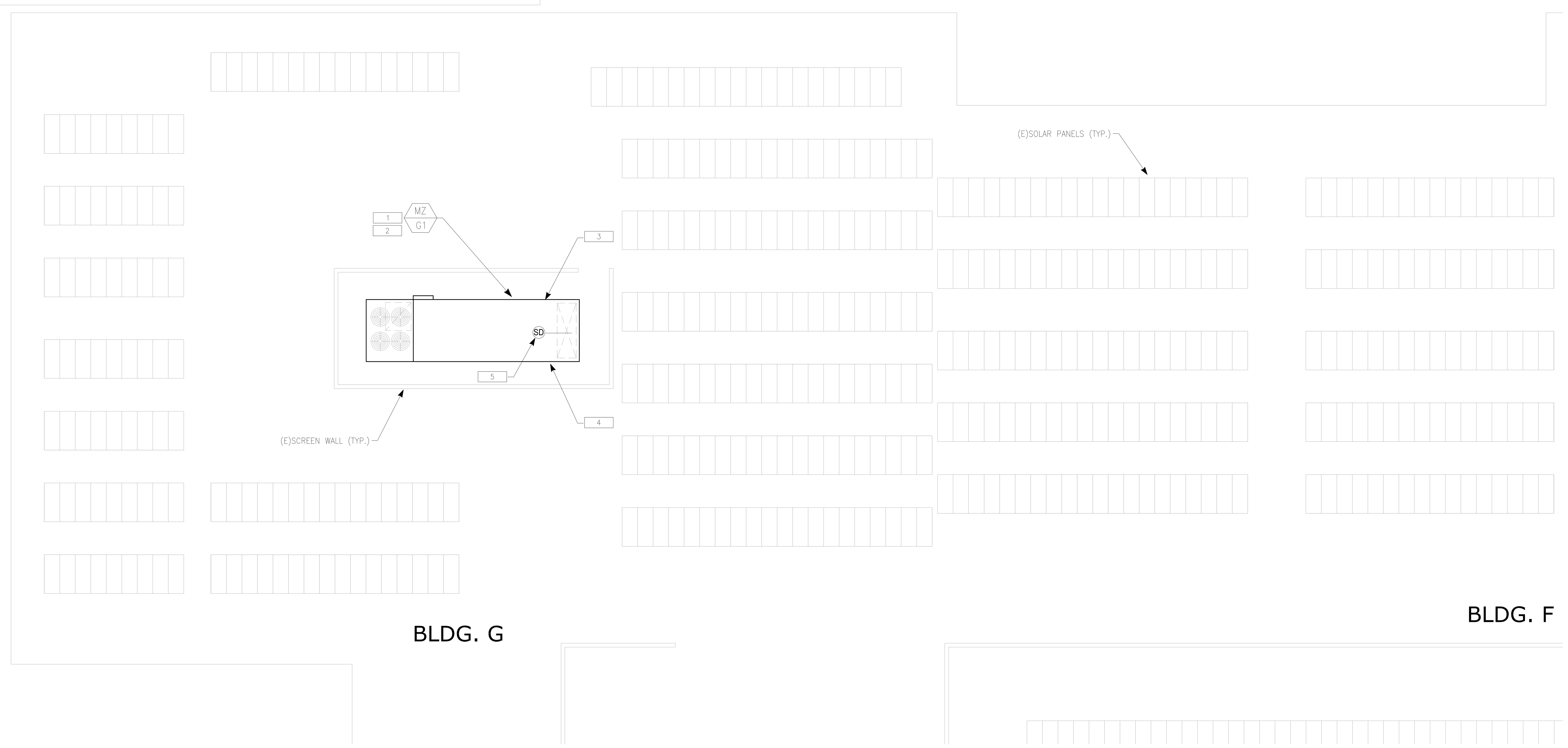
HVAC ROOF PLAN - BLDG. A1, A2 AND B

M1-3.0

1-34-38



BLDG. H1



BLDG. G

BLDG. F

NOTE: NOT ALL ROOF TOP EQUIPMENT INDICATED. ALL HVAC EQUIPMENT NOT INDICATED TO REMAIN.

HVAC ROOF PLAN - BUILDING G AND H

SCALE: 1/8" = 1'-0" 1

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Costa Mesa, CA 92627

Telephone: (949) 515-4333

JOB NO. 2023-032

CONSULTANT BRANDING

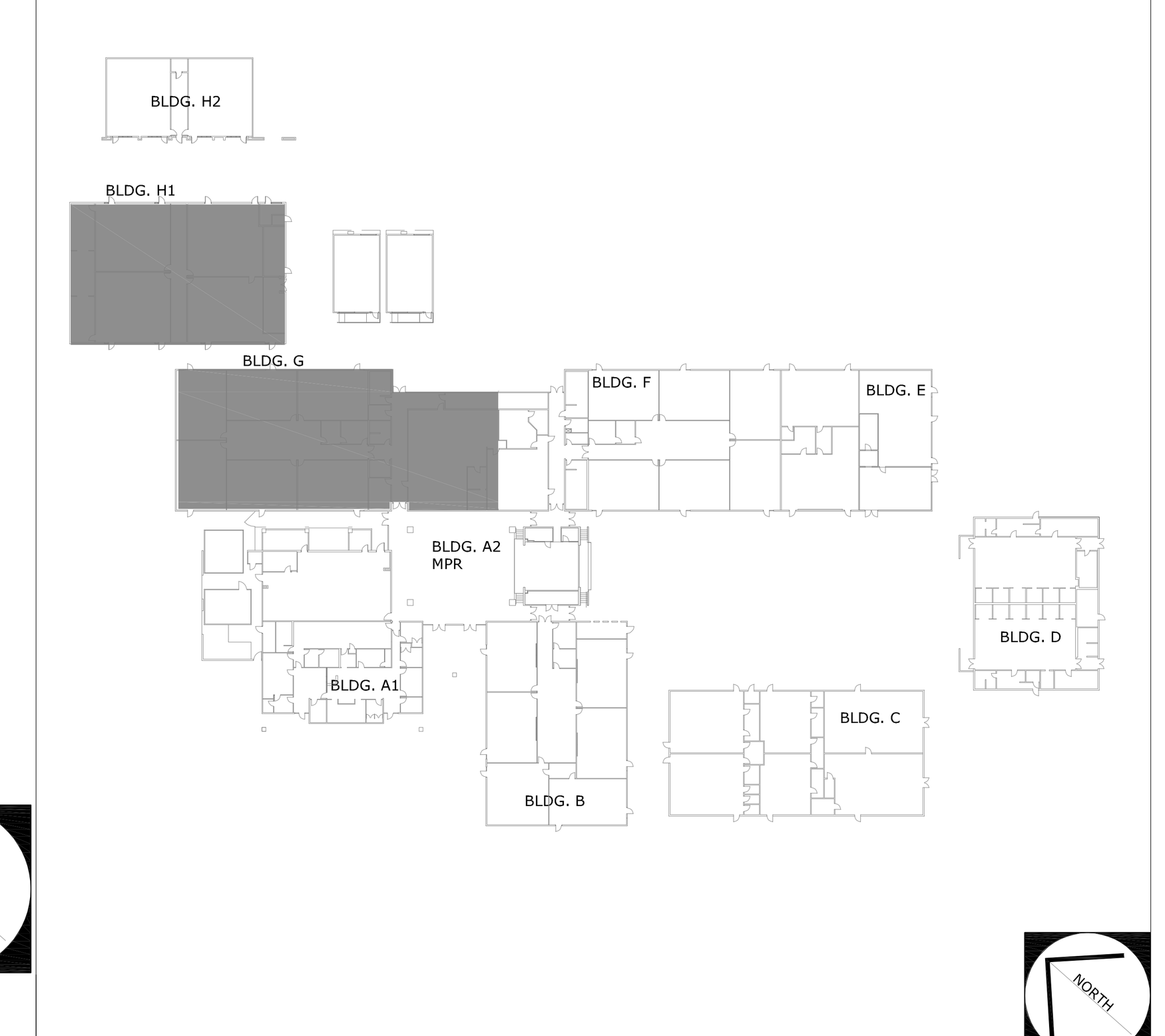
RUHNAU CLARKE ARCHITECTS

HVAC KEYNOTES

1. INSTALL MULTIZONE AIR CONDITIONING UNIT ON ROOF. REUSE EXISTING CURB AND FOOTPRINT. SEE DETAIL 1/M0-0.2
2. AIR BALANCE ROOMS SERVED BY MULTIZONE UNIT BOTH PRIOR TO AND AFTER INSTALLATION. FOR DIFFUSER/GRILLE LOCATIONS AND AIR QUANTITIES SEE SHEET 1/M2-1.1
3. PROVIDE NEW SOC AND GAS CONNECTION TO UNIT, SEE DETAIL 4/M0-0.2
4. PROVIDE NEW CONDENSATE DRAIN PIPING TO UNIT, SEE DETAIL 5/M0-0.2
5. FACTORY INSTALLED SMOKE DETECTOR IN SUPPLY AIR DUCT

HVAC CONTROLS

PROVIDE SIGLERS CONTROLS COMPATIBLE WITH THE CURRENT IUSD ENERGY MANAGEMENT SYSTEM. INTEGRATE CONTROLS AND PROVIDE GRAPHICS, TRENDS, REPORTS AND ALARMING.



RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA

RUHNAUCLARKE.COM

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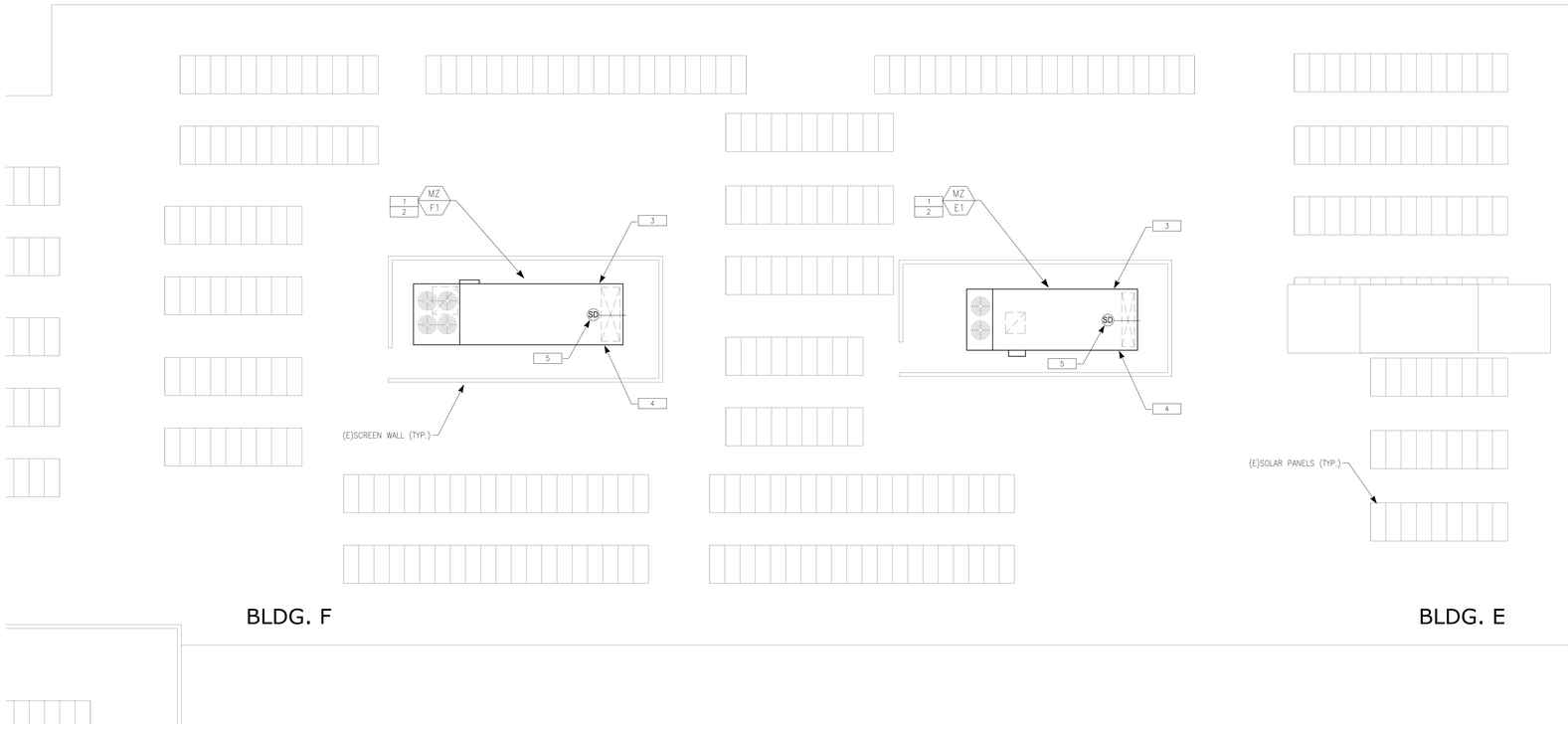
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT

RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

HVAC ROOF PLAN - BLDG. G AND H

M1-3.1

1-34-38



NOTE: NOT ALL ROOF TOP EQUIPMENT INDICATED. ALL HVAC EQUIPMENT NOT INDICATED TO REMAIN.

HVAC KEYNOTES

1 INSTALL MULTIZONE AIR CONDITIONING UNIT ON ROOF. REUSE EXISTING CURB AND FOOTPRINT. SEE DETAIL 1/M0-0.2

2 AIR BALANCE ROOMS SERVED BY MULTIZONE UNIT BOTH PRIOR TO AND AFTER INSTALLATION. FOR DIFFUSER/GRILLE LOCATIONS AND AIR QUANTITIES SEE SHEET 1/M2-1.1 1/M2-1.2

3 PROVIDE NEW SOC AND GAS CONNECTION TO UNIT, SEE DETAIL 4/M0-0.2

4 PROVIDE NEW CONDENSATE DRAIN PIPING TO UNIT, SEE DETAIL 5/M0-0.2

5 FACTORY INSTALLED SMOKE DETECTOR IN SUPPLY AIR DUCT

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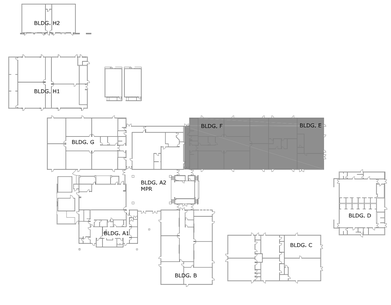

HVAC ROOF PLAN - BUILDING E AND F — SCALE: 1/8" = 1'-0" — 1

ZERO & ASSOCIATES
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JOB NO. 2023-032
CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

REGISTERED PROFESSIONAL ENGINEER — No. M 27634 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — ROGER CLARKE — No. C-18642 10-31-25 — STATE OF CALIFORNIA

STAMPS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

AGENCY APPROVAL
File No. 30-48 A# 04-122954

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT; DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA — CHECKED BY:RCA

DELTA #	DATE	☐ ADD	☐ AFO	☐ CCD	☐ REV
DELTA #	DATE	☐ ADD	☐ AFO	☐ CCD	☐ REV
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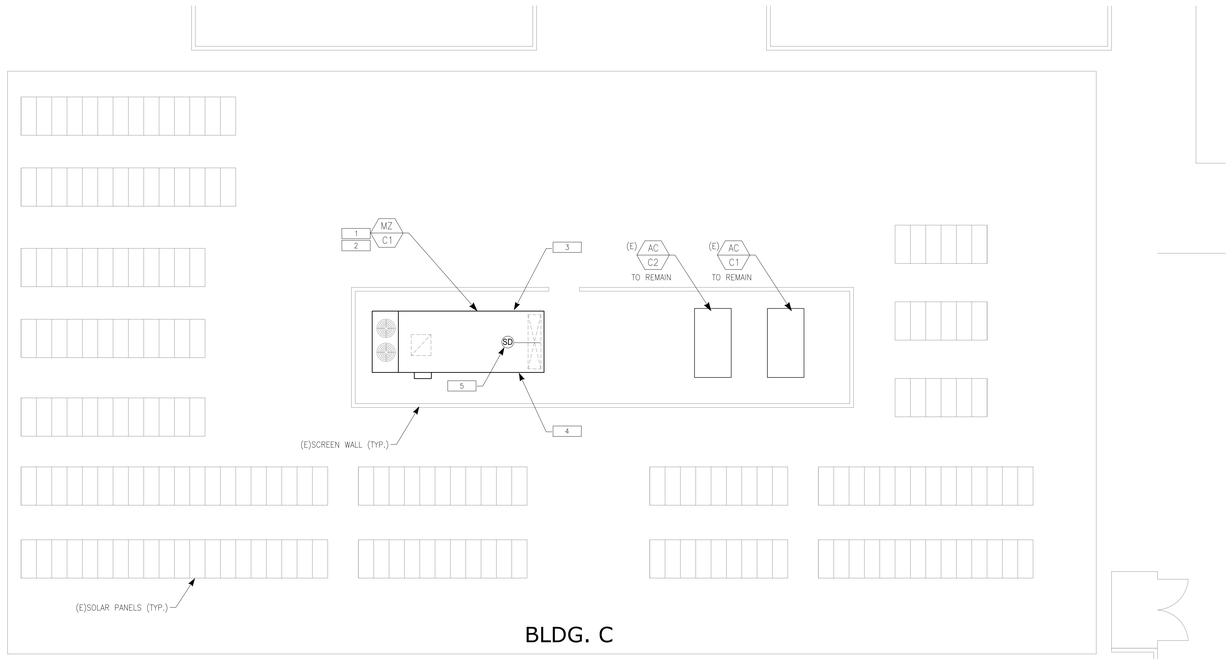


BLDG. C

NOTE: NOT ALL ROOF TOP EQUIPMENT INDICATED. ALL HVAC EQUIPMENT NOT INDICATED TO REMAIN.

HVAC KEYNOTES

1 INSTALL MULTIZONE AIR CONDITIONING UNIT ON ROOF. REUSE EXISTING CURB AND FOOTPRINT. SEE DETAIL 1/M0-0.2

2 AIR BALANCE ROOMS SERVED BY MULTIZONE UNIT BOTH PRIOR TO AND AFTER INSTALLATION. FOR DIFFUSER/GRILLE LOCATIONS AND AIR QUANTITIES SEE SHEET 1/M2-1.3

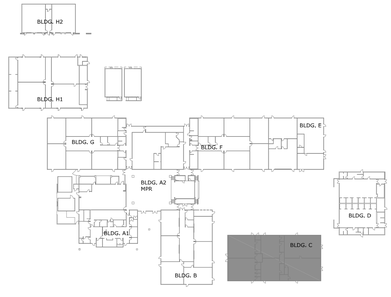
3 PROVIDE NEW SOC AND GAS CONNECTION TO UNIT, SEE DETAIL 4/M0-0.2

4 PROVIDE NEW CONDENSATE DRAIN PIPING TO UNIT, SEE DETAIL 5/M0-0.2

5 FACTORY INSTALLED SMOKE DETECTOR IN SUPPLY AIR DUCT

HVAC CONTROLS

PROVIDE SIGLERS CONTROLS COMPATIBLE WITH THE CURRENT IUSD ENERGY MANAGEMENT SYSTEM. INTEGRATE CONTROLS AND PROVIDE GRAPHICS, TRENDS, REPORTS AND ALARMING.



HVAC ROOF PLAN - BUILDING C

SCALE: 1/8" = 1'-0"

1

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DELTA # ____	DATE _____	☐ ADD	☐ AFO	☐ CCD	☐ REV

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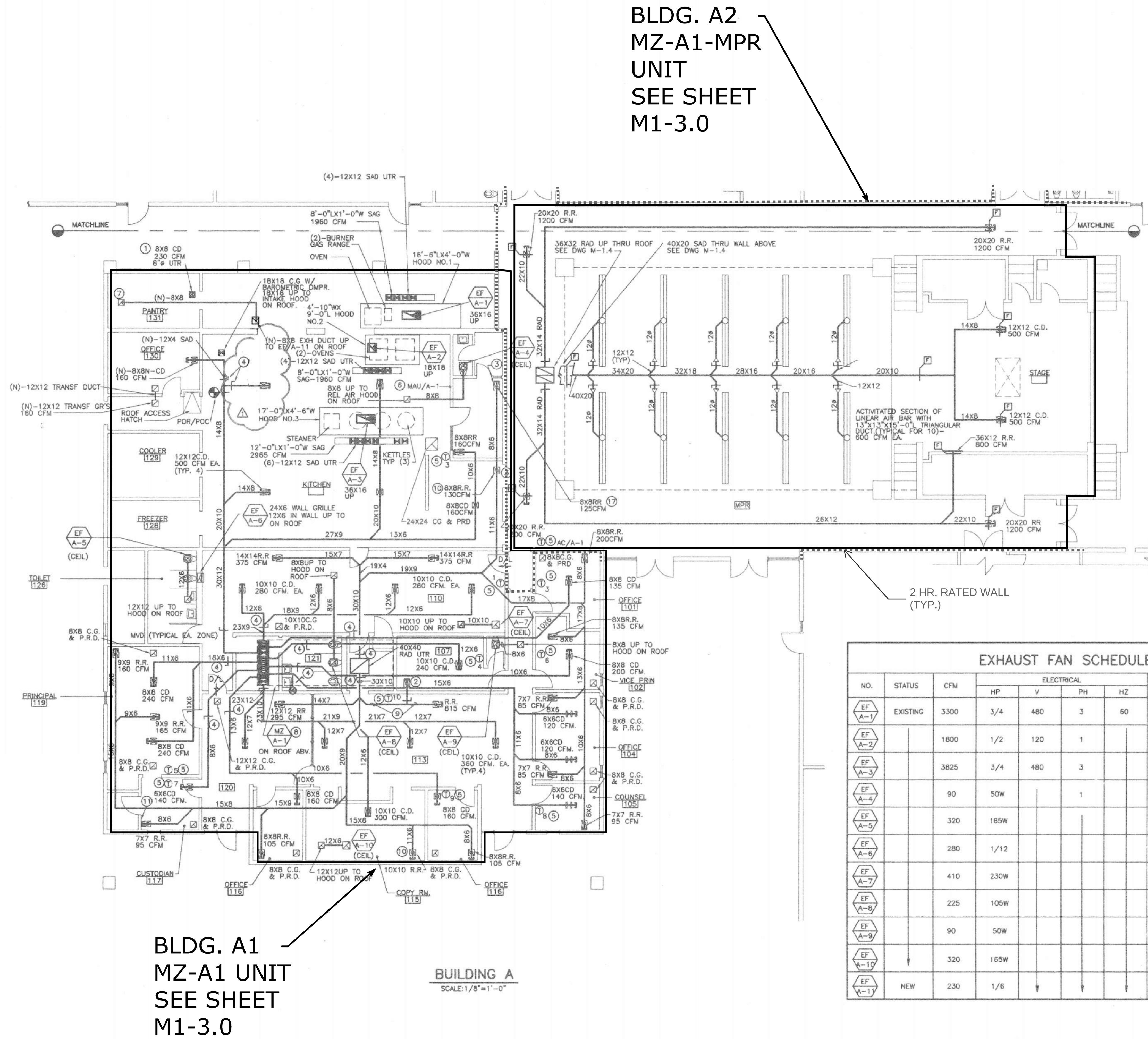
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

HVAC ROOF PLAN - BLDG. C

M1-3.3

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24



CONSTRUCTION NOTES

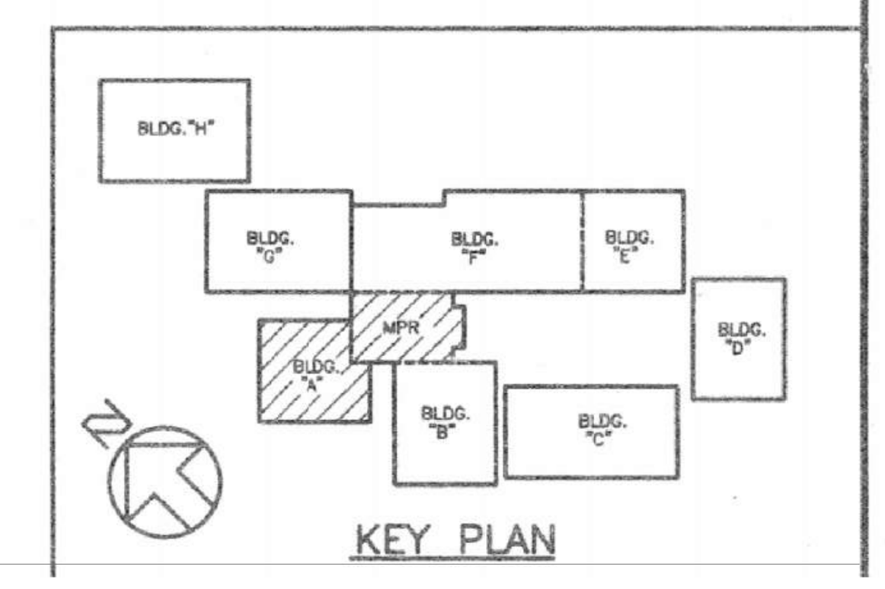
1. REMOVE (E)-8" CEILING DIFFUSER & SA DUCT.
2. INSTALL (N)-8"X8' RR @ 150 CFM.CONN (N)-8"X6' RA DUCT TO (N)-14"X14' RA DUCT @ POC.
3. REMOVE (E)-6"X8' RR & CAP DUCT ABOVE CEILING.
4. INSTALL (N)-MANUAL BALANCING DAMPERS.
5. REPLACE (E)-THERMOSTAT WITH (N)-TEMPERATURE SENSOR-TRANSMITTER.SEE CONTROL SCHEMATIC.
6. INSTALL (N)- SWITCH ON WALL @ 4'-6" HIGH FOR (N)-MAU/A-1.
7. INSTALL (N)-8"X8' EXHAUST GRILLE IN CEILING,230 CFM.
8. REPLACE (E)-MZ UNIT ON ROOF WITH (N)- MZ UNIT A-1.RECONNECT (E)-CONDENSATE DRAIN & GAS PIPING TO (N)-MZ UNIT.INSTALL (N)-SMOKE DETECTOR IN FAN DISCHARGE PLENUM.
9. REPLACE (E)-14"X7' RA DUCT WITH (N)-14"X14' RA DUCT.
10. INSTALL 22 GA GALV SHEET METAL BLANKOFF PLATE ABOVE RR.PAINT UNDERSIDE DULL BLACK.
11. MOUNT (N)-EMCS PANEL WITH "PLUG-IN-PORTS" ON WALL @ 4'-6" ABOVE FLOOR.

GENERAL NOTES

1. REPLACE ALL EXISTING CEILING, DIFFUSERS, REGISTERS & GRILLES, (EXCLUDING KITCHEN AREAS, MPR & TOILET ROOMS), WITH NEW OR SAME SIZE. CLEAN EXISTING DIFFUSERS, REGISTERS & GRILLES IN MPR. REPAINT DIFFUSERS IN KITCHEN AREAS & TOILET ROOMS TO COLOR SELECTED BY ARCHITECT.
2. EXISTING SIDE WALL REGISTERS & GRILLES TO REMAIN. REPAINT TO COLOR AS SELECTED BY ARCHITECT.
3. REBALANCE ALL SYSTEMS TO THE AIR QUANTITIES INDICATED.
4. ALL EXHAUST FANS TO REMAIN.
5. CLEAN ALL SUPPLY, RETURN, RELIEF & EXHAUST DUCTWORK INCLUDING EXHAUST DUCTWORK FOR HOOD NO'S 1,2 & 3 & EXHAUST FANS ON ROOF ABOVE.
6. INSTALL MANUAL BALANCING DAMPERS IN ALL SUPPLY & RETURN DUCTWORK IF NOT CURRENTLY INSTALLED.

EXHAUST FAN SCHEDULE

NO.	STATUS	CFM	ELECTRICAL				REMARKS
			HP	V	PH	HZ	
EF A-1	EXISTING	3300	3/4	480	3	60	
EF A-2	↓	1800	1/2	120	1	↓	
EF A-3		3825	3/4	480	3		
EF A-4		90	50W	↓	1		
EF A-5		320	165W		↓		
EF A-6		280	1/12				
EF A-7		410	230W				
EF A-8		225	105W				
EF A-9		90	50W				
EF A-10	↓	320	165W				
EF A-11	NEW	230	1/6	↓	↓	↓	



AIR BALANCE NOTE

BALANCE EXISTING SUPPLY AND RETURN AIR DIFFUSERS AS NOTED ON THIS PLAN.

STAMPS

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Telephone: (949) 515-4333
JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

BUILDING A1, A2 PARTIAL HVAC AS BUILT — SCALE: NONE — 1

PROJECT No. : 1-34-38

RUHNAUCLARKE.COM
3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501 (951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 (760) 438 5899

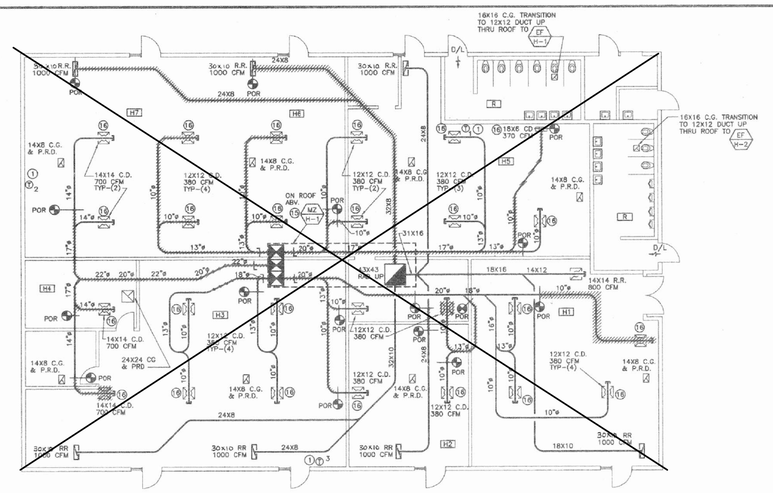
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

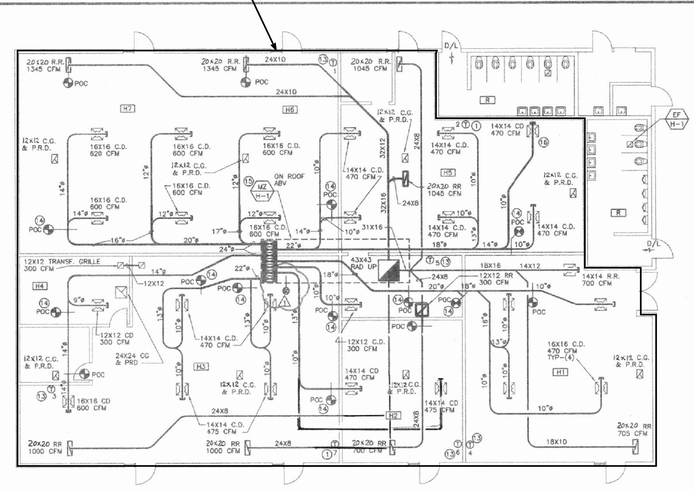
AIR BALANCE
BLDG. A1 AND A2

M2-1.0

1-34-38

BLDG. H
MZ-H1 UNIT
SEE SHEET
M1-3.1





CONSTRUCTION NOTES

1. REPLACE (E) -THERMOSTAT WITH (N) -TEMPERATURE SENSOR -TRANSMITTER.
2. REMOVE (E) -DUCTWORK & CAP 2 30"X12" SAD.
3. CONNECT (N) -20"X8" SAD TO (E) -20"X10" SAD @ POR.
4. REMOVE (E) -14"X7" SAD & CEIL DIFFUSER & CAP @ POR.
5. REMOVE (E) -CEIL DIFFUSER & CAP DUCT ABOVE CEILING.
6. INSTALL (N) -12"X12" CEIL DIFFUSER.
7. INSTALL (N) -14"X7" SAD.
8. INSTALL (N) -18"X18" RR IN CEIL. -650 CFM.
9. INSTALL (N) -8"X8" RR IN CEIL -150 CFM.
10. REMOVE (E) -30"XRR IN WALL, CAP DUCT & PATCH WALL OPENING TO MATCH (E).
11. INSTALL (N) -TEMPERATURE SENSOR -TRANSMITTER.
12. (N) -18"X8" RAD ABV. CEILING CONNECT TO (E) -17"X10" @ POC.
13. (N) -TEMPERATURE SENSOR -TRANSMITTER.
14. POC OF (N) -DUCT CONNECTION TO (E) DUCT.
15. REPLACE (E) -MZ UNIT ON ROOF ABOVE WITH (N) MZ UNIT. RECONNECT (E) -CONDENSATE DRAIN & GAS PIPING TO (N) -MZ UNIT. INSTALL SMOKE DETECTOR IN SUPPLY FAN DISCHARGE PLENUM.
16. REPLACE (E)-CEILING DIFFUSER WITH (N)-OF SIZE INDICATED.
17. REMOVE (E)-9"X5" RA DUCT & CAP AT POR.
18. RECONNECT(E)-14"X14"RR TO (N)-9"X6" RA DUCT.

GENERAL NOTES

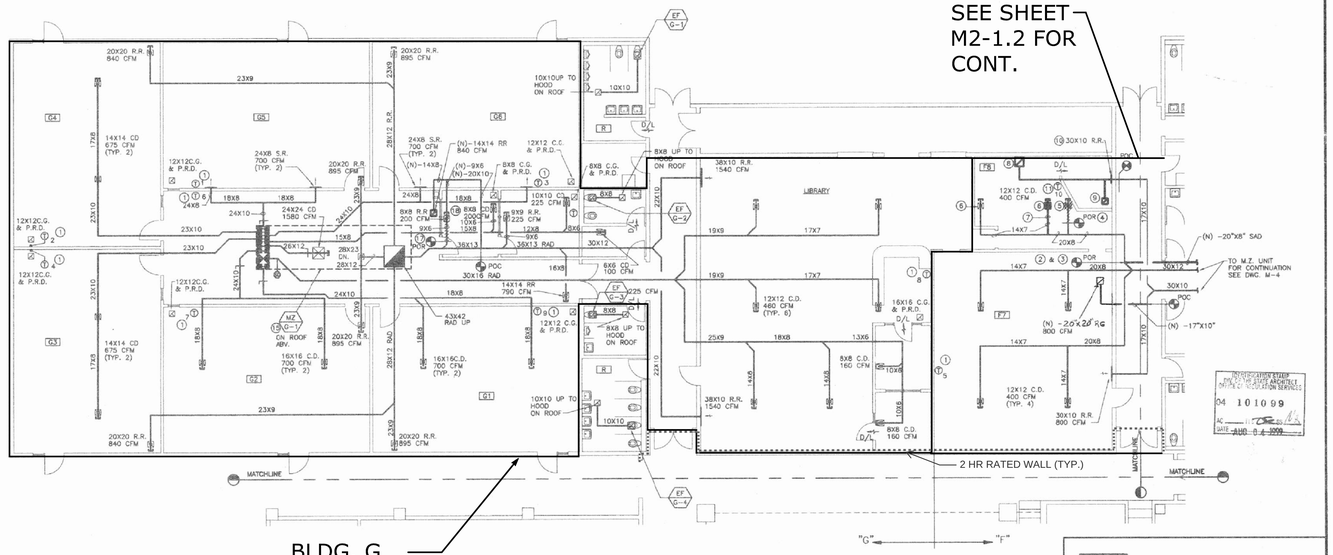
1. REPLACE ALL EXISTING CEILING, DIFFUSERS, REGISTERS & GRILLES, WITH NEW OR SAME SIZE EXCEPT TOILET ROOMS.
2. EXISTING SIDE WALL REGISTERS & GRILLES TO REMAIN. REPAINT TO COLOR AS SELECTED BY ARCHITECT.
3. REBALANCE ALL SYSTEMS TO THE AIR QUANTITIES INDICATED.
4. CLEAN ALL SUPPLY, RETURN, RELIEF & EXHAUST DUCTWORK.

BUILDING H-DEMOLITION
SCALE:1/8"=1'-0"

BUILDING H-NEW
SCALE:1/8"=1'-0"

EXHAUST FAN SCHEDULE

NO.	STATUS	CFM	ELECTRICAL				REMARKS
			HP	V	PH	HZ	
EF G-1	EXISTING	410	230W	120	1	60	
EF G-2		225	105W				
EF G-3		225	105W				
EF G-4		410	230W				
EF H-1		675	1/12				
EF H-2		675	1/12				



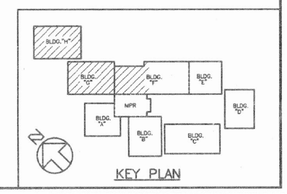
BLDG. G
MZ-G1 UNIT
SEE SHEET
M1-3.1

BUILDING G
SCALE:1/8"=1'-0"

BUILDING F
SCALE:1/8"=1'-0"

SEE SHEET
M2-1.2 FOR
CONT.

AS-BUILT DRAWINGS
AIRE MASTERS AIR CONDITIONING
12555 HOLCOMB DRIVE
Santa Fe Springs, Ca. 90670
944-6302
By



AIR BALANCE NOTE

BALANCE EXISTING SUPPLY AND RETURN AIR DIFFUSERS AS NOTED ON THIS PLAN.

NORTH

BUILDING G AND H HVAC PARTIAL AS BUILT

SCALE: NONE | 1

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

AIR BALANCE
BLDG. G AND H

M2-1.1

1-34-38

STAMPS

REGISTERED PROFESSIONAL ENGINEER — No. M 27634 — 6-30-25 — MECHANICAL — STATE OF CALIFORNIA

LICENSED ARCHITECT — ROGER CLARKE — No. C-21345 — Exp. 10-31-25 — STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

AGENCY APPROVAL
File No. AF

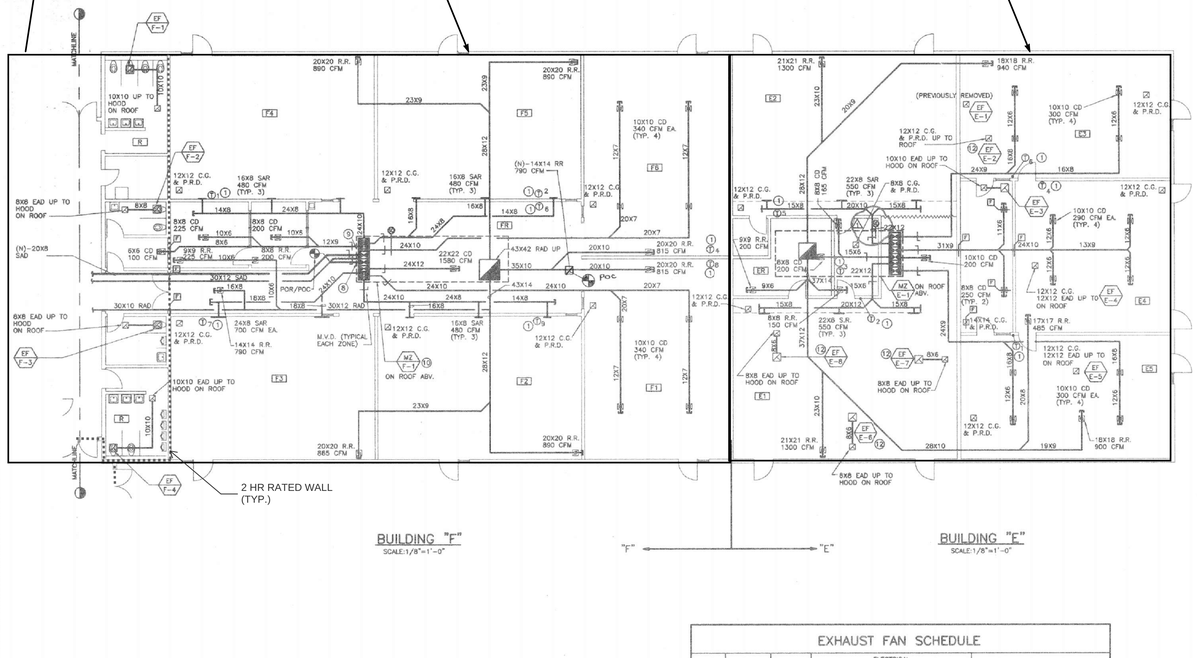
Z&A
ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627
Telephone: (949) 515-4333
JOB NO. 2023-032
CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

SEE SHEET M2-1.1 FOR CONT.

BLDG. F MZ-F1 UNIT SEE SHEET M1-3.2

BLDG. E MZ-E1 UNIT SEE SHEET M1-3.2



BUILDING "F"
SCALE:1/8"=1'-0"

"F" "E"

BUILDING "E"
SCALE:1/8"=1'-0"

GENERAL NOTES

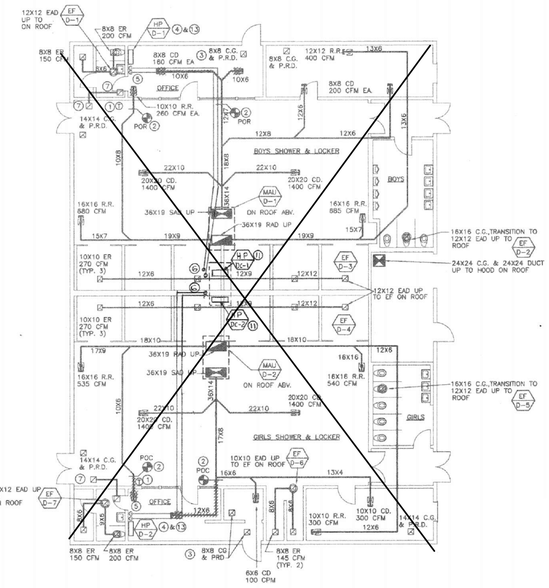
1. REPLACE ALL EXISTING CEILING DIFFUSERS, REGISTERS & GRILLES, WITH NEW OR SAME SIZE. EXHAUST REGISTERS ABOVE SHOWERS (BLDG. D), SHALL BE ALUMINUM, (HOT PAINTED). ALL OTHERS SHALL BE PAINTED TO COLOR AS SELECTED BY ARCHITECT.
2. EXISTING SIDE WALL REGISTERS & GRILLES TO REMAIN. REPAINT TO COLOR AS SELECTED BY ARCHITECT.
3. REBALANCE ALL SYSTEMS TO THE AIR QUANTITIES INDICATED.
4. CLEAN ALL SUPPLY, RETURN, RELIEF & EXHAUST DUCTWORK.
5. INSTALL MANUAL BALANCING DAMPERS IN ALL SUPPLY, RETURN & EXHAUST DUCTWORK IF NOT CURRENTLY INSTALLED.

CONSTRUCTION NOTES

1. REPLACE (E) – THERMOSTAT WITH (W) TEMPERATURE SENSOR–TRANSMITTER. SEE CONTROL SCHEMATIC.
2. REMOVE (E) – DUCTWORK & CAP BACK AT P.O.R..
3. INSTALL 22 GA. GALV. SHEET METAL BLANK OFF PLATE. PAINT EXIST. BLACK ON BACKSIDE OF (E) GRILLE. FASTEN WITH SHEET METAL SCREWS.
4. MOUNT (N) – HEAT PUMP ON WALL AS HIGH AS POSSIBLE.
5. INSTALL (N) – REFRIG. PIPING ABOVE CEIL DOWN TO HEAT PUMP. SIZE PIPING AS PER MFR'S INSTRUCTIONS.
6. (N) – REFRIG. PIPING UP THRU. ROOF TO (N) – OUTDOOR SECTION ABOVE.
7. INSTALL (N) – 12"X12" TRANSFER GRILLES IN CEILING WITH 12"X12" TRANSFER DUCT, LINED WITH 1" LINER.
8. DISCONNECT (E) – 30"X12" SAD FROM (E) MZ UNIT & RECONNECT TO (N) CONNECTION ON (N) – MZ UNIT.
9. (N) – 20"X8" SAD DOWN FROM (N) – MZ UNIT.
10. REPLACE (E) –MZ UNIT ON ROOF ABOVE WITH (N) –MZ UNIT RECONNECT (E) –CONDENSATE DRAIN & GN PIPING TO (N) INSTALL SMOKE DETECTOR IN SUPPLY FAN DISCHARGE PLENUM.
11. INSTALL OUTDOOR HEAT PUMP UNITS ON WOOD PLATFORM WITHIN THE EQUIPT SCREENED AREA ON ROOF ABOVE.
12. DISCONNECT (E) EXHAUST FAN FROM ELECTRICAL CIRCUIT FOR FUTURE REMOVAL. REMOVE (E)–EXHAUST GRILLE & CAP DUCT ABOVE CEIL WITH 24GA GALV SHEET METAL.REPLACE CEIL. TILE.
13. CONNECT (N)–5/8" ø COND DR PIPE FROM HEAT PUMP & RUN DOWN INSIDE WALL/RUN FROM WALL & CONN TO TAL/PIECE ABOVE TRAP.INSTALL ESCUTCHEON PLATE AT EXIT FROM WALL.

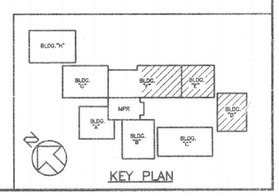
EXHAUST FAN SCHEDULE

NO.	STATUS	CFM	ELECTRICAL HP	V	PH	HZ	REMARKS
EF D-1	EXISTING	350	1/12	120	1	60	
EF D-2		675	1/12				
EF D-3		820	1/6				
EF D-4		820	1/6				
EF D-5		675	1/12				
EF D-6		290	1/12				
EF D-7		350	1/12				
EF E-1		675	——				FAN HAS BEEN PREVIOUSLY REMOVED
EF E-2		675	1/12				SEE CONST NOTE NO.12
EF E-3		410	230W				
EF E-4		675	1/12				
EF E-5		675	1/12				
EF E-6		225	105W				SEE CONST NOTE NO.12
EF E-7		225	105W				
EF E-8		225	105W				
EF F-1		410	230W				
EF F-2		225	105W				
EF F-3		225	105W				
EF F-4		410	230W				



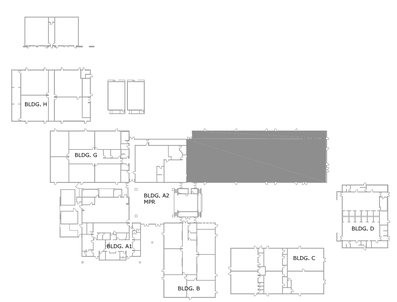
BUILDING "D"
SCALE:1/8"=1'-0"

AG-PURT ENGINEERING
AIRE MASTERS AIR CONDITIONING
123366 N.D. GWIN DRIVE
Santa Fe Springs, Ca. 92070
946-6302
By



AIR BALANCE NOTE

BALANCE EXISTING SUPPLY AND RETURN AIR DIFFUSERS AS NOTED ON THIS PLAN.



BUILDING E & F HVAC PARTIAL AS BUILT | SCALE: NONE | 1

PROJECT No. : 1-34-38

DRAWN BY/RCA CHECKED BY/RCA
DELTA # ____ DATE ____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ____ DATE ____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ____ DATE ____ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ____ DATE ____ ☐ ADD ☐ AFO ☐ CCD ☐ REV

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

AIR BALANCE
BLDG. E AND F

M2-1.2

1-34-38

REGISTERED PROFESSIONAL ENGINEER No. M 27634 6-30-25 MECHANICAL STATE OF CALIFORNIA

LICENSED ARCHITECT ROGER CLARKE No. C-21906 Exp. 10-31-25 STATE OF CALIFORNIA

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
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DATE: 04/09/2024

STAMPS

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File No. AF

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ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
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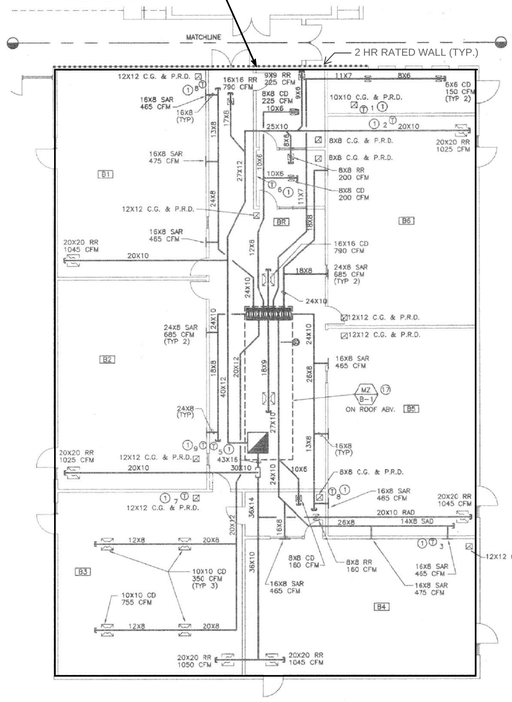
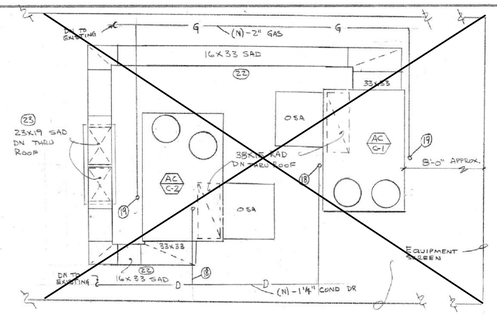
Telephone: (949) 515-4333
JOB NO. 2023-032
CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

BLDG. B
MZ-B1 UNIT
SEE SHEET
M1-3.0

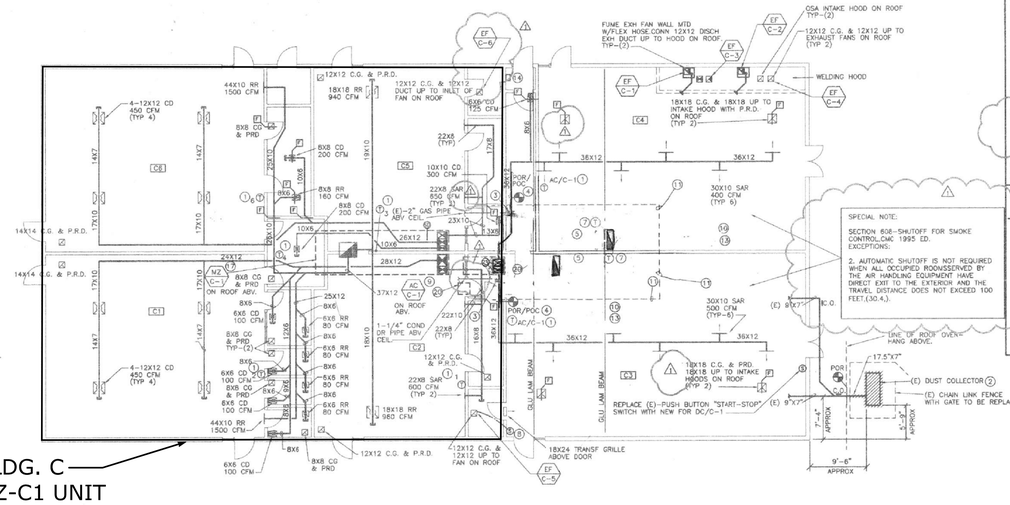


BUILDING B
SCALE:1/8"=1'-0"

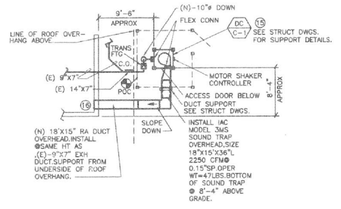


PARTIAL ROOF EQUIPMENT PLAN BLDG. 'C"
SCALE 3/8"=1'-0"

BLDG. C
MZ-C1 UNIT
SEE SHEET
M1-3.3

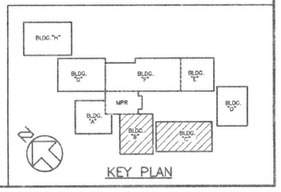


BUILDING C
SCALE:1/8"=1'-0"



NEW DUST COLLECTOR PART"L PLAN
SCALE:1/8"=1'-0"

AS-BUILT DRAWINGS
AIRE MASTERS AIR CONDITIONING
11205 LOS OLIVOS DRIVE
Santa Fe Springs, Ca. 90670
944-6302
By



KEY PLAN

CONSTRUCTION NOTES

1. REPLACE (E) – THERMOSTAT WITH (N) TEMPERATURE SENSOR–TRANSMITTER. SEE CONTROL SCHEMATIC.
2. REMOVE (E) – DUST COLLECTOR .
3. REMOVE (E) – DX COOLING COIL ABOVE CEILING & ALL REFRIGERANT PIPING AND CONTROLS.
4. DISCONNECT (E) 36"X12" SAD & REMOVE DUCT.INSTALL (N) 36"X12" SAD & RECONNECT AT POR/POC.
5. (N) 38"X15" RAD.
6. DELETED
7. INSTALL (N) TEMPERATURE SENSOR–TRANSMITTER.
8. TWO–SPEED SWITCH FOR EF/C–5.
9. REMOVE (E) AC UNIT ON ROOF ABOVE & CAP CONDENSATE DRAIN & GAS PIPING ABOVE ROOF.
10. ~~(N) AC UNIT ON ROOF ABOVE.~~
11. (N) EQUIPMENT SCREEN ON ROOF ABOVE.
12. REMOVE (E) EQUIPMENT SCREEN ON ROOF ABOVE.
13. ~~(N)–28"x14"(L) SA DUCT & 36"x12" (L) RA DUCT UP THRU ROOF TO (N)–AC UNITS ABOVE.~~
14. REMOVE (E) TIME CLOCK FOR (E) AC UNIT.
15. (N) DUST COLLECTOR.
16. SAWCUT (N) 19"X16" WALL OPENING IN (E) WALL.INSTALL 1/4" MESH SCREEN WITH 1"X1/16" ANGLE IRON WELDED FRAME AROUND SCREEN & FASTEN TO DUCT FLANGE WITH (8) –1/4" SHEET METAL SCREWS EQUALY SPACED.INSTALL 1/8" NEOPRENE GASKET BETWEEN FRAME & DUCT.
17. REPLACE (E) NZ UNIT ON ROOF WITH (N)–MZ UNIT.RECONNECT (E)–COND DRAIN & GAS PIPING TO (N) MZ UNIT.INSTALL SMOKE DETECTOR IN SUPPLY FAN DISCHARGE PLENUM.
18. (N)–3/4" COND DRAIN UP THRU ROOF IN PITCH POCKET TO (N)–AC UNIT ABOVE.
19. CONN (N) 1" GAS PIPE WITH GAS COCK TO (E)–2" GAS PIPE OVERHEAD.RISE UP THRU ROOF IN PITCH POCKET & CONN TO (N)–AC UNIT ABOVE.
20. REMOVE (E)–CONDENSING UNITS & ALL REFRIGERANT PIPING & CONTROLS ON ROOF ABOVE.
21. DELETED
22. (N) 16"X33" SAD ON ROOF
23. (N) 23"X19" SAD DTR

GENERAL NOTES

1. REPLACE ALL EXISTING CEILING DIFFUSERS, REGISTERS & GRILLES, WITH NEW OR SAME SIZE EXCEPT FOR SHOPS AND TOILET ROOMS. CLEAN & RE–PAINT REGISTERS & GRILLES IN SHOPS AND TOILET ROOMS TO COLOR SELECTED BY ARCHITECT.
2. EXISTING SIDE WALL REGISTERS & GRILLES TO REMAIN. REPAINT TO COLOR AS SELECTED BY ARCHITECT.
3. REBALANCE ALL SYSTEMS TO THE AIR QUANTITIES INDICATED.
4. ALL EXHAUST FANS TO REMAIN.
5. CLEAN ALL SUPPLY, RETURN, RELIEF & EXHAUST DUCTWORK.
6. INSTALL MANUAL BALANCING DAMPERS IN ALL SUPPLY & RETURN DUCTWORK IF NOT CURRENTLY INSTALLED.

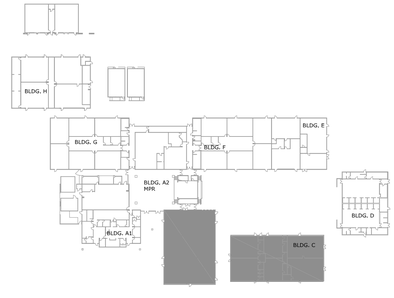
SPECIAL NOTE:
SECTION 608–SHUTOFF FOR SMOKE CONTROL,CMC 1995 ED.
EXCEPTIONS:
2. AUTOMATIC SHUTOFF IS NOT REQUIRED WHEN ALL OCCUPIED ROOMS SERVED BY THE AIR HANDLING EQUIPMENT HAVE DIRECT EXIT TO THE EXTERIOR AND THE TRAVEL DISTANCE DOES NOT EXCEED 100 FEET.(30.4.).

EXHAUST FAN SCHEDULE

NO.	STATUS	CFM	ELECTRICAL HP	V	PH	HZ	REMARKS
EF C-1	EXISTING	1800	1/2	120	1	60	
EF C-2		1800	1/2				
EF C-3		535	1/12				
EF C-4		535	1/12				
EF C-5		660	1/6				
EF C-6		660	1/6				

AIR BALANCE NOTE

BALANCE EXISTING SUPPLY AND RETURN AIR DIFFUSERS AS NOTED ON THIS PLAN.



BUILDING B & C HVAC PARTIAL AS BUILT | SCALE: NONE | 1

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV
DELTA # ____ DATE ____ ADD AFO CCD REV

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

AIR BALANCE
BLDG. B AND C

M2-1.3

1-34-38

REGISTERED PROFESSIONAL ENGINEER No. M 27634 6-30-25 MECHANICAL STATE OF CALIFORNIA
LICENSED ARCHITECT ROGER CLARKE No. C-21549 Exp. 10-31-25 STATE OF CALIFORNIA

STAMPS

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Telephone: (949) 515-4333
JOB NO. 2023-032
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MANDATORY MEASURES

Manufactured fenestration and exterior doors shall meet all listed requirements in Sec 10-111-(a) under Section 110.6(a) of Part 6. Temporary labels for manufactured fenestration shall have a clearly visible temporary label and shall comply with labeling requirements of NFRC 700. No other values for U-factor, SHGC, VT and Air Leakage are allowed on the temporary label attached to the manufactured fenestration product or exterior door

SEC 10-111(a)1.

Rated fenestration shall have a permanent label consistent with their rating and certification that is either a stand-alone label, an extension or tab of an existing permanent certification label being used by the manufacturer/responsible party, or a series of marks or etchings on the product

SEC 10-111(a)2.

Joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exfiltration.

SEC 110.7

All insulating material shall be installed in compliance with the flame-spread rating and smoke density requirements of the CBC.

SEC 110.8(c)

Solar Ready Building to meet requirements in sections, 110.10(b) through 110.10(d)

Any roofing product used as a cool roof shall be certified and labeled in accordance with the requirements of Sec. 10-113 by the Cool Roof Rating Council (CRRC) and meet conditions set in Sec. 110.8 (i)

All recirculated air or outdoor air supplied to occupiable spaces is filtered (minimum MERV before passing through any air conditioning component; the lesser of the minimum rate of outdoor air required by Sec. 120.1 (c), or three complete air changes shall be supplied to the entire building during the one-hour period immediately before the building is normally occupied.

SEC 120.1 (b)(c)

All mechanical ventilation and space-conditioning systems shall be designed with ductwork, dampers, and controls which allows outside air rates to be operated at the larger of (1) the minimum levels specified in Section 120.1(c)3 or (2) the rate required for make- up of exhaust systems that are required for an exempt or covered process, for control of odors, or for the removal of contaminants within the space. Measured outside air rates of constant and variable volume mechanical ventilation systems shall be within 10% of outside air rate shown on Table 120.1-A.

SEC 120.1 (f) 1.

The thermostatic controls for HVAC systems shall be capable of being set locally or remotely by to control comfort heating down to 55 °F or lower and cooling up to 85°F or
The thermostatic controls shall be capable of providing a dead band range of at least 5 °F within which heating and cooling energy to the zone is shut off or reduce to a minimum.

SEC. 120.2 (a) (b)

Outdoor air supply and exhaust equipment shall be installed with dampers that automatically close upon fan shutdown.

SEC 120.2 (f)

Air distribution system ducts and plenums, including, but not limited to, building cavities, mechanical closets, air-handler boxes and support platforms used as ducts or plenums, shall be installed, sealed and insulated to meet the requirements of Chapter 6 CMC Code and ANSI/SMACNA -006-2006 HVAC Duct Construction Standards Metal and Flexible. Supply-air ducts conveying heated or cooled air shall be insulated to a minimum installed level of R-4.2 (R-8 in unconditioned space), unless ducts are in conditioned space.

SEC 120.4 (a)

Maximum length of flexible duct and connectors shall not be more than 5 feet. Flexible ducts shall not be used in lieu of rigid elbows.

Each space-conditioning system shall be installed with controls (1) Capable of automatically shutting off the system during periods of non-use and shall have (a) 4-hr timer or; (b) occupancy sensors or; (c) auto time switch controls and accessible manual override for up to 4-hrs. (2) Automatically restart and temporarily operate the system to maintain setback thermostat setpoints for mechanical heating and cooling. (3) Multipurpose, classrooms conference, convention, auditorium and meeting center rooms of certain size which do not have processes or operations that generate dusts, fumes, vapors or gasses shall be equipped with occupant sensor(s) to accomplish the following during unoccupied periods (a) Automatically setup the operating cooling temperature set point by 2°F or more and setback the operating heating temperature set point by 2□F or more and; (b) Automatically reset the minimum required ventilation rate with an occupant sensor ventilation control device according to Section 120.1(c)5. (4) Hotel and motel guest rooms shall have captive card key controls, occupancy sensing controls, or automatic controls such that, no longer than 30 minutes after the guest room has been vacated, setpoints are setup at least +5°F (+3°C) in cooling mode and set-down at least
-5°F (-3°C) in heating mode SEC 120. (E) (1-4)

CAL GREEN MANDATORY MEASURES

SECTION 5.506 INDOOR AIR QUALITY:

505.6.1 OUTSIDE AIR DELIVERY
FOR MECHANICALLY OR NATURALLY VENTILATED SPACES IN BUILDINGS, MEET THE MININIMUM REQUIREMENTS OF SECTION 120.1 (REQUIREMENTS FOR VENTIALTION) OF THE CA ENERGY CODE AND DIVISION 1, CHAPTER 4 OF CCR, TITLE 8.

5.506.2 CARBON DIOXIDE (CO2) MONITORING
FOR BUILDINGS OR ADDITIONS EQUIPPED WITH DEMAND CONTROL VENTILATION, CO 2 SENSORS AND VENTILATION CONTROLS SHALL BE SPECIFIED AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CA ENERGY CODE, SECTION 120.1(c)(4).

5.506.3 CARBON DIOXIDE (CO2) MONITORING IN CLASSROOMS
(DSA-SS) EACH PUBLIC K-12 SCHOOL CLASSROOM, AS LISTED IN TABLE 120.1-A OF THE CALIFORNIA ENERGY CODE, SHALL BE EQUIPPED WITH A CARBON DIOXIDE MONITOR OR SENSOR THAT MEETS THE FOLLOWING REQUIREMENTS:

1. THE MONITOR OR SENSOR SHALL BE PERMANENTLY AFFIXED IN A TAMPER-PROOF MANNER IN EACH CLASSROOM BETWEEN 3 AND 6 FEET (914 MM AND 1829 MM) ABOVE THE FLOOR AND AT LEAST 5 FEET (1524 MM) AWAY FROM DOORS AND OPERABLE WINDOWS.

2. WHEN THE MONITOR OR SENSOR IS NOT INTEGRAL TO AN ENERGY MANAGEMENT CONTROL SYSTEM (EMCS), THE MONITOR OR SENSOR SHALL DISPLAY THE CARBON DIOXIDE READINGS ON THE DEVICE. WHEN THE SENSOR IS INTEGRAL TO AN EMCS, THE CARBON DIOXIDE READINGS SHALL BE AVAILABLE TO AND REGULARLY MONITORED BY FACILITY PERSONNEL.

3. A MONITOR SHALL PROVIDE NOTIFICATION THROUGH A VISUAL INDICATOR ON THE MONITOR WHEN THE CARBON DIOXIDE LEVELS IN THE CLASSROOM HAVE EXCEEDED 1,100 PPM. A SENSOR INTEGRAL TO AN EMCS SHALL PROVIDE NOTIFICATION TO FACILITY PERSONNEL THROUGH A VISUAL AND/OR AUDIBLE INDICATOR WHEN THE CARBON DIOXIDE LEVELS IN THE CLASSROOM HAVE EXCEEDED 1,100 PPM.

4. THE MONITOR OR SENSOR SHALL MEASURE CARBON DIOXIDE LEVELS AT MINIMUM 15-MINUTE INTERVALS AND SHALL MAINTAIN A RECORD OF PREVIOUS CARBON DIOXIDE MEASUREMENTS OF NOT LESS THAN 30 DAYS DURATION.

5.THE MONITOR OR SENSOR USED TO MEASURE CARBON DIOXIDE LEVELS SHALL HAVE THE CAPACITY TO MEASURE CARBON DIOXIDE LEVELS WITH A RANGE OF 400 PPM TO 2000 PPM OR GREATER.

6. THE MONITOR OR SENSOR SHALL BE CERTIFIED BY THE MANUFACTURER TO BE ACCURATE WITHIN 75 PPM AT 1,000 PPM CARBON DIOXIDE CONCENTRATION AND SHALL BE CERTIFIED BY THE MANUFACTURER TO REQUIRE CALIBRATION NO MORE FREQUENTLY THAN ONCE EVERY 5 YEARS.

SECTION 5.508 OUTDOOR AIR QUALITY:

505.8.1 OZONE DEPLETION AND GREENHOUSE GAS REDUCTIONS
INSTALLATIONS OF HVAC, REFRIGERATION AND FIRE SUPPRESSION EQUIPMENT SHALL COMPLY WITH SECTIONS 5.508.1.1 AND 5.508.1.2.

505.8.1 CHLOROFLOUROCARBONS (CFCs)
INSTALL HVAC, REFRIGERATION AND FIRE SUPPRESSION EQUIPMENT THAT DO NOT CONTAIN CFC's.

505.8.1.2 HALONS
INSTALL HVAC, REFRIGERATION AND FIRE SUPPRESSION EQUIPMENT THAT DO NOT CONTAIN HALONS.

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		14.02		Fan System Electrical Output (kW)		12.02
System Name	MZ/C1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	7,160	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	7,160		3243		Manufacturer provided		6.29
			MERV 13-16 Filter downstream of thermal conditioning equipment	7,160		1346				
			Gas heat	7,160		408				
			Hydronic/DX cooling coil or heat pump coil	7,160		816				
			Economizer Return Damper	7,160		272				
			Supply Fan System	7,160		816				
RF	Relief	1	Exhaust System Base Allowance	5,540		1363		Manufacturer provided		1.72
			Filter (any MERV value)	5,540		227				
			Fully ducted, or Systems that maintain pressure differential between rooms	5,540		554				
			Airflow control devices required for space pressurization control	5,540		554				
			Exhaust/Relief/Return/Transfer Fan System	5,540		338				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		9.94		Fan System Electrical Output (kW)		8.01
System Name	MZ/E1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	8,525	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	8,525		3862		Manufacturer provided		6.29
			MERV 13-16 Filter downstream of thermal conditioning equipment	8,525		1603				
			Gas heat	8,525		486				
			Hydronic/DX cooling coil or heat pump coil	8,525		972				
			Economizer Return Damper	8,525		324				
			Supply Fan System	8,525		972				
RF	Relief	1	Exhaust System Base Allowance	5,540		1363		Manufacturer provided		1.72
			Filter (any MERV value)	5,540		227				
			Fully ducted, or Systems that maintain pressure differential between rooms	5,540		554				
			Airflow control devices required for space pressurization control	5,540		554				
			Exhaust/Relief/Return/Transfer Fan System	5,540		338				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		11.25		Fan System Electrical Output (kW)		8.01
System Name	MZ/F1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	12,945	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	12,945		5346		Manufacturer provided		8.32
			MERV 13-16 Filter downstream of thermal conditioning equipment	12,945		2278				
			Gas heat	12,945		906				
			Hydronic/DX cooling coil or heat pump coil	12,945		1359				
			Economizer Return Damper	12,945		453				
			Supply Fan System	12,945		1359				
RF	Relief	1	Exhaust System Base Allowance	5,540		1307		Manufacturer provided		1.33
			Filter (any MERV value)	5,540		199				
			Fully ducted, or Systems that maintain pressure differential between rooms	5,540		493				
			Airflow control devices required for space pressurization control	5,540		493				
			Exhaust/Relief/Return/Transfer Fan System	5,540		299				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		14.49		Fan System Electrical Output (kW)		9.66
System Name	MZ/G1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	13,485	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	13,485		5569		Manufacturer provided		12.4
			MERV 13-16 Filter downstream of thermal conditioning equipment	13,485		2373				
			Gas heat	13,485		944				
			Hydronic/DX cooling coil or heat pump coil	13,485		1416				
			Economizer Return Damper	13,485		472				
			Supply Fan System	13,485		1416				
RF	Relief	1	Exhaust System Base Allowance	10,345		2441		Manufacturer provided		4.19
			Filter (any MERV value)	10,345		372				
			Fully ducted, or Systems that maintain pressure differential between rooms	10,345		921				
			Airflow control devices required for space pressurization control	10,345		921				
			Exhaust/Relief/Return/Transfer Fan System	10,345		559				

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F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Dry System Equipment Efficiency (other than Package Terminal Air Conditioners (PTAC) and Package Terminal Heat Pumps (PTHP), DX-DOAS and Dual Fuel Heat Pumps)

01	02	03	04	05	06	07	08	09
		Heating Mode				Cooling Mode		
Name or Item Tag	Size Category (Btu/h)	Rating Condition (°F)	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency
MZ/B1	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	11.7 12.9
MZ/C1	>=240,000		AFUE	0.8	0.8	EER IEER	9.8 13	10.6 12.9
MZ/E1	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	10.5 12.9
MZ/F1	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	11.5 12.8
MZ/G1	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	10.7 12.8
MZ/H1	>=240,000		AFUE	0.8	0.8	EER IEER	9.8 13	11 12.7

G. PUMPS

This section does not apply to this project.

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H. FAN SYSTEMS & AIR ECONOMIZERS

This table is used to demonstrate compliance with prescriptive requirements found in 140.4(c), 140.4(e), 140.4(m), 170.2(c)3, and 170.2(c)4A for fan systems. Fan systems serving only process loads are exempt from these requirements and do not need to be included in Table H.

System Name	MZ/A1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	7,300	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	7,300		3307		Manufacturer provided		6.29
			MERV 13-16 Filter downstream of thermal conditioning equipment	7,300		1372				
			Gas heat	7,300		416				
			Hydronic/DX cooling coil or heat pump coil	7,300		832				
			Economizer Return Damper	7,300		277				
			Supply Fan System	7,300		832				
RF	Relief	1	Exhaust System Base Allowance	2,600		640		Manufacturer provided		1.33
			Filter (any MERV value)	2,600		107				
			Fully ducted, or Systems that maintain pressure differential between rooms	2,600		260				
			Airflow control devices required for space pressurization control	2,600		260				
			Exhaust/Relief/Return/Transfer Fan System	2,600		159				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		8.46		Fan System Electrical Output (kW)		7.62
System Name	AC/A1-MPR	Quantity	1	Fan System Status	Alteration	System Zoning	all other systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	7,000	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	7,000		1792		Manufacturer provided		4.36
			MERV 13-16 Filter downstream of thermal conditioning equipment	7,000		1379				
			Gas heat	7,000		420				
			Hydronic/DX cooling coil or heat pump coil	7,000		840				
			Economizer Return Damper	7,000		280				
			Supply Fan System	7,000		840				
RF	Relief	1	Exhaust System Base Allowance	5,600		1030		Manufacturer provided		0.89
			Filter (any MERV value)	5,600		230				
			Fully ducted, or Systems that maintain pressure differential between rooms	5,600		571				
			Airflow control devices required for space pressurization control	5,600		571				
			Exhaust/Relief/Return/Transfer Fan System	5,600		347				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)						Fan System Allowance (kW)[3]		8.3		Fan System Electrical Output (kW)		5.25
System Name	MZ/B1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	10,825	Site Elevation	50	Economizer	Fixed Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
						Allowance		Design		
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	10,825		4471		Manufacturer provided		8.32
			MERV 13-16 Filter downstream of thermal conditioning equipment	10,825		1905				
			Gas heat	10,825		758				
			Hydronic/DX cooling coil or heat pump coil	10,825		1137				
			Economizer Return Damper	10,825		379				
			Supply Fan System	10,825		1137				
RF	Relief	1	Exhaust System Base Allowance	8,400		1982		Manufacturer provided		3.69
			Filter (any MERV value)	8,400		302				
			Fully ducted, or Systems that maintain pressure differential between rooms	8,400		748				
			Airflow control devices required for space pressurization control	8,400		748				
			Exhaust/Relief/Return/Transfer Fan System	8,400		454				

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This document is used to demonstrate compliance for mechanical systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.4, or 141.0(b)2 for alterations.		
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Project Address: 4861 Michelson Drive	Date Prepared:	3/11/2024

A. GENERAL INFORMATION

01	Project Location (city)	Irvine	04	Total Conditioned Floor Area	57100
02	Climate Zone	8	05	Total Unconditioned Floor Area	0
03	Occupancy Types Within Project:		06	# of Stories (Habitable Above Grade)	1
• Classroom • Office • All Other Occupancies					

B. PROJECT SCOPE

This table includes mechanical systems or components that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.4, 170.2(b) or 141.0(b)2 and 180.2(b)2 for alterations.

01	02	03
Air System(s)	Wet System Components	Dry System Components
☒ Heating Air System	☐ Water Economizer	☒ Air Economizer
☒ Cooling Air System	☐ Pumps	☐ Electric Resistance Heat
Mechanical Controls	☐ System Piping	☒ Fan Systems
☒ Mechanical Controls (existing to remain, altered or new)	☐ Cooling Towers	☒ Ductwork (existing to remain, altered or new)
	☐ Chillers	☒ Ventilation
	☐ Boilers	☐ Zonal Systems/ Terminal Boxes

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C. COMPLIANCE RESULTS

Table C will indicate if the project data input into the compliance document is compliant with mechanical requirements. This table is not editable by the user. If this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D., or the table indicated as not compliant for guidance.

01		02		03		04		05		06		07		08	09
System Summary 110.1, 110.2, 140.4, 170.2(c)	AND	Pumps 140.4(k), 170.2(c)4I	AND	Fans/ Economizers 140.4(c), 140.4(e), 170.2(c)	AND	System Controls 110.2, 120.2, 140.4(f), 170.2(c)	AND	Ventilation 120.1, 160.2	AND	Terminal Box Controls 140.4(d), 170.2(c)4B	AND	Distribution 120.3, 140.4(l), 160.2, 160.3	AND	Cooling Towers 110.2(e)2	Compliance Results
(See Table F)		(See Table G)		(See Table H)		(See Table I)		(See Table J)		(See Table K)		(See Table L)		(See Table M)	
Yes	AND		AND	Yes	AND	Yes	AND	Yes	AND		AND	Yes	AND		COMPLIES
Mandatory Measures Compliance (See Table Q for Details)										COMPLIES					

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Space Conditioning System Information

01	02	03	04	05	06
System Name	Quantity	System Serving	System Status	Space Type	Utilizing Recovered Heat
MZ/A1	1	Multi-zone	Alteration		☐
AC/A1-MPR	1	Single zone	Alteration		☐
MZ/B1	1	Multi-zone	Alteration		☐
MZ/C1	1	Multi-zone	Alteration		☐

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F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Space Conditioning System Information

01	02	03	04	05	06
System Name	Quantity	System Serving	System Status	Space Type	Utilizing Recovered Heat
MZ/E1	1	Multi-zone	Alteration		☐
MZ/F1	1	Multi-zone	Alteration		☐
MZ/G1	1	Multi-zone	Alteration		☐
MZ/H1	1	Multi-zone	Alteration		☐

Dry System Equipment Sizing (includes air conditioners, condensers, heat pumps, VRF, furnaces and unit heaters and DOAS systems)

01	02	03	04	05	06	07	08	09	10	11
				Equipment Sizing per Mechanical Schedule (kBtu/h) 140.4(a&b), 170.2(c)1 & 170.2(c)2						
				Heating Output[2,3]			Cooling Output[2,3]		Load Calculations[3,4]	
Name or Item Tag	Equipment Category per Tables 110.2, 140.4(a)2 and 170.2(c)3aii	Equipment Type per Tables 110.2 and Title 20	Smallest Size Available[1] 140.4(a) and 170.2(c)1	Per Design (kBtu/h)	Rated (kBtu/h)	Supp. Heating Output (kBtu/h)	Sensible Per Design (kBtu/h)	Rated (kBtu/h)	Total Heating Load (kBtu/h)	Total Sensible Cooling Load (kBtu/h)
MZ/A1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	320	320	0	307.49	254.91	4.11	109.4
AC/A1-MPR	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	250	250	0	261.59	220.55	-7.61	55.73
MZ/B1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	280	280	0	415.81	346.03	-9.47	127.26
MZ/C1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	200	200	0	295.96	244.93	15.99	120.43

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F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Dry System Equipment Sizing (includes air conditioners, condensers, heat pumps, VRF, furnaces and unit heaters and DOAS systems)

01	02	03	04	05	06	07	08	09	10	11
MZ/E1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	320	320	0	311.16	265.55	-2.83	90.71
MZ/F1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	280	280	0	452.66	400.34	9.48	130.33
MZ/G1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	320	320	0	527.09	434.57	-12.62	176.64
MZ/H1	Furnace + AC	AC, air cooled, single pkg + warm-air central furnace, gas-fired	NA: Altered per 141.0(b)2E and 180.2(b)2	200	200	0	455.38	385.36	-8.1	116.7

[1]FOOTNOTES: Equipment shall be the smallest size, within the available options of the desired equipment line, necessary to meet the design heating and cooling loads of the building per 140.4(a) and 170.2(c)1. Healthcare facilities are excepted.
[2]It is common practice to show rated output capacity on the equipment schedule. Sensible cooling output comes from specification sheet tables.
[3] If equipment is heating only, leave cooling output and load blank. If equipment is cooling only, leave heating output and load blank.
[4] Authority Having Jurisdiction may ask for load calculations used for compliance per 140.4(b) and 170.2(c).

Dry System Equipment Efficiency (other than Package Terminal Air Conditioners (PTAC) and Package Terminal Heat Pumps (PTHP), DX-DOAS and Dual Fuel Heat Pumps)

01	02	03	04	05	06	07	08	09
		Heating Mode				Cooling Mode		
Name or Item Tag	Size Category (Btu/h)	Rating Condition (°F)	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency
MZ/A1	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	10.5 12.9
AC/A1-MPR	>=240,000		Combustion Efficiency	0.8	0.8	EER IEER	9.8 13	11 11.5

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REGISTERED PROFESSIONAL ENGINEER LAWRENCE A. ... No. M 27634 6-30-25 MECHANICAL STATE OF CALIFORNIA
LICENSED ARCHITECT ROGER CLARKE No. C-... Exp. 10-31-25 STATE OF CALIFORNIA

STAMPS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

AGENCY APPROVAL
File No. 30-48 A# 04-122954

ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627

Telephone: (949) 515-4333

JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
DELTA # ______ DATE __________ ☐ADD ☐ AFO ☐ CCD ☐ REV
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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

TITLE 24 CALCULATIONS AND MANDATORY MEASURES

MT-0.1

1-34-38

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K. TERMINAL BOX CONTROLS
This section does not apply to this project.

L. DISTRIBUTION (DUCTWORK and PIPING)
This table is used to show compliance with mandatory pipe insulation requirements found in 120.3 and mandatory requirements found in 120.4(g) for duct sealing.

01	☐	Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather shall be installed with a cover suitable for outdoor service. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall have a Class I or Class II vapor retarder. All penetrations and joints of which shall be sealed.

Duct Leakage Testing

The answers to the questions below apply to the following duct systems:	MZ/A1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	AC/A1-MPR	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	Yes	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	Yes	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/B1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/C1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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J. VENTILATION AND INDOOR AIR QUALITY

Bldg. A1 Admin	Office space	4000			600	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				1065	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	AC/A1-MPR	System Design OA CFM Airflow[1]		140	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
Bldg. A2 MPR	All others	3100			465	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				465	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/B1	System Design OA CFM Airflow[1]		333	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		

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J. VENTILATION AND INDOOR AIR QUALITY

Bldg. B	Classroom (ages 5-18)	7400			2812	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				2812	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/C1	System Design OA CFM Airflow[1]		375	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
Bldg. C	Classroom (ages 5-18)	8320			3161.6	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				3162	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/E1	System Design OA CFM Airflow[1]		247	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		

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J. VENTILATION AND INDOOR AIR QUALITY

Bldg. E	Classroom (ages 5-18)	5480			2082.4	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				2082	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/F1	System Design OA CFM Airflow[1]		387	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
Bldg. F	Classroom (ages 5-18)	8585			3262.3	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				3262	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/G1	System Design OA CFM Airflow[1]		464	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		

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J. VENTILATION AND INDOOR AIR QUALITY

Bldg. G	Classroom (ages 5-18)	10300			3914	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				3914	18	Ventilation for this System Complies?		Yes
04		05			06			07	
System Name	MZ/H1	System Design OA CFM Airflow[1]		307	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
Bldg. H	Classroom (ages 5-18)	6815			2589.7	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				2590	18	Ventilation for this System Complies?		Yes

[1] *FOOTNOTES: System CFM should include both mechanical and natural ventilation for the zone/system*

[2] *Air filtration requirements apply to the following three system types per 120.1(c)1A: space conditioning systems utilizing ducts to supply air to occupiable space; supply-only ventilation systems providing outside air to occupiable space; supply side of balanced ventilation systems including heat recovery and energy recovery ventilation systems providing outside air to occupiable space.*

[3] *Uniform Mechanical Code may have more stringent ventilation requirements; the most stringent code requirement takes precedence.*

[4] *See Standards Tables 120.1-A and 120.1-B.*

[5] *For lecture halls with fixed seating, the expected number of occupants shall be determined in accordance with the California Building Code.*

[6] *120.2(e)3 requires systems serving rooms that are required by 130.1(c) to have lighting occupancy sensing controls to also have occupancy sensing zone controls for ventilation. Examples of spaces which require lighting occupancy sensors include offices 250ft^2 or smaller, multipurpose rooms less than 1,000 ft^2, classrooms, conference rooms, restrooms, aisles and open areas in warehouses, library book stack aisles, corridors, stairwells, parking garages, and loading and unloading zones, unless excepted by 130.1(c).*

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)		Exhuast/Return/Relief/Transfer Fan Base Allowance(kW)		Fan System Allowance (kW)[3]	17.4	Fan System Electrical Output (kW)	16.6

System Name	MZ/H1	Quantity	1	Fan System Status	Alteration	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	12,365	Site Elevation	50	Economizer	Fixed Temperature

01	02	03	04	05	06	07	08	09	10	11
						Allowance		Design		
Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Component Allowance	Fan Allowance (watt/cfm)[3]	Design Electrical Input Power Method	Motor Nameplate Horsepower	Design Electrical Input Power (kW)
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	12,365		5107		Manufacturer provided		8.32
			MERV 13-16 Filter downstream of thermal conditioning equipment	12,365		2176				
			Gas heat	12,365		866				
			Hydronic/DX cooling coil or heat pump coil	12,365		1298				
			Economizer Return Damper	12,365		433				
			Supply Fan System	12,365		1298				
RF	Relief	1	Exhaust System Base Allowance	9,185		2168		Manufacturer provided		2.58
			Filter (any MERV value)	9,185		331				
			Fully ducted, or Systems that maintain pressure differential between rooms	9,185		817				
			Airflow control devices required for space pressurization control	9,185		817				
			Exhaust/Relief/Return/Transfer Fan System	9,185		496				

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H. FAN SYSTEMS & AIR ECONOMIZERS

Supply Fan Base Allowance (kW)		Exhuast/Return/Relief/Transfer Fan Base Allowance(kW)		Fan System Allowance (kW)[3]	15.81	Fan System Electrical Output (kW)	10.9

[1] *FOOTNOTES: Fans serving spaces with design background noise goals below NC35*
[2] *Low-turndown single-zone VAV fan system must be capable of and configured to reduce airflow to 50 percent of design airflow and use no more than 30 percent of the design wattage at that airflow. No more than 10 percent of the design load served by the equipment shall have fixed loads.*
[3] *Fan system allowance includes fan system base allowance.*
[4] *Filter pressure loss can only be counted once per fan system.*
[5] *Complex Fan System means a fan system that combines a single cabinet fan system with other supply fans, exhaust fans, or both.*
[6] *Computer room economizers must meet requirements of 140.9(a) and will be documented on the NRCC-PRC-E document..*

H. EXHAUST AIR HEAT RECOVERY 140.4(q), 170.2(c)4O

01	02	03	04	05	06	07	08	09	10	11
Fan System Name	Qty	Hours of Operation per Year	Design Supply Airflow Rate	Outdoor Airflow	% Outdoor Air at Full Design Airflow	Exemptions to Exhaust Air Heat Recovery Requirement per 140.4(q) & 170.2(c)4O	Exhaust Air Heat Recovery 140.4(q) & 170.2(c)4O	Type Of Heat Recovery Rating	Required Recovery Ratio	Energy Recovery Bypass

Fan Energy Index (FEI)

01	02	03
Name or Item Tag	FEI Exception	FEI

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-MCH-E
Project Name: Rancho San Joaquin Middle School	Report Page:	(Page 15 of 33)
	Date Prepared:	3/11/2024

I. SYSTEM CONTROLS
This table is used to demonstrate compliance with mandatory controls in 110.2 and 120.2 and prescriptive controls in 140.4(f) and (n), 170.2(c)4D 170.2(c)4L or requirements in 141.0(b)2E 180.2(b)2 for altered space conditioning systems.

01	02	03	04	05	06	07	08	09
System Name	System Zoning	Conditioned Floor Area Being Served (ft^2)	Thermostats 110.2(b) & (c)[1], 120.2(a) 160.3(a)2A or 141.0(b)2E & 180.2(b)2	Shut-Off Controls 120.2(e) & 160.3(a)2D	Isolation Zone Controls 120.2(g) & 160.3(a)2F	Demand Response 110.12 120.2(b) & 160.3(a)2B	Supply Air Temp. Reset 140.4(f) & 170.2(c)4D	Window Interlocks per 140.4(n) & 170.2(c)4D
MZ/A1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
AC/A1-MPR	Single zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/B1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/C1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/E1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/F1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/G1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows
MZ/H1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	EMCS	EMCS	EMCS	EMCS	NA: Alteration	NA: No operable windows

STATE OF CALIFORNIA
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CERTIFICATE OF COMPLIANCE		NRCC-MCH-E
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	Date Prepared:	3/11/2024

I. SYSTEM CONTROLS
[1]*FOOTNOTES: Gravity gas wall heaters, gravity floor heaters, gravity room heaters, non-central electric heaters, fireplaces or decorative gas appliances, wood stoves are not required to have setback thermostats.*

J. VENTILATION AND INDOOR AIR QUALITY
This table is used to demonstrate compliance with mandatory ventilation requirements in 120.1 120.2(e)3B 140.4(p) and 140.4(q) for all nonresidential and hotel/motel and d:t24refnolink/]160.2, 160.3(a)3D, 170.2(a)4N, 170.2(a)4O for high-rise residential occupancies. For alterations, only ventilation systems being altered within the scope of the permit application need to be documented in this table. In lieu of this table, the required outdoor ventilation rates and airflows may be shown on the plans or the calculations can be presented in a spreadsheet.

01	☐	Check the box if the project is showing ventilation calculations on the plans, or attaching the calculations instead of completing this table.
02	☒	Check this box if the project included Nonresidential, Hotel/Motel Spaces or Multifamily Common Use Spaces
	☐	
03	☐	Check the box if the project is using natural ventilation in any nonresidential or hotel/motel spaces to meet required ventilation rates per 120.1(c)2.

Nonresidential and Hotel/ Motel Multifamily Common Use Ventilation Systems

04		05			06			07	
System Name	MZ/A1	System Design OA CFM Airflow[1]		320	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	Provided
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft^2)	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
Bldg. A1 Kitchen	Kitchen (cooking)	3100			465	2170	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type

REGISTERED PROFESSIONAL ENGINEER LAWRENCE A. ZARO No. M 27634 6-30-25 MECHANICAL STATE OF CALIFORNIA

LICENSED ARCHITECT ROGER CLARKE No. C-24... Exp. 10-31-25 STATE OF CALIFORNIA

STAMPS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

AGENCY APPROVAL
File No. 30-48 A# 04-122954

ZERO & ASSOCIATES
Consulting Mechanical Engineers
711 West 17th Street, Suite D-6
Costa Mesa, CA 92627

Telephone: (949) 515-4333

JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
DELTA # ______ DATE ____________ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ______ DATE ____________ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ______ DATE ____________ ☐ ADD ☐ AFO ☐ CCD ☐ REV
DELTA # ______ DATE ____________ ☐ ADD ☐ AFO ☐ CCD ☐ REV

RUHNAUCLARKE.COM
3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501 (951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 (760) 438 5899

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

TITLE 24 CALCULATIONS

MT-0.2

1-34-38

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
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		Date Prepared:	3/11/2024

Q. MANDATORY MEASURES DOCUMENTATION LOCATION		
This table is used to indicate where mandatory measures are documented in the plan set or construction documentation.		
01		02
Compliance with Mandatory Measures documented through MCH Mandatory Measures Note Block	Yes	Plan sheet or construction document location: M-Sheets

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STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 29 of 33)
		Date Prepared:	3/11/2024

L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			

M. COOLING TOWERS
This section does not apply to this project.

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CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 25 of 33)
		Date Prepared:	3/11/2024

L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/E1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-50118-0324-0348 Report Generated: 2024-03-11 10:03:34

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 33 of 33)
Project Address:	4861 Michelson Drive	Date Prepared:	3/11/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name: Lawrence A. Zero	Documentation Author Signature:
Company: Zero & Associates	Signature Date: 2024-03-11
Address: 711 West 17th Street, Suite D-6	CEA/ HERS Certification Identification (if applicable): M 27634
City/State/Zip: Costa Mesa CA 92627	Phone: (949)515-4333

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Lawrence A. Zero	Responsible Designer Signature:
Company: Zero & Associates	Date Signed: 2024-03-11
Address: 711 West 17th Street, Suite D-6	License: M 27634
City/State/Zip: Costa Mesa CA 92627	Phone: (949)515-4333

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STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 30 of 33)
		Date Prepared:	3/11/2024

N. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION
Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCI/
Form/Title
NRCI-MCH-01-E - Must be submitted for all buildings

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STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 26 of 33)
		Date Prepared:	3/11/2024

L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/F1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-50118-0324-0348 Report Generated: 2024-03-11 10:03:34

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 31 of 33)
		Date Prepared:	3/11/2024

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCA/

Form/Title	Systems/Spaces To Be Field Verified
NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap.	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-03-A - Constant Volume Single Zone HVAC NOTE: This form does not automatically move to "Yes'. If Constant Volume Single Zone HVAC Systems are included in the scope, permit applicant should move this form to "Yes".	MZ/A1MPR;
NRCA-MCH-05-A - Air Economizer Controls	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-07-A Supply Fan Variable Flow Controls	MZ/A1; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-11-A Automatic Demand Shed Controls	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-12-A FDD for Packaged Direct Expansion Units	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-18-A Energy Management Control Systems	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;

P. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION
There are no NRCV forms required for this project.

Generated Date/Time: Documentation Software: EnergyPro
CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-50118-0324-0348 Report Generated: 2024-03-11 10:03:34

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 27 of 33)
		Date Prepared:	3/11/2024

L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/G1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-50118-0324-0348 Report Generated: 2024-03-11 10:03:34

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 31 of 33)
		Date Prepared:	3/11/2024

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCA/

Form/Title	Systems/Spaces To Be Field Verified
NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap.	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-03-A - Constant Volume Single Zone HVAC NOTE: This form does not automatically move to "Yes'. If Constant Volume Single Zone HVAC Systems are included in the scope, permit applicant should move this form to "Yes".	MZ/A1MPR;
NRCA-MCH-05-A - Air Economizer Controls	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-07-A Supply Fan Variable Flow Controls	MZ/A1; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-11-A Automatic Demand Shed Controls	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-12-A FDD for Packaged Direct Expansion Units	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;
NRCA-MCH-18-A Energy Management Control Systems	MZ/A1; MZ/A1MPR; MZ/B1; MZ/C1; MZ/E1; MZ/F1; MZ/G1; MZ/H1;

P. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION
There are no NRCV forms required for this project.

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CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-50118-0324-0348 Report Generated: 2024-03-11 10:03:34

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-MCH-E
Project Name:	Rancho San Joaquin Middle School	Report Page:	(Page 28 of 33)
		Date Prepared:	3/11/2024

L. DISTRIBUTION (DUCTWORK and PIPING)

		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes
11	No	The scope of the project includes only duct systems serving healthcare facilities	
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.	
13	No	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.	
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system	
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.	
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.	
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A	
18		All ductwork is an extension of an existing duct system	
19		Ductwork serving individual dwelling unit	
20		< 25 ft of new or replacement space conditioning ducts installed	
21	R-8	Duct Insulation R-value	
22			
23			
The answers to the questions below apply to the following duct systems:	MZ/H1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No

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REGISTERED PROFESSIONAL ENGINEER
LAWRENCE A. ZERO
No. M 27634
6-30-25
MECHANICAL
STATE OF CALIFORNIA

LICENSED ARCHITECT
ROGER CLARKE
No. C-21640
Exp. 10-31-25
STATE OF CALIFORNIA

STAMPS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

AGENCY APPROVAL
File No. 30-48 A# 04-122954

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JOB NO. 2023-032

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT: DSA RESUBMITTAL 03/11/24

PROJECT No. : 1-34-38

DRAWN BY:RCA CHECKED BY:RCA
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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

TITLE 24 CALCULATIONS

MT-0.3

1-34-38

GENERAL NOTES

1. THESE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER A COMPLETE INSTALLATION OF SYSTEMS. THE OMISSION OR EXPRESSED REFERENCE TO ANY ITEM OF LABOR OR MATERIALS REQUIRED FOR THE PROPER EXECUTION OF THE WORK IN ACCORDANCE WITH PRESENT PRACTICE OF THE TRADE SHALL NOT RELIEVE THE CONTRACTOR FROM PROVIDING SUCH ADDITIONAL LABOR AND MATERIALS.

2. THESE PLANS, SPECIFICATIONS, AND ALL MATERIALS SHALL BE IN FULL ACCORDANCE WITH ALL LEGAL AND INDUSTRY REQUIREMENTS, AND STANDARDS INCLUDING WITHOUT LIMITATION TO THE FOLLOWING:
   a. CALIFORNIA CODE OF REGULATIONS TITLE 24, PARTS 1 AND 2 (CALIFORNIA BUILDING CODE), 2022 EDITION.
   b. CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 3 (CALIFORNIA ELECTRICAL CODE), 2022 EDITION.
   c. CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 6 (CALIFORNIA ENERGY CODE), 2022 EDITION.
   d. CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 9 (CALIFORNIA FIRE CODE), 2022 EDITION.
   e. OTHER REGULATING AGENCIES WHICH MAY HAVE AUTHORITY OVER ANY PORTION OF THE WORK, INCLUDING THE STATE OF CALIFORNIA DIVISION OF INDUSTRIAL SAFETY, AND THOSE CODES AND STANDARDS LISTED IN THESE NOTES AND SPECIFICATIONS.
   f. THE ELECTRICAL SYSTEMS FUNCTIONALITY STANDARDS SET FORTH IN TITLE 7 OF THE CALIFORNIA CIVIL CODE (THE "RIGHT TO REPAIR ACT").
   g. THE MANUFACTURER'S REQUIREMENTS OR RECOMMENDATIONS FOR ANY INCORPORATED PRODUCTS.
   h. THE MOST CURRENT APPROVED ISSUES OF ANY NOTED SPECIFICATIONS, CODES AND STANDARDS, INCLUDING SUPPLEMENTS, UNLESS NOTED OTHERWISE.

3. THE PLANS REPRESENT ONLY THE FINISHED ELECTRICAL FIRE ALARM, AND LOW VOLTAGE SYSTEMS, AND THEY ARE NOT INTENDED TO INDICATE OR REQUIRE ANY CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES.

4. IN USING THE PLANS FOR BIDDING OR CONSTRUCTION PURPOSES, THE CONTRACTOR IS REQUIRED TO REVIEW ALL OF THE PROJECT'S CONSTRUCTION DOCUMENTS AS A WHOLE IN ORDER TO IDENTIFY ALL REQUIREMENTS THAT DIRECTLY OR INDIRECTLY AFFECT ITS PORTION OF THE ELECTRICAL WORK, EVEN REQUIREMENTS LOCATED IN SECTIONS DESIGNATED AS APPLICABLE TO OTHER TRADES. IN CASE OF CONFLICTS, THE CONTRACTOR SHALL EITHER OBTAIN DIRECTION FROM AN APPROPRIATE OWNER REPRESENTATIVE OR OTHERWISE APPLY THE MORE STRINGENT REQUIREMENT.

5. IN INTERPRETATING THE PLANS, THE FOLLOWING GENERAL RULES APPLY:
   a. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DRAWINGS.
   b. SCALED DIMENSIONS AND GRAPHICALLY SHOWN LOCATIONS ARE TO BE CONSIDERED ONLY APPROXIMATE. FIELD VERIFY DIMENSIONS PRIOR TO BID.

6. IN IMPLEMENTING THE PLANS, THE FOLLOWING GENERAL RULES APPLY:
   a. BECAUSE THE PLANS ARE INTENDED TO SET FORTH THE REQUIREMENTS FOR CONSTRUCTION IN ONLY AN INDUSTRY-STANDARD LEVEL OF QUALITY AND DETAIL, AND THEREFORE ARE INTENDED TO BE SUPPLEMENTED BY APPROPRIATE REQUESTS FOR CLARIFICATION AND INFORMATION, ERRORS AND OMISSIONS ARE TO BE EXPECTED AND ANTICIPATED; AND THE CONTRACTOR IS REQUIRED TO CAREFULLY REVIEW THE PLANS FOR ERRORS AND OMISSIONS AND TO BRING THESE ERRORS AND OMISSIONS TO THE ATTENTION OF AN APPROPRIATE OWNER REPRESENTATIVE IN A TIMELY MANNER AN ASSUMES THE RISK OF THE CONSEQUENCES OF FAILING TO DO SO BEFORE BIDDING OR OTHERWISE PROCEEDING.
   b. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS PRIOR TO STARTING CONSTRUCTION, AND NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES OR INCONSISTENCIES.

7. SUBMITTALS WILL BE REVIEWED BY THE ELECTRICAL ENGINEER, IF AT ALL, ONLY PURSUANT TO THE INDUSTRY-STANDARD PROTOCOL SET FORTH IN A1A DOCUMENT A201, AND IN NO EVENT WILL THE SUBMITTAL REVIEW PROCESS RELIEVE OR LESSEN THE SUBMITTING CONTRACTOR'S RESPONSIBILITY FOR AN INAPPROPRIATE SUBMITTAL.

8. IN NO EVENT WILL ANY SITE VISITS BY THE ELECTRICAL ENGINEER CONCERN CONSTRUCTION MEANS AND METHODS OR CONSTRUCTION SAFETY, AND ALL SUCH MATTERS SHALL REMAIN THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

9. COPIES OF THE PLANS PROVIDED IN ANY ELECTRONIC FORM ARE SUBJECT TO THE SAME PROVISIONS AS THE OTHER INSTRUMENTS OF SERVICE PREPARED BY OR ON BEHALF OF ELECTRICAL ENGINEER FOR THE PROJECT, INCLUDING WITHOUT LIMITATION THE ENGINEER'S COMMON LAW, STATUTORY OR OTHER RESERVED RIGHTS, INCLUDING COPYRIGHTS. A RECIPIENT IS GRANTED AT MOST A TRANSFERABLE NONEXCLUSIVE LICENSE TO REUSE THE PLANS SOLELY FOR PROJECT PURPOSES; AND NO RECIPIENT IS AUTHORIZED TO USE OR TO ALLOW THE USE OF ALL OR ANY PORTION OF THESE PLANS FOR ANY OTHER PURPOSE, AND ANY USE FOR ANY OTHER PURPOSE WOULD CONSTITUTE ACTIONABLE PLAGIARISM. ELECTRICAL ENGINEER PROVIDES DOCUMENTS IN AN ELECTRONIC FORM ONLY IN ITS STANDARD FORMATS AND CONVENTIONS AND WITH NO GUARANTEE OF COMPATIBILITY WITH ANY RECEIPIENT'S SOFTWARE OR HARDWARE, AND ANY USE WITH OR CONVERSION TO OTHER FORMATS OR CONVENTIONS, OR THE USE WITH ANY PARTICULAR SOFTWARE OR HARDWARE, IS AT THE RECIPIENT'S SOLE RISK.

10. REFER TO THE DRAWINGS AND SHOP DRAWINGS OF OTHER TRADES FOR ADDITIONAL DETAILS WHICH AFFECT THE PROPER INSTALLATION OF THIS WORK.

11. BEFORE SUBMITTING A BID, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH ALL FEATURES OF THE BUILDING, AND ALL BUILDING DRAWINGS WHICH MAY AFFECT THE EXECUTION OF THE WORK. NO EXTRA PAYMENT WILL BE ALLOWED FOR FAILURE TO OBTAIN THIS INFORMATION.

12. PROTECT ALL WORK, MATERIALS AND EQUIPMENT FROM DAMAGE FROM ANY CAUSE WHATEVER AND PROVIDE ADEQUATE AND PROPER STORAGE FACILITIES DURING THE PROGRESS OF THE WORK. PROVIDE FOR THE SAFETY AND GOOD CONDITION OF ALL THE WORK UNTIL FINAL ACCEPTANCE OF THE WORK BY THE OWNER AND REPLACE ALL DAMAGED OR DEFECTIVE WORK, MATERIALS AND EQUIPMENT BEFORE REQUESTING FINAL ACCEPTANCE.

13. THE DRAWINGS INDICATE IN A DIAGRAMMATIC MANNER, THE DESIRED LOCATIONS OF ARRANGEMENT OF THE COMPONENTS OF ELECTRICAL WORK. DETERMINE EXACT CONDUIT ROUTING, CONDUIT BENDS, AUXILIARY JUNCTION BOXES, SUPPORTS, AND UNDEFINED CONSTRUCTION DETAILS AS A JOB CONDITION TO BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE CODE REQUIREMENTS. PROPER JUDGEMENT MUST BE EXERCISED IN EXECUTING THE WORK SO AS TO SECURE THE BEST POSSIBLE INSTALLATION IN THE AVAILABLE SPACE, AND TO OVERCOME LOCAL DIFFICULTIES DUE TO SPACE LIMITATIONS OR INTERFERENCE OF CONDITIONS ENCOUNTERED.

14. IN THE EVENT CHANGES IN THE INDICATED LOCATIONS OR ARRANGEMENTS ARE NECESSARY, DUE TO DEVELOPE CONDITIONS IN THE BUILDING CONSTRUCTION OR REARRANGEMENT OF EQUIPMENT, SUCH CHANGES SHALL BE MADE WITHOUT COST PROVIDING THE CHANGE IS ORDERED BEFORE THE CONDUIT RUNS, ETC., AND WORK DIRECTLY CONNECTED TO SAME IS INSTALLED AND NO EXTRA MATERIALS ARE REQUIRED.

15. THE DRAWINGS INDICATE APPROXIMATE LOCATIONS OF EXISTING CONDUITS. THE EXACT ROUTING SHALL BE VERIFIED IN FIELD AND LENGTH OF CONDUCTORS SHALL BE ADJUSTED TO THE LENGTH REQUIRED.

16. PERFORM CUTTING AND PATCHING ON THE CONSTRUCTION WORK WHICH MAY BE REQUIRED FOR THE PROPER INSTALLATION OF THE ELECTRICAL WORK. PATCHING SHALL BE OF THE SAME MATERIAL, WORKMANSHIP AND FINISH AS SPECIFIED AND ACCURATELY MATCH SURROUNDING WORK TO SATISFACTION OF THE ARCHITECT.

17. PROVIDE ALL EQUIPMENT WITH ENCLOSURES LISTED OR LABELED FOR USE AND LOCATION WHERE SUCH EQUIPMENT IS INSTALLED.

18. PROVIDE UL LISTED FIRE STOP FOR ALL PENETRATIONS THROUGH FIRE RATED FLOORS, WALLS AND CEILINGS TO MAINTAIN ALL FIRE RATINGS. THE FIRE STOP MATERIALS SHALL BE RE-ENTERABLE AND REUSABLE.

19. PROVIDE COORDINATED SHOP DRAWINGS. INDICATING DIMENSIONED LOCATIONS AND SIZES OF ALL CORE DRILLS FOR REVIEW AND APPROVAL. ALL CORE DRILL LOCATIONS SHALL BE VERIFIED AND APPROVED WITH OWNERS REPRESENTATIVE, STRUCTURAL AND ARCHITECT PRIOR TO CORE DRILL. UTILIZE X-RAY EQUIPMENT TO LOCATE AND VERIFY EXISTING STRUCTUREAL ELEMENTS WITHIN SLAB.

20. GROUNDING SHALL BE EXECUTED IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS, BOTH OF THE STATE OF CALIFORNIA AND LOCAL AUTHORITIES HAVING JURISDICTION.

21. PROVIDE GROUND WIRE IN EACH CONDUIT CONTAINING CIRCUITS FEEDING RECEPTACLES. THE CONDUIT SHALL NOT BE PERMITTED TO SERVE AS THE ONLY ELECTRICAL GROUND RETURN PATH.

22. WHERE CIRCUIT CHANGES OR ADDITIONS OCCUR IN PANELBOARDS UPDATE PANEL DIRECTORY CARDS WITH NEW TYPEWRITTEN CARDS INDICATING DESCRIPTION OF ALL CIRCUITS.

23. PROVIDE HANDLE TIES AT CIRCUIT BREAKERS TO SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS OF MULTI-WIRE BRANCH CIRCUITS WITH A SHARED NEUTRAL.

24. UNLESS NOTED OTHERWISE ALL 120 VOLT HOMERUNS OVER 100 FEET SHALL BE #10 AWG MINIMUM. ADJUST CONDUIT SIZE ACCORDINGLY.

25. UNLESS NOTED OTHERWISE ALL 277 VOLT HOMERUNS OVER 200 FEET SHALL BE #10 AWG MINIMUM, OVER 300 FEET SHALL BE #8 AWG MINIMUM. ADJUST CONDUIT SIZE ACCORDINGLY.

26. NOTIFY THE ARCHITECT IN WRITING WHEN INSTALLATION IS COMPLETE AND THAT A FINAL INSPECTION OF THIS WORK CAN BE PERFORMED. IN THE EVENT DEFECTS OR DEFICIENCIES ARE FOUND DURING THIS FINAL INSPECTION, THEY SHALL BE CORRECTED TO THE SATISFACTION OF THE ARCHITECT BEFORE FINAL ACCEPTANCE CAN BE ISSUED.

27. UNLESS SPECIFICALLY SHOWN ON THESE PLANS NO STRUCTURAL MEMBER SHALL BE CUT, NEITHER DRILLED NOR NOTCHED. WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE STRUCTURAL ENGINEER AND THE DIVISION OF THE STATE ARCHITECT.

28. CONDUITS RUN ABOVE GRADE: PROVIDE OZ COMPANY TYPE "DX" EXPANSION/DEFLEXION FITTINGS WITH BONDING JUMPER ON ALL CONDUITS AT ALL BUILDING EXPANSION OR SEISMIC JOINT CROSSINGS.

29. ALL FIXED EQUIPMENT CONNECTIONS SHALL BE PROVIDED WITH FLEX JOINTS.

SYMBOL LIST

(ALL SYMBOLS NOT NECESSARILY USED ON THESE DRAWINGS)
ALL SYMBOL DESCRIPTIONS ARE SUBJECT TO MODIFICATION AS NOTED ON THE DRAWINGS.
VERIFY EXACT LOCATIONS AND HEIGHTS OF OUTLETS WITH ARCHITECTURAL INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.

MOTOR CONNECTION. PROVIDE FUSED SAFETY SWITCH (DISCONNECT), HORSE POWER RATED, WALL MOUNTED, +45" OR EQUIPMENT MOUNTED, +36". PROVIDE SWITCH AND FUSES SIZED PER EQUIPMENT MANUFACTURER REQUIREMENTS.

P — JUNCTION BOX, FLUSH IN FLOOR. "P" INDICATES PEDESTAL TYPE ON FLUSH FLOOR MOUNTED OUTLET BOX.

K — INTRUSION DETECTION SYSTEM KEY PAD ON FLUSH WALL MOUNTED OUTLET BOX, 45" AFF.

AV — AUDIO/VIDEO OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX WITH COVERPLATE AND GROMETTED OPENING. PROVIDE OUTLET BOX, COVERPLATE AND 2" CONDUIT CONCEALED IN WALL TO THE ACCESSIBLE CEILING SPACE UNLESS NOTED OTHERWISE. PROVIDE VGA AND USB CABLE FROM THE TEACHER'S DESK TO THE INTERACTIVE WHITEBOARD AND SHORT THROW PROJECTOR OUTLET LOCATED AT THE TEACHING WALL. MOUNT AV OUTLET AT TEACHER'S DESK AT +18". MOUNT AV OUTLET AT INTERACTIVE WHITEBOARD AT +70". REFERENCE ET5.4.

TC — AUDIO/VIDEO CONTROL PANEL, ON FLUSH IN WALL MOUNTED OUTLET BOX, +45" A.F.F. LOCATED AT TEACHER'S DESK. PROVIDE CONTROL PANEL, OUTLET BOX AND 1" CONDUIT CONCEALED IN WALL DOWN TO AV CONNECTOR PLATE AT +18" A.F.F. PROVIDE AV CABLING BETWEEN AV CONTROL PANEL AND AV CONNECTOR PLATE IN ACCORDANCE WITH THE AV SYSTEM REQUIREMENTS. REFERENCE ET5.4.

CCTV — CLOSED CIRCUIT TELEVISION CAMERA, DOME MOUNTED, AT 108 IN. ABOVE FINISHED GRADE.

CCTV — CLOSED CIRCUIT TELEVISION CAMERA ARM. MOUNT AT 108 IN. ABOVE FINISHED GRADE.

R — TELEPHONE OUTLET, ON FLUSH FLOOR MOUNTED OUTLET BOX. WITH MULTI-SERVICE FITTINGS

TELEPHONE OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX +18", WITH DESK MOUNTED DEVICE WITH 1" CONDUIT TO ACCESSIBLE CEILING SPACE. "C" INDICATES HORIZONTAL IN FLUSH WALL MOUNTED OUTLET BOX +6" ABOVE COUNTER SPLASH.

TELEPHONE OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX +45", WITH WALL MOUNTED DEVICE WITH 1" CONDUIT TO ACCESSIBLE CEILING SPACE, UNLESS NOTED OTHERWISE.

T1 — TELEPHONE SYSTEM 3/4"C. WITH 1 (ONE) SET OF CONDUCTORS AS SPECIFIED.
T2 - 1"C. WITH 2 (TWO) SET OF CONDUCTORS AS SPECIFIED
T3 - 1 1/4"C. WITH 3 (THREE) SET OF CONDUCTORS AS SPECIFIED
T4 - 1 1/2"C. WITH 4 (FOUR) SET OF CONDUCTORS AS SPECIFIED

D1 — COMPUTER/DATA PROCESSING SYSTEM - 1"C. WITH CONDUCTORS AS SPECIFIED.
D2 - 1"C. WITH CONDUCTORS AS SPECIFIED.
D3 - 1"C. WITH CONDUCTORS AS SPECIFIED.
D4 - 1 1/4"C. WITH CONDUCTORS AS SPECIFIED.

COMPUTER/DATA OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX +18". PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE , UNLESS NOTED OTHERWISE, "C" INDICATES HORIZONTAL IN FLUSH WALL MOUNTED OUTLET BOX +6" ABOVE COUNTER SPLASH.

COMPUTER/DATA OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX +18". PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE, UNLESS NOTED OTHERWISE. "C" INDICATES HORIZONTAL IN FLUSH WALL MOUNTED OUTLET BOX +6" ABOVE COUNTER SPLASH.

COMPUTER/DATA OUTLET, ON FLUSH WALL MOUNTED OUTLET BOX +18". PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE, UNLESS NOTED OTHERWISE. "C" INDICATES HORIZONTAL IN FLUSH WALL MOUNTED OUTLET BOX +6" ABOVE COUNTER SPLASH.

R — DATA OUTLET,"R" INDICATES RECESSED FLOOR BOX WITH MULTI-SERVICE FITTINGS. PROVIDE 1" CONDUIT TO ACCESSIBLE CEILING SPACE, UNLESS NOTED OTHERWISE.

LC — LIGHTING CONTROL SYSTEM - 1"C. WITH CONDUCTORS AS SPECIFIED.

A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
AWG	AMERICAN WIRE GAUGE
AMP, A	AMPERE
A.I.C.	AMPERES INTERRUPTING CAPACITY (SYMMETRICAL)
AF/AT	AMP FRAME, AMP TRIP
AS/AF	AMP SWITCH, AMP FUSE
CIRC., CKT.	CIRCUIT
CB	CIRCUIT BREAKER
C	CONDUIT
C.O.	CONDUIT ONLY
CONN	CONNECTED
CLCB	CURRENT LIMITING CIRCUIT BREAKER
DIA	DIAMETER
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EWC	ELECTRIC WATER COOLER
E-O-L	END-OF-LINE CIRCUIT TERMINATOR
EF	EXHAUST FAN
FT OR '	FEET
FA	FIRE ALARM
FLA	FULL LOAD AMPS
GFI	GROUND FAULT INTERRUPTER
GRD	GROUND
HOA	HAND-OFF-AUTO
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
H.,W.,D.,L.	HEIGHT, WIDTH, DEPTH, LENGTH
HID	HIGH INTENSITY DISCHARGE
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
IN. OR "	INCHES
IG	ISOLATED GROUND
J-BOX	JUNCTION BOX
KVA	KILOVOLT AMPERES
KW	KILOWATT
LCL	LONG CONTINUOUS LOAD
L.F.	LINEAR FEET
LTG, LTS	LIGHTING
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
MH	METAL HALIDE
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CIRCUIT PROTECTOR
MTD	MOUNTED
MW	MICROWAVE
NEC	NATIONAL ELECTRIC CODE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NF	NON-FUSED
NIC	NOT IN CONTRACT
NO. OR #	NUMBER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
PRIMARY	OVER 600 VOLTS
PH. OR Ø	PHASE
PROVIDE	FURNISH, INSTALL AND CONNECT
PA	PUBLIC ADDRESS
R	EXISTING EQUIPMENT/DEVICE TO BE DISCONTINUED AND REMOVED
REC, RECEPT	RECEPTACLE
U.N.O.	UNLESS NOTED OTHERWISE

S 2,P 1 a,b — SINGLE POLE TOGGLE SWITCH, ON FLUSH WALL MOUNTED OUTLET BOX, +45". INSTALL MULTIPLE SWITCHES UNDER COMMON COVER PLATE. SUBSCRIPT OR SUPERSCRIPT AT SWITCH SYMBOL INDICATES THE FOLLOWING:

2 - DOUBLE POLE
3 - THREE WAY
4 - FOUR WAY
P - PILOT LIGHT
M - MANUAL MOTOR STARTERS
K - KEY OPERATED
R - SPDT MOMENTARY CONTACT RELAY SWITCH
V - VAPOR PROOF
a,b,c,d, ETC. - MULTIPLE SWITCHES WITH IDENTIFICATION OF OUTLET CONTROLLED

3 BUTTON CONTROLLER STATION WITH "OPEN-STOP-CLOSE" BUTTONS ON FLUSH WALL MOUNTED OUTLET BOX +45". SYMBOL INDICATES THE FOLLOWING:

K - KEY OPERATED

DUPLEX CONVENIENCE RECEPTACLE VERTICAL ON FLUSH WALL MOUNTED OUTLET BOX, +18". STEM INDICATES WALL MOUNTED OUTLET BOX, TYPICAL.

DUPLEX CONVENIENCE RECEPTACLE HORIZONTAL ON FLUSH WALL MOUNTED OUTLET BOX, +6" ABOVE COUNTER SPLASH.

DUPLEX CONVENIENCE RECEPTACLE SPLIT WIRED, ON FLUSH WALL MOUNTED OUTLET BOX, +18".

DOUBLE DUPLEX (FOUR-PLEX) CONVENIENCE RECEPTACLE ON ONE FLUSH WALL MOUNTED OUTLET BOX +18".

DUPLEX CONVENIENCE RECEPTACLE WITH INTERNAL GROUND FAULT INTERRUPTER, VERTICAL ON FLUSH WALL MOUNTED OUTLET BOX +18". U.N.O.

DOUBLE DUPLEX CONVENIENCE RECEPTACLE WITH INTERNAL GROUND FAULT INTERRUPTER, VERTICAL ON FLUSH WALL MOUNTED OUTLET BOX +18". U.N.O.

DUPLEX CONVENIENCE RECEPTACLE WITH INTERNAL GROUND FAULT INTERRUPTER, HORIZONTAL ON FLUSH WALL MOUNTED OUTLET BOX, +6" ABOVE COUNTER SPLASH. U.N.O.

WP — DUPLEX CONVENIENCE RECEPTACLE, WITH INTERNAL GROUND FAULT INTERRUPTER, IN FLUSH WALL MOUNTED ENCLOSURE WITH HINGED DOOR, LOCK AND KEY, +18".

WP — DUPLEX CONVENIENCE RECEPTACLE, WITH INTERNAL GROUND FAULT INTERRUPTER, ON FLUSH WALL MOUNTED OUTLET BOX WITH SPRING DOOR COVER, +18" U.N.O.

LC — DUPLEX CONVENIENCE RECEPTACLE, SPLIT WIRED, IN FLUSH IN WALL OUTLET BOX, +18". HALF OF DUPLEX RECEPTACLE SHALL BE CONTROLLED BY THE ROOM'S LIGHTING CONTROL SYSTEM IN ACCORDANCE WITH CEC TITLE 24 LIGHTING REQUIREMENTS.

R — DOUBLE DUPLEX CONVENIENCE RECEPTACLE IN FLUSH FLOOR OUTLET BOX. "R" DESIGNATION INDICATES RECESSED FLOOR BOX WITH MULTI-SERVICE FITTINGS, WIREMOLD "RFB" SERIES BOX OR EQUAL.

DUPLEX CONVENIENCE RECEPTACLE IN FLUSH FLOOR OUTLET BOX, UNLESS NOTED OTHERWISE. "R" DESIGNATION INDICATES RECESSED FLOOR BOX WITH MULTI SERVICE FITTINGS, WIREMOLD "RFB" SERVICE BOX OR EQUAL.

P — DUPLEX CONVENIENCE RECEPTACLES, BACK TO BACK, "P" INDICATES PEDESTAL TYPE ON SURFACE MOUNTED OUTLET BOX.

PR — POKE-THRU FLOOR BOX FOR POWER AND DATA. WALKER RB6.

P — DUPLEX CONVENIENCE RECEPTACLE, ON FLUSH CEILING MOUNTED OUTLET BOX FOR PROJECTOR.

J — JUNCTION BOX, FLUSH WALL MOUNTED, +18" U.N.O.

J — JUNCTION BOX CONCEALED ABOVE ACCESSIBLE CEILING OR ON EXPOSED CEILING. U.N.O.

J — INDICATES CONNECTION TO EQUIPMENT AS REQUIRED, TYPICAL. U.N.O.

T — THERMOSTAT ON FLUSH WALL MOUNTED OUTLET BOX, REFER TO MECHANICAL DRAWINGS FOR HEIGHT AND LOCATION.

PANELBOARD, ADJACENT LINE INDICATES PANEL FRONT. ADJACENT BALLOON INDICATES PANEL DESIGNATION "A", SEE DRAWING E-1 FOR PANEL SCHEDULE.

TERMINAL CABINET OR EQUIPMENT CABINET. ADJACENT LINE INDICATES CABINET FRONT.

FLOOR STANDING SWITCHGEAR ADJACENT BALLOON INDICATES EQUIPMENT DESIGNATION "DBA", SEE DRAWING E-1 FOR SINGLE LINE DIAGRAM AND/OR SCHEDULE.

TERMINAL CABINET OR EQUIPMENT CABINET. ADJACENT LINE INDICATES CABINET FRONT.

CIRCUIT BREAKER WITH ZERO SEQUENCE GROUND FAULT RELAY SYSTEM.

TRANSFORMER; KVA, LINE AND LOAD VOLTAGE RATINGS AS INDICATED.

FUSED SAFETY SWITCH (DISCONNECT), HORSE POWER RATED. MOUNT ON WALL +45", OR ON EQUIPMENT +36". PROVIDE SWITCH AND FUSES SIZED PER EQUIPMENT MANUFACTURER REQUIREMENTS.

AM-FM ANTENNA (VERIFY MOUNTING LOCATION)

OUTLET BOX FOR CLOSED CIRCUIT CAMERA. PROVIDE 1" C. TO BUILDING'S ACCESSIBLE CEILING. (VERIFY MOUNTING LOCATION)

MCA-11 — HOME RUN TO MCA-11, INDICATES MOTOR CONTROL CENTER "MCA" CIRCUIT NO. 11. SEE RESPECTIVE SCHEDULE FOR WIRE AND CONDUIT.

PUSH BUTTON STATION WITH "STOP-START" PUSH BUTTONS AND RED INDICATING PILOT LIGHT ON FLUSH WALL MOUNTED OUTLET BOX, +45".

CONDUIT, INSTALLED CONCEALED IN WALL OR IN CEILING SPACE.

CONDUIT, INSTALLED CONCEALED IN OR UNDER FLOOR OR BELOW GRADE, 3/4" CONDUIT MINIMUM.

CONDUIT, INSTALLED EXPOSED.

B-5,7,9 — HOMERUN TO PANEL "B" FOR CIRCUITS 5, 7, 9 WITH COMMON NEUTRAL.

UNDERGROUND CONDUIT STUBOUT, STUB 5'-0" FROM BUILDING OR WALKWAY, CAP, MARK AND RECORD.

STAMPS

REGISTERED PROFESSIONAL ENGINEER — STEPHEN M. CARLSON — No. E 10372 — Exp. 09-30-24

LICENSED ARCHITECT — ROGER CLARKE — No. C-14126 — Exp. 10-31-25 — STATE OF CALIFORNIA

AGENCY APPROVAL
File No.: #-########-########

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

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CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

ANCHORAGE NOTES

Applicable Code: 2022 CBC MEP Component Anchorage Note

All mechanical, plumbing, and electrical components shall be anchored and installed per the details on the DSA-approved construction documents. The following components shall be anchored or braced to meet the force and displacement requirements prescribed in the 2022 CBC Sections 1617A.1.18 through 1617A.1.26 and ASCE 7-16 Chapters 13, 26, and 30:

1. All permanent equipment and components.
   Temporary, movable or mobile equipment that is permanently attached (e.g., hard wired) to the building utility services such as electricity, gas or water. "Permanently attached" shall include all electrical connections except plugs for 110/220-volt receptacles having a flexible cable.
2. Temporary, movable or mobile equipment which is heavier than 400 pounds or has a center of mass located 4 feet or more above the adjacent floor or roof level that directly support the component is required to be restrained in a manner approved by DSA.

The following mechanical and electrical components shall be positively attached to the structure but need not demonstrate design compliance with the references noted above. These components shall have flexible connections provided between the component and associated ductwork, piping, and conduit. Flexible connections must allow movement in both transverse and longitudinal directions:

A. Components weighing less than 400 pounds and having a center of mass located 4 feet or less above the adjacent floor or roof level that directly support the component.
B. Components weighing less than 20 pounds, or in the case of distributed systems, less than 5 pounds per foot, which are suspended from a roof or floor or hung from a wall.

The anchorage of all mechanical, electrical and plumbing components shall be subject to the approval of the design professional in general responsible charge or structural engineer delegated responsibility and acceptance by DSA. The project inspector will verify that all components and equipment have been anchored in accordance with the above requirements.

Applicable Code: 2022 CBC

Piping, Ductwork, and Electrical Distribution System Bracing Note

Piping, ductwork, and electrical distribution systems shall be embraced to comply with the forces and displacements prescribed in ASCE 7-16 Section 13.3 as defined in ASCE 7-16 Sections 13.6.5, 13.6.6, 13.6.7, 13.6.8, and 2022 CBC, Sections 1617A.1.24, 1617A.1.25 and 1617A.1.26.

The method of showing bracing and attachments to the structure for the identified distribution system are as noted below. When bracing and attachments are based on a pre-approved installation guide (e.g. HCAi OPM for 2013 CBC or later), copies of the bracing system installation guide or manual shall be available on the jobsite prior to the start of and during the hanging and bracing of the distribution systems. The Structural Engineer of Record shall verify the adequacy of the structure to support the hanger and brace loads.

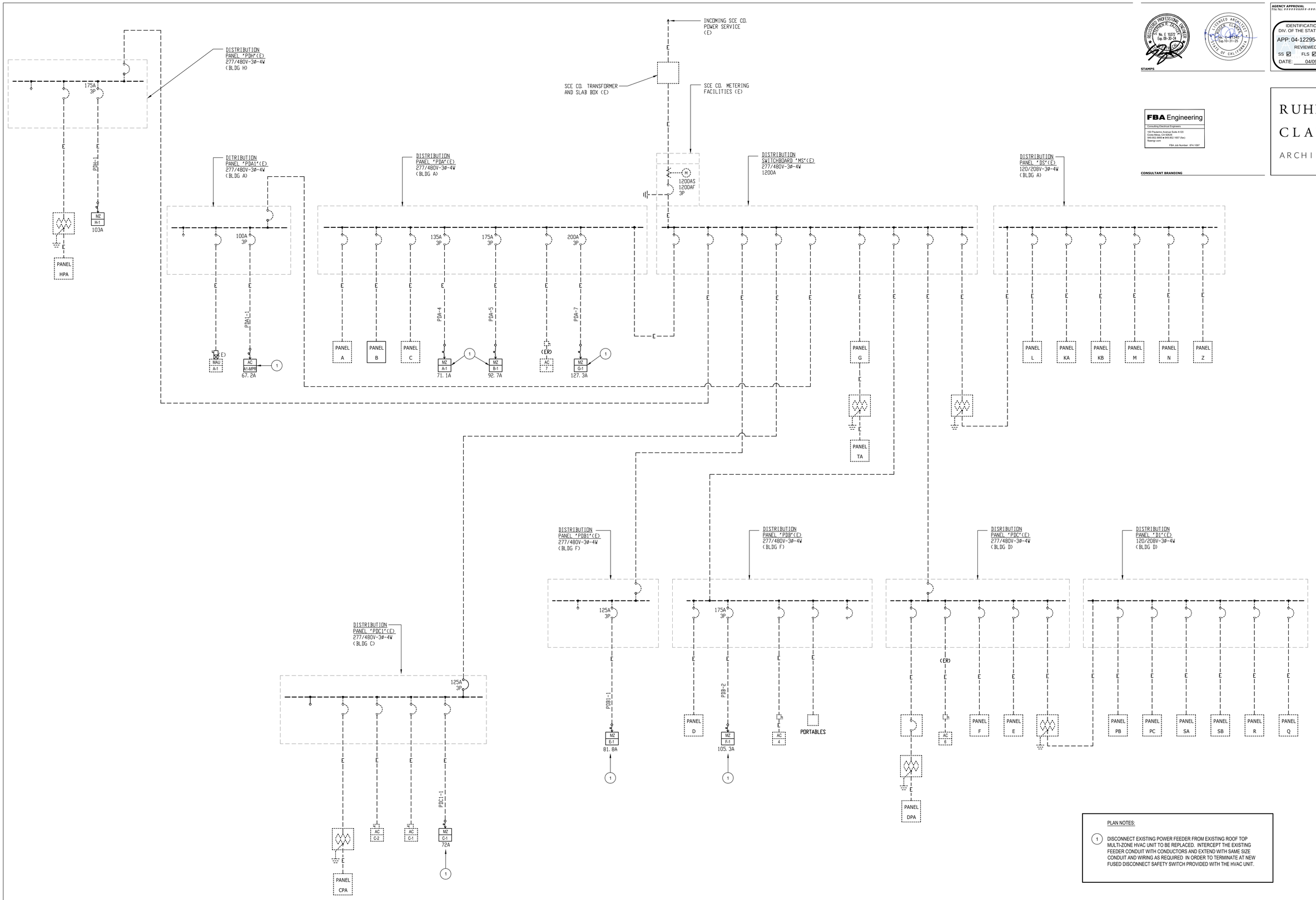
Mechanical Piping (MP), Mechanical Ducts (MD), Plumbing Piping (PP), Electrical Distribution Systems (E):

MP☐MD☐ PP☐E☒Option 1: Detailed on the approved drawings with project specific notes and details.

MP☐MD☐ PP☐E☐Option 2: Shall comply with HCAi (OSHPD) Pre-approval (OPM #) #_____, as included in these drawings with project specific notes and details.

ELECTRICAL SHEET INDEX

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:



PLAN NOTES:

(1) DISCONNECT EXISTING POWER FEEDER FROM EXISTING ROOF TOP MULTI-ZONE HVAC UNIT TO BE REPLACED. INTERCEPT THE EXISTING FEEDER CONDUIT WITH CONDUCTORS AND EXTEND WITH SAME SIZE CONDUIT AND WIRING AS REQUIRED IN ORDER TO TERMINATE AT NEW FUSED DISCONNECT SAFETY SWITCH PROVIDED WITH THE HVAC UNIT.

STAMPS

REGISTERED PROFESSIONAL ENGINEER — No. E 16372 — Exp. 09-30-24 — ELECTRICAL

LICENSED ARCHITECT — JENNIFER CLARKE — Exp.10-31-25 — STATE OF CALIFORNIA

AGENCY APPROVAL
File No.: ########-########

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

CONSULTANT BRANDING

FBA Engineering
Consulting Electrical Engineers
150 Pacifica Avenue Suite A120
Irvine, California, CA 92606
949.679.0444 / 949.852.1657 (fax)
fbaengr.com
FBA Job Number: 874.1097

RUHNAU CLARKE ARCHITECTS

SINGLE LINE DIAGRAM | SCALE: NONE | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RUHNAUCLARKE.COM
3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501(951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 438 5899

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

SINGLE LINE DIAGRAM

E0.2

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

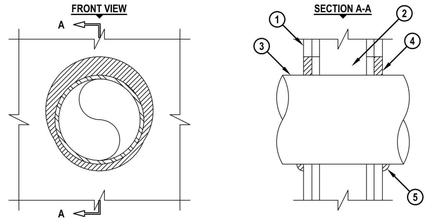
FBA Engineering / Plot Date: 3/4/2024 4:26 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\EO.2_SINGLE LINE DIAGRAM.dwg

UL/cUL SYSTEM NO. W-L-1054

METAL PIPE THROUGH GYPSUM WALL ASSEMBLY

F-RATING = 1-HR. OR 2-HR.
T-RATING = 0-HR.
L-RATING AT AMBIENT = LESS THAN 1 CFM / SQ FT
L-RATING AT 400°F = LESS THAN 1 CFM / SQ FT

WL1054u.041316



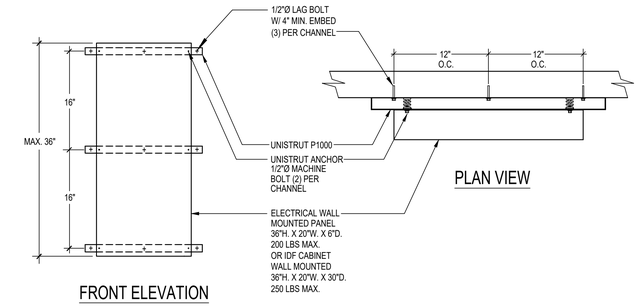
1. GYPSUM WALL ASSEMBLY (UL/cUL CLASSIFIED U300 OR U400 SERIES) (1-HR. OR 2-HR. FIRE-RATING) (2-HR. SHOWN).
2. [NOT SHOWN] WOOD STUDS TO CONSIST OF NOMINAL 2" x 4" LUMBER. STEEL STUDS TO BE MINIMUM 2-1/2" WIDE.
3. PENETRATING ITEM TO BE ONE OF THE FOLLOWING :
   - A. MAXIMUM 30" DIAMETER STEEL PIPE (SCHEDULE 10 OR HEAVIER).
   - B. MAXIMUM 30" DIAMETER CAST IRON PIPE.
   - C. MAXIMUM 6" NOMINAL DIAMETER COPPER PIPE.
   - D. MAXIMUM 6" NOMINAL DIAMETER STEEL CONDUIT.
   - E. MAXIMUM 4" NOMINAL DIAMETER EMT.
4. MINIMUM 5/8" DEPTH HILTI FS-ONE MAX INTUMESCENT FIRESTOP SEALANT.
5. MINIMUM 1/2" BEAD HILTI FS-ONE MAX INTUMESCENT FIRESTOP SEALANT APPLIED AT POINT OF CONTACT.

NOTES : 1. MAXIMUM DIAMETER OF OPENING :
- A. 32-1/4" FOR STEEL STUD WALLS.
- B. 14-1/2" FOR WOOD STUD WALLS.

2. ANNULAR SPACE = MINIMUM 0", MAXIMUM 2-1/4".
3. PIPE MAY BE INSTALLED WITH CONTINUOUS POINT OF CONTACT.

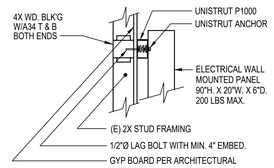
TYPICAL FIRE STOP PENETRATION DETAIL

SCALE: NONE | 5



PLAN VIEW

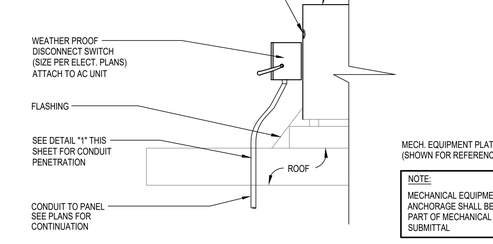
FRONT ELEVATION



WOOD STUD WALL

WALL MOUNTED ELECTRICAL EQUIPMENT ANCHORAGE

SCALE: NONE | 3



NOTE:
MECHANICAL EQUIPMENT ANCHORAGE SHALL BE PART OF MECHANICAL SUBMITTAL

DISCONNECT SWITCH MOUNTING DETAIL

SCALE: NONE | 2

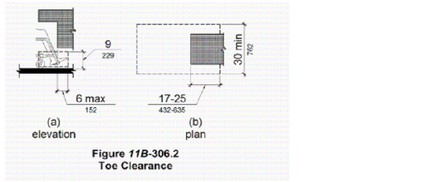


Figure *11B*-306.2
Toe Clearance

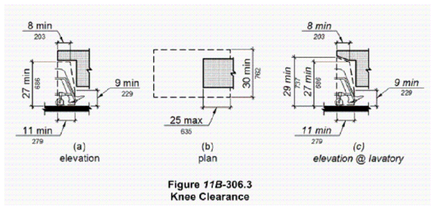
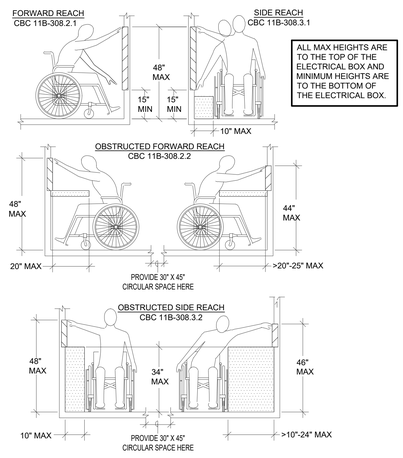
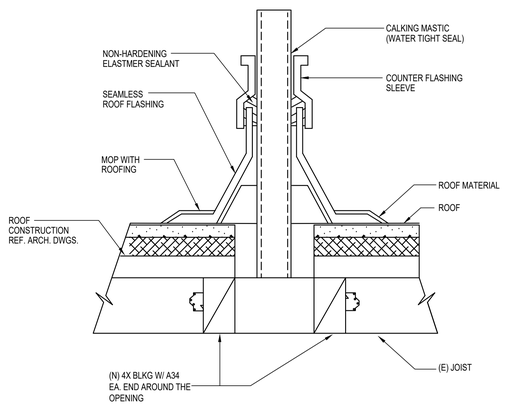


Figure *11B*-306.3
Knee Clearance



MOUNTING HEIGHT OVER OBSTRUCTION

SCALE: NONE | 4



CONDUIT PENETRATION THROUGH ROOF SUPPORT

SCALE: NONE | 1

AGENCY APPROVAL
File No.: #########-########

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

STAMPS

FBA Engineering
Consulting Electrical Engineers
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FBA Job Number: 874.1097

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:26 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E0.3_ELECTRICAL DETAILS.dwg

PROJECT No. :1-34-38
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FIRE ALARM SYSTEM CALCULATIONS

SILENT KNIGHT RPS1000 NAC EXPANDER PANEL

NAC PANEL RPS-G1			STAND BY CURRENT (AMPS)	ALARM CURRENT (AMPS)	
		RPS1000 MAIN CIRCUIT BRD	0.0100	0.0100	
	NAC CKT	LOCATION		CKT DRAW	VDROP%
NAC / OUTPUT #1 -	V1	BLDG. G	0.0000	0.6660	5.12
NAC / OUTPUT #2 -	V1	BLDG. E	0.0000	0.6660	5.12
NAC / OUTPUT #3 -	V2	BLDG. E	0.0000	0.5550	4.27
		TOTAL CURRENT DRAW=	0.0100	1.8970	

TOTAL STAND-BY CURRENT X 24 HOURS 0.0100 X 24 = 0.240 A-HR
TOTAL ALARM CURRENT X 15 MINUTES 1.8970 X 0.250 = 0.474 A-HR

TOTAL MINIMUM AMP HOURS OF BATTERIES = 0.714 A-HR
ADDITIONAL 25% DERATING SAFETY FACTOR = 0.8928 A-HR

MINIMUM SIZE BATTERY REQUIRED = 10.0 A-HR

NOTES:
1. BATTERY CALCULATION BASED ON 24 HOURS OF STAND BY AND 15 MINS. OF ALARM TIME
2. PROVIDE MINIMUM OF (2) 12VOLT-10 AH BATTERIES FOR SECONDARY BACKUP POWER.

SILENT KNIGHT RPS1000 NAC EXPANDER PANEL

NAC PANEL RPS-B1			STAND BY CURRENT (AMPS)	ALARM CURRENT (AMPS)	
		RPS1000 MAIN CIRCUIT BRD	0.0100	0.0100	
	NAC CKT	LOCATION		CKT DRAW	VDROP%
NAC / OUTPUT #1 -	V1	BLDG. B	0.0000	0.6660	5.12
NAC / OUTPUT #2 -	V1	BLDG. C	0.0000	0.4440	3.42
		TOTAL CURRENT DRAW=	0.0100	1.1200	

TOTAL STAND-BY CURRENT X 24 HOURS 0.0100 X 24 = 0.240 A-HR
TOTAL ALARM CURRENT X 15 MINUTES 1.1200 X 0.250 = 0.280 A-HR

TOTAL MINIMUM AMP HOURS OF BATTERIES = 0.520 A-HR
ADDITIONAL 25% DERATING SAFETY FACTOR = 0.6500 A-HR

MINIMUM SIZE BATTERY REQUIRED = 10.0 A-HR

NOTES:
1. BATTERY CALCULATION BASED ON 24 HOURS OF STAND BY AND 15 MINS. OF ALARM TIME
2. PROVIDE MINIMUM OF (2) 12VOLT-10 AH BATTERIES FOR SECONDARY BACKUP POWER.

REMOTE POWER SUPPLY BATTERY CALCULATIONS "RPS-G2"

QTY	DEVICE	STAND BY CURRENT	ALARM CURRENT
1	RPS1000 MAIN CIRCUIT BRD	0.010	0.010
	BLDG. G		
QTY	DEVICE		
6	CARBON MONOXIDE SOUNDER BASE	0.120	0.240
	BLDG. E		
QTY	DEVICE		
11	CARBON MONOXIDE SOUNDER BASE	0.220	0.440
	TOTAL CURRENT DRAW	0.350	0.690

TOTAL STAND-BY CURRENT X 24 HOURS = 0.350 X 24 = 8.400 A-HR
TOTAL ALARM CURRENT X 15 MINUTES = 0.69 X 0.250 = 0.173 A-HR

TOTAL MINIMUM AMP HOURS OF BATTERIES = 8.573 A-HR
ADDITIONAL 20% DERATING SAFETY FACTOR = 10.287 A-HR

NOTES:
1. BATTERY CALCULATION SHALL BE BASED ON 24 HOURS OF STAND BY AND 15 MINUTES OF ALARM CURRENT
2. PROVIDE MINIMUM OF 12 A-HOURS ADDITIONAL STANDBY BATTERY POWER.

REMOTE POWER SUPPLY BATTERY CALCULATIONS "RPS-B2"

QTY	DEVICE	STAND BY CURRENT	ALARM CURRENT
1	RPS1000 MAIN CIRCUIT BRD	0.010	0.010
	BLDG. B		
QTY	DEVICE		
6	CARBON MONOXIDE SOUNDER BASE	0.120	0.240
	BLDG. C		
QTY	DEVICE		
4	CARBON MONOXIDE SOUNDER BASE	0.080	0.160
	TOTAL CURRENT DRAW	0.210	0.410

TOTAL STAND-BY CURRENT X 24 HOURS = 0.210 X 24 = 5.040 A-HR
TOTAL ALARM CURRENT X 15 MINUTES = 0.41 X 0.250 = 0.103 A-HR

TOTAL MINIMUM AMP HOURS OF BATTERIES = 5.143 A-HR
ADDITIONAL 20% DERATING SAFETY FACTOR = 6.171 A-HR

NOTES:
1. BATTERY CALCULATION SHALL BE BASED ON 24 HOURS OF STAND BY AND 15 MINUTES OF ALARM CURRENT
2. PROVIDE MINIMUM OF 7 A-HOURS ADDITIONAL STANDBY BATTERY POWER.

FIRE ALARM BATTERY CALCULATION - (EXISTING FACP) A#04-115588

ADDITIONAL LOAD TO EXISTING FACP PANEL "EFACP"

QTY	DEVICE	CURRENT	CURRENT
	EXISTING FIRE ALARM CONTROL PANEL CURRENT LOAD (LOCATED AT EXISTING ADMIN. BLDG.)	0.322	1.912
	NEW DEVICES AND MODULES FOR 2 STORY BUILDING		
1	5815 SLC LOOP EXPANDER CARD	0.055	0.125
0	MANUAL PULL STATION	0.000	0.000
27	CO/SMOKE DETECTOR	0.008	0.176
7	RELAY MODULE	0.025	0.385
	TOTAL CURRENT LOAD	0.4096	2.5975

TOTAL STAND-BY CURRENT X 24 HOURS = 0.410 X 24 = 9.830 A-HR
TOTAL ALARM CURRENT X 15 MINUTES = 2.60 X 0.250 = 0.649 A-HR

TOTAL ADDITIONAL MINIMUM AMP HOURS OF BATTERIES = 10.480 A-HR
25% ADDITIONAL LOAD TO MINIMUM AMP HOURS OF BATTERIES = 13.100 A-HR

NOTES:
1. *EXISTING BATTERY CALCULATION BASED ON 24 HOURS OF STAND BY AND 15 MINUTES OF ALARM TIME*
2. *CURRENT BACKUP BATTERY INSTALLED - 50 AMP HOUR. (CONTRACTOR TO VERIFY)*
3. *CONTRACTOR TO VERIFY BATTERY SIZE AND UPGRADE IF REQUIRED BASED ON CALCULATION.*

FIRE ALARM EQUIPMENT SCHEDULE

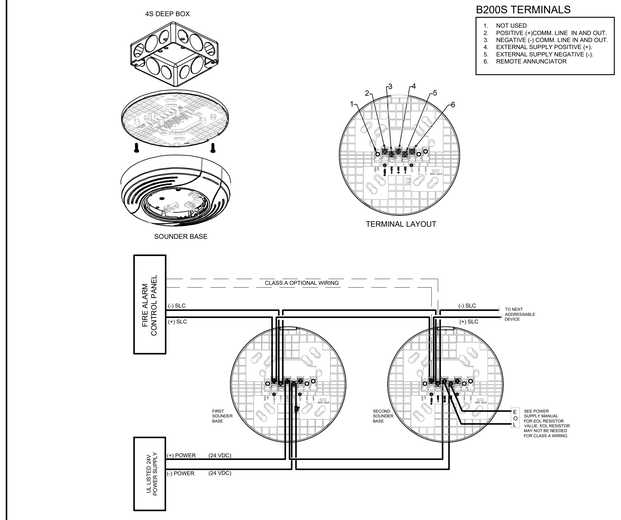
SYMBOL	DESCRIPTION	MANUFACTURER MODEL NO.#	MNT. HEIGHT REQ.	BACKBOX REQ.	CSFM NO.#
FACP	EXISTING FIRE ALARM CONTROL PANEL A#04-115588	SILENT KNIGHT IFP-2000ECS	-	-	7165-0559-0174
FACP	EXISTING FIRE ALARM CONTROL PANEL A#101397	FARADAY MPC-1500	-	-	-
RPS	FIRE ALARM NAC EXPANDER PANEL "RPS_"	SILENT KNIGHT RPS-1000	+66" A.F.F. TO TOP OF BACKBOX	BACKBOX INCL.	7165-0559-0158
RM	ADDRESSABLE RELAY MODULE	SILENT KNIGHT IDP-RELAY	FIELD VERIFY LOC.	4S DEEP BOX W/EXT. RING	7300-0559-0155
CO	FA MULTI-CRITERIA FIRE/CO DETECTOR WITH SOUNDER BASE (B200S)	SILENT KNIGHT IDP-FIRE-CO	FLUSH ON CEILING	4S BOX W/3-0 GANG RING	7272-0559:0149
	FA CEILING SPEAKER/STROBE (LED) (#cd DENOTES CANDELA RATING)	SYSTEM SENSOR SPSCRL	FLUSH ON CEILING	4S BOX OR SBBCRRL	7320-1653:0505
(E)	EXISTING SMOKE DETECTOR DEVICE	-	-	-	-
(E)	EXISTING HEAT DETECTOR DEVICE	-	-	-	-
(E) CO	EXISTING CARBON MONOXIDE DETECTION DEVICE WITH SOUNDER BASE	-	-	-	-
(E)	EXISTING FIRE ALARM MANUAL PULL STATION	-	-	-	-
(E)	EXISTING FIRE ALARM INTERIOR AUDIBLE HORN DEVICE	-	-	-	-
(E) WP	EXISTING FORE ALARM EXTERIOR AUDIBLE DEVICE.	-	-	-	-
(E)	EXISTING FIRE ALARM VISUAL STROBE	-	-	-	-
(E)	EXISTING FIRE ALARM COMBINATION AUDIBLE HORN AND VISUAL STROBE DEVICE	-	-	-	-

FIRE ALARM SEQUENCE OF OPERATION

DEVICE/ACTION	EXISTING AREA SMOKE DETECTORS	EXISTING AREA HEAT DETECTORS	CLASSROOM CARBON MONOXIDE DETECTOR	CARBON MONOXIDE 24VDC POWER LOSS	GROUND FAULT	SHORT CIRCUIT	LOW BATT	FACP 120VAC POWER FAIL	NOTES
ANNUNCIATE ALARM SIGNAL AT FACP AND REMOTE ANNUNCIATOR	X	X	X						
ANNUNCIATE SUPERVISORY CONDITION AT FACP AND REMOTE ANNUNCIATOR			X	X	X	X	X		
ANNUNCIATE TROUBLE CONDITION AT FACP AND REMOTE ANNUNCIATOR	X	X	X	X	X	X	X	X	[1]
ACTIVATE AUDIBLE/VISUAL SIGNAL THROUGHOUT SCHOOL (ALARM)	X	X							
CONTACT CENTRAL STATION (UDACT)	X	X			X	X	X	X	
ACTIVATE CARBON MONOXIDE SOUNDER BASE AT LOCATION OF ALARM(TEMPORAL 4 PATTERN)			X						
ACTIVATE SEPARATE VISUAL NOTIFICATION ON CO ALARM IN CLASSROOMS			X						
ACTIVATE AUDIBLE (ALARM SOUND) IN ADMIN OFFICE			X						[2]

NOTES:
[1] INDICATE TROUBLE ON WIRING FAULT OR DEVICE AS REQUIRED.
[2] CO DETECTORS WILL SOUND ALARM SIGNAL AT ADMIN OFFICE (PER CFC 915.2.3).

CO DETECTOR SOUNDER BASE WIRING



FIRE ALARM SYSTEM NOTES

FIRE ALARM COMPLETE PLAN SUBMITTAL

1.0 PROJECT INFORMATION

A. OCCUPANCY GROUP
REFER TO ARCHITECTURAL DRAWINGS.

B. CONSTRUCTION TYPE
REFER TO ARCHITECTURAL DRAWINGS.

C. PENETRATIONS OF FIRE RATED WALLS SHALL BE PROTECTED IN ACCORDANCE WITH CALIFORNIA BUILDING CODE, PART 2, CHAPTER 7, TITLE 24. REFER TO THE ARCHITECTURAL PLANS FOR FIRE-RATE CORRIDOR(S), OCCUPANCY SEPARATION(S) AND AREA SEPARATION WALL(S).

D. UPON COMPLETION OF SYSTEM INSTALLATION, THE SYSTEM SHALL BE TESTED IN THE PRESENCE OF AND IN A MANNER ACCEPTABLE TO THE ENFORCING AGENCY.

E. PROVIDE A STATEMENT OF COMPLIANCE WHEN REQUESTING INSPECTION CFC 901.2.1

F. THE FIRE ALARM SYSTEM DESIGN FOR THIS PROJECT IS ADDRESSABLE AND FULLY AUTOMATIC WITH CARBON MONOXIDE DETECTOR SYSTEM.

LIST OF APPLICABLE CODES

2022 California Administrative Code (CAC), Part 1, Title 24 CCR
2022 California Building Code (CBC), Part 2, Title 24 CCR
2022 California Electrical Code (CEC), Part 3, Title 24 CCR2022 California Mechanical Code (CMC), Part 4, Title 24 CCR
2022 California Plumbing Code (CPC), Part 5, Title 24 CCR
2022 California Energy Code, Part 6, Title 24 CCR
2022 California Fire Code (CFC), Part 9, Title 24 CCR2022 California Existing Building Code (CEBC), Part 10, Title 24 CCR
2022 California Green Building Standards Code (CALGreen), Part 11, Title 24 CCR
2022 California Referenced Standards Code, Part 12, Title 24 CCRTitle 19 CCR, Public Safety, State Fire Marshal Regulations

APPLICABLE STANDARDS

For a list of applicable standards, including California amendments to the NFPA Standards, refer to CBC Chapter 35 and CFC Chapter 80.

3.0 UPON RECEIPT OF THE CERTIFICATE OF COMPLIANCE, THE INSTALLER SHALL SUPPLY THE OWNER WITH A WRITTEN OPERATING, TESTING AND MAINTENANCE INSTRUCTIONS, POINT-TO-POINT AS -BUILT DRAWINGS AND EQUIPMENT SPECIFICATIONS.

4.0 NFPA 72 CHAPTER 10.14 INSPECTION TESTING AND MAINTENANCE COMPLETE THE INSPECTION AND TESTING FORM IN ITS ENTIRETY SUBMIT A COPY TO THE DISTRICT, ARCHITECT AND DSA DIVISION OF FIRE AND LIFE SAFETY.

5.0 OCCUPANCY PROHIBITED TO ANY PORTION OF BUILDING UNTIL FIRE ALARM SYSTEM HAS BEEN TESTED AND APPROVED. CBC 901.5; CFC 901.5.1 RECORD DRAWINGS OF ALL INSPECTION, TEST SHALL BE MAINTAINED ON PREMISES MINIMUM THREE YEARS. CFC 901.6.2 (5 YEARS PER TITLE 14) SMOKE DETECTORS TO UTILIZE CALIBRATED MANUFACTURE SENSITIVITY TEST INSTRUMENT. CFC 907.9.4

6.2 CONTRACTOR SHALL PROVIDE 24 HOUR FIRE WATCH IN CASE EXISTING CAMPUS FIRE ALARM SYSTEM IS SHUTDOWN OR DURING THE DURATION OF THE CONSTRUCTION PHASE.(IF APPLICABLE TO THE PROJECT). REFER TO DSA DOCUMENT IR F-2 FOR MORE INFORMATION AND REQUIREMENTS.

6.3 EXISTING FIRE ALARM SYSTEM SHALL REMAIN OPERATIONAL DURING THE BUILDING MODERNIZATION CONSTRUCTION UNTIL THE NEW FIRE ALARM SYSTEM IS INSTALLED AND FULLY OPERABLE. UPON COMPLETE FINAL TEST AND APPROVAL OF THE NEW SYSTEM, EXISTING SYSTEM AND ITS DEVICES SHALL BE DISCONNECTED AND REMOVED AS REQUIRED.(IF APPLICABLE TO THE PROJECT).

CABLE / WIRE SCHEDULE

FIRE ALARM RACEWAY SCHEDULE

WIRETAG	CONDUCTORS/CABLE	MINIMUM CONDUIT SIZE
B	2#14 THHN SOLID (MISC)	3/4"C.
C	2#12 TP STRANDED (SYNC CKT.)	3/4"C.
D	2#18 TSP SOLID-FPL-(DATA COMM.)	3/4"C.
P	2#14 THHN SOLID (24VDC)	3/4"C.
S	2#16 TSP SOLID (SPEAKER CKT.)	3/4"C.
V	2#12 THHN SOLID (STROBE CKT.)	3/4"C.
Z	2#16 TP SOLID-FPL-(SLC CKT.)	3/4"C.
DAL	2#18 FPL TPNS SOLID (DIGITAL AUDIO LOOP)	3/4"C.
SB	4#16 THHN SOLID (SBUS CKT.)	3/4"C.
VB	2#16 TSP SOLID (VBUS CKT.)	3/4"C.

NOTE:
1. ALL UNDERGROUND CABLING / WIRE SHALL BE TYPE THWN OR AQUASEAL TYPE APPROVED FOR WET LOCATION. MINIMUM CONDUIT SIZE FOR ALL UNDERGROUND CONDUITS SHALL BE 2" UNLESS OTHERWISE NOTED ON PLANS.
2. ALL FIRE ALARM CABLING SHALL BE INSTALLED IN RED CONDUIT.

TP = TWISTED PAIR
TPNS = TWISTED UNSHEILDED PAIR
TSP = TWISTED SHEILDED PAIR

VOLTAGE DROP CALCULATIONS

	CIRCUIT LOCATION	BLDG. B		BLDG. C		
		CIRCUIT	PANEL	CIRCUIT	PANEL	
MANUFACTURER - SYSTEM SENSOR		V1	RPS-B1	V1	RPS-B1	
		QTY	CURR.	QTY	CURR.	
Ceiling Strobes-SCRL	Draw (Amps)					QTY
30cd - 30X30	0.063		0.000		0.000	0
75cd - 44X44	0.111	6	0.666	4	0.444	10
CIRCUIT CURREN DRAW (AMPS)		0.666	AMPS	0.444	AMPS	
MAX. WIRE LENGTH		500	FT.	500	FT.	
% VOLTAGE DROP		5.12	%	3.42	%	
WIRE SIZE (CIRC. MILLS) # AWG		12	6530	12	6530	

	CIRCUIT LOCATION	BLDG. G		BLDG. E		BLDG. E		
		CIRCUIT	PANEL	CIRCUIT	PANEL	CIRCUIT	PANEL	
MANUFACTURER - SYSTEM SENSOR		V1	RPS-G1	V1	RPS-G1	V2	RPS-G1	
		QTY	CURR.	QTY	CURR.	QTY	CURR.	
Ceiling Strobes-SCRL	Draw (Amps)							QTY
30cd - 30X30	0.063		0.000		0.000		0.000	0
75cd - 44X44	0.111	6	0.666	6	0.666	5	0.555	17
CIRCUIT CURREN DRAW (AMPS)		0.666	AMPS	0.666	AMPS	0.555	AMPS	
MAX. WIRE LENGTH		500	FT.	500	FT.	500	FT.	
% VOLTAGE DROP		5.12	%	5.12	%	4.27	%	
WIRE SIZE (CIRC. MILLS) # AWG		12	6530	12	6530	12	6530	

STAMPS

AGENCY APPROVAL
File No.: ########-########

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
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DATE: 04/09/2024

FBA Engineering
Consulting Electrical Engineers
150 Paularino Avenue Suite A120
Costa Mesa, CA 92626
949.852.9444 / 949.852.1657 (fax)
fbaengr.com
FBA Job Number: 874.1097

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

* 120VAC POWER FOR PANELS SHALL HAVE THE FOLLOWING:

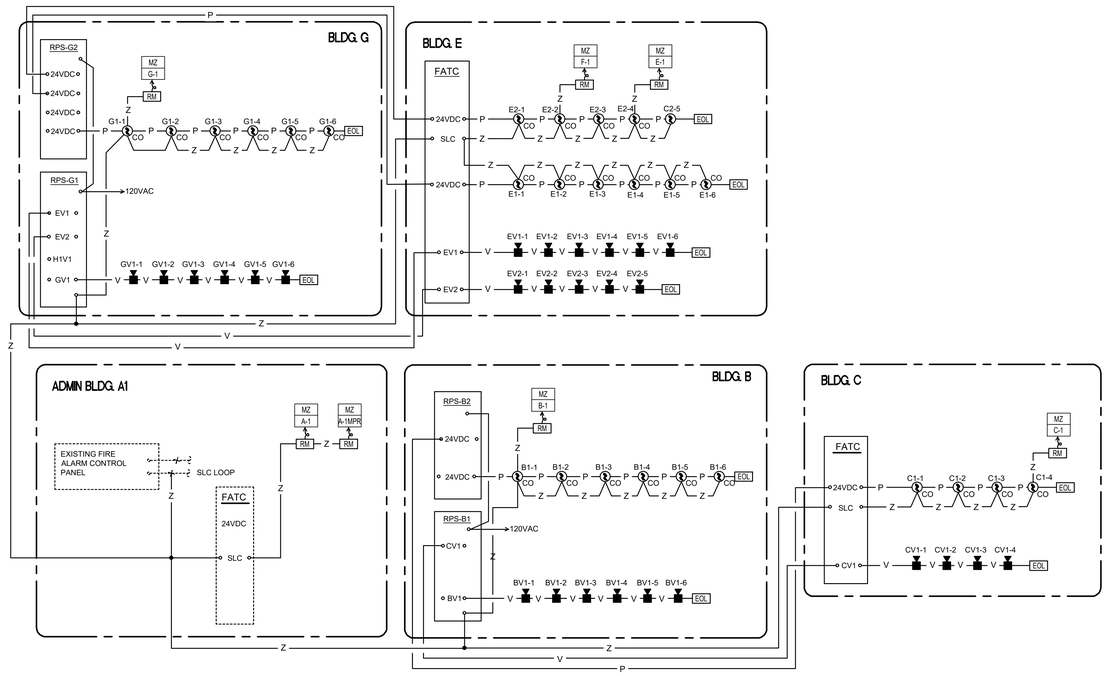
1. 120VAC SHALL BE A DEDICATED CIRCUIT
2. MECHANICALLY PROTECTED WITH LOCK-OUT TYPE DEVICE.
3. IDENTIFIED AS "FIRE ALARM CIRCUIT" MARKED IN RED.
4. ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL.
5. LOCATION OF CIRCUIT BREAKER PERMANENTLY IDENTIFIED AT FIRE ALARM CONTROL UNIT.

FIRE ALARM RACEWAY SCHEDULE

WIRETAG	CONDUCTORS/CABLE	MINIMUM CONDUIT SIZE
B	2#14 THHN SOLID (MISC.)	3/4"C.
P	2#14 THHN SOLID (24VDC)	3/4"C.
V	2#12 THHN SOLID (STROBE CKT.)	3/4"C.
Z	2#16 TP SOLID-FPL-(SLC CKT.)	3/4"C.

NOTE:
1. ALL UNDERGROUND CABLING / WIRE SHALL BE TYPE THWN OR AQUASEAL TYPE APPROVED FOR WET LOCATION. MINIMUM CONDUIT SIZE FOR ALL UNDERGROUND CONDUITS SHALL BE 2" UNLESS OTHERWISE NOTED ON PLANS.
2. ALL FIRE ALARM CABLING SHALL BE INSTALLED IN RED CONDUIT.

TP = TWISTED PAIR
TPNS = TWISTED UNSHEILDED PAIR
TSP = TWISTED SHEILDED PAIR



CARBON MONOXIDE SYSTEM RISER DIAGRAM | SCALE: NONE | 1

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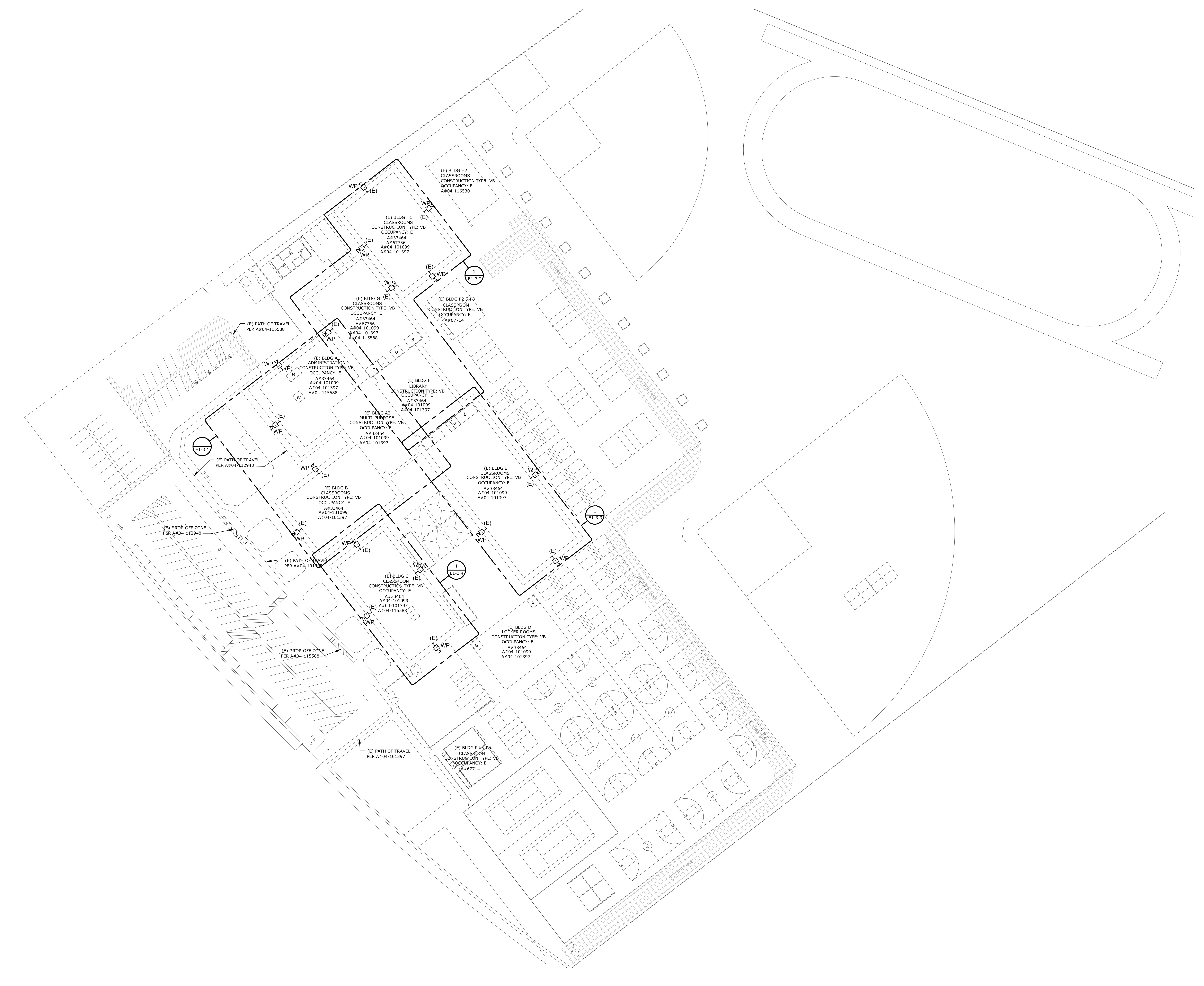
fbaengr.com
FBA Job Number: 874.1097

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

PLAN NOTES



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OVERALL SITE ELECTRICAL PLAN | SCALE: 1"=40'-0" | 1

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

DRAWN BY: CHECKED BY:
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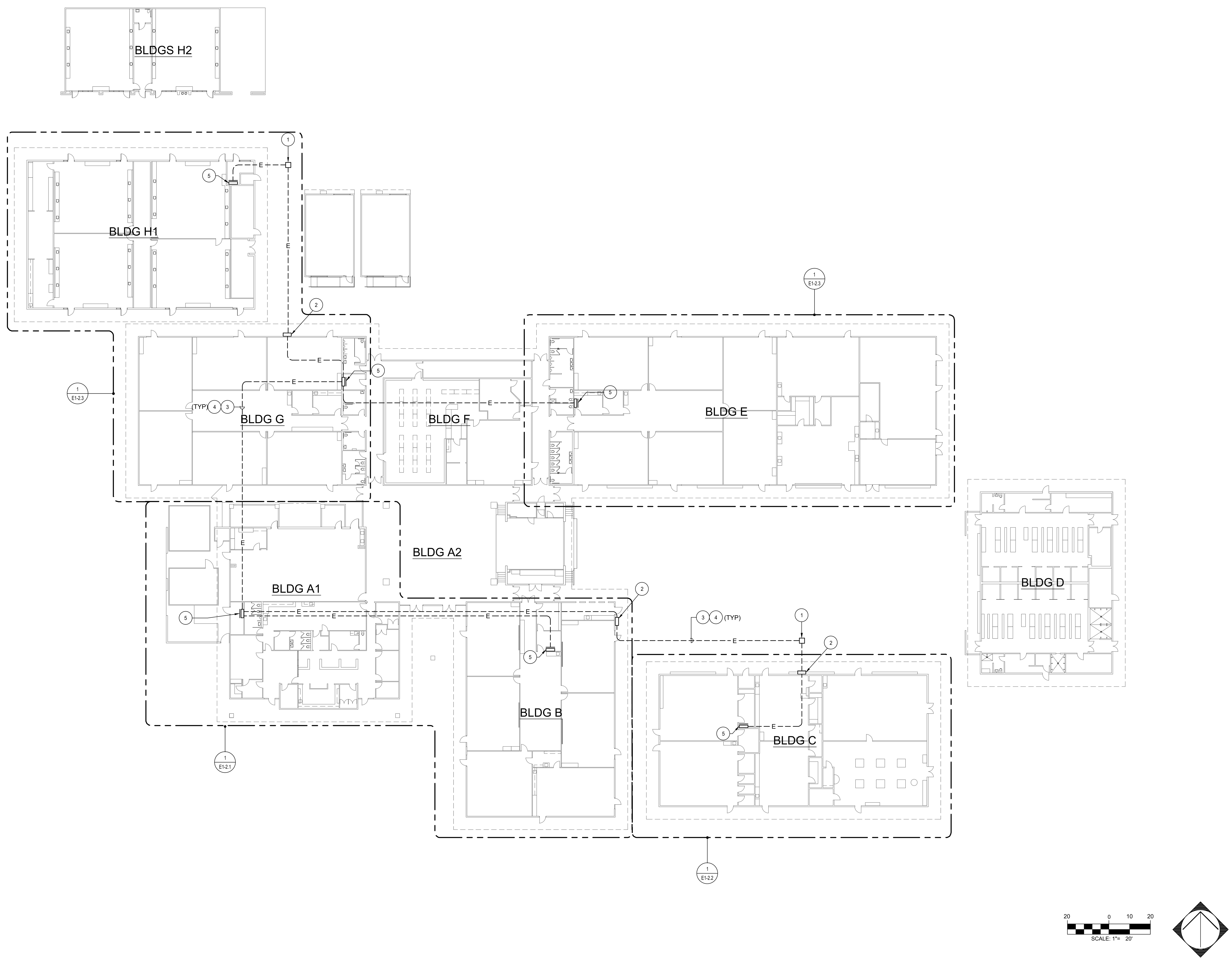
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

OVERALL SITE ELECTRICAL PLAN

ES-1.0

1-34-38

FBA Engineering / Plot Date: 3/4/2024 4:28 PM / Plotted by: Josue Saldana / Drawing Location: I:\8741\1097\ES-1.0_OVERALL SITE ELECTRICAL PLAN.dwg



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STAMPS

FBA Engineering

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

PLAN NOTES

1. EXISTING FLUSH IN GRADE PULLBOX TO REMAIN AND BE UTILIZED FOR EXTEND NEW FIRE ALARM CO SYSTEM CONTROL WIRING AS REQUIRED TO SERVE THE NEW CONSTRUCTION.
2. EXISTING WALL MOUNTED WEATHERPROOF FIRE ALARM SYSTEM PULLBOX TO REMAIN AND BE UTILIZED FOR EXTEND NEW FIRE ALAM CO SYSTEM CONTROL WIRING AS REQUIRED TO SERVE THE NEW CONSTRUCTION.
3. EXISTING FIRE ALARM SYSTEM CONDUIT WITH WIRING. PROVIDE NEW FIRE ALARM CO SYSTEM CONTROL WIRING ND EXTEND AS INDICATED.
4. WHERE NEW CONDUCTORS ARE BEING PROVIDED IN EXISTING CONDUITS THAT CONTAIN EXISTING CONDUCTORS, THE CONTRACTOR SHALL DISCONNECT AND REMOVE ENOUGH OF THE EXISTING CONDUCTORS IN ORDER TO INSTALL NEW CONDUCTORS AS INDICATED PLUS REPLACEMENT CONDUCTORS FOR THE CONDUCTORS THAT WERE REMOVED.
5. EXISTING FIRE ALARM SYSTEM TERMINAL CABINET SHALL BE UTILIZED FOR ROUTING AND EXTENDING NEW FIRE ALARM SYSTEM CO CONTROL WIRING AS INDICATED TO SERVE THE NEW CONSTRUCTION.

ENLARGED SITE ELECTRICAL PLAN | SCALE: 1"=20'-0" | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

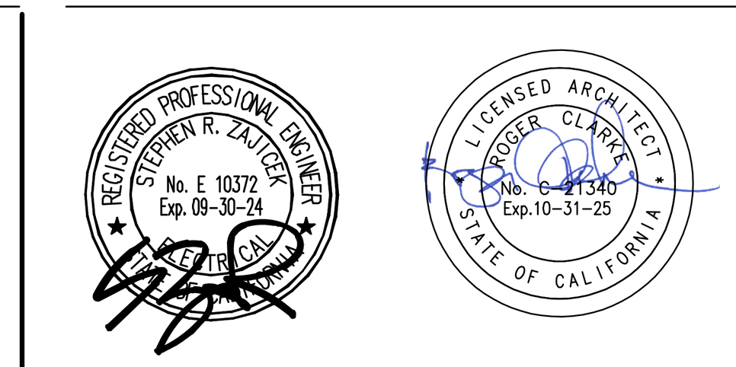
ENLARGED SITE ELECTRICAL PLAN

ES-1.1

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:28 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\ES-1.1_ENLARGED SITE ELECTRICAL PLAN.dwg



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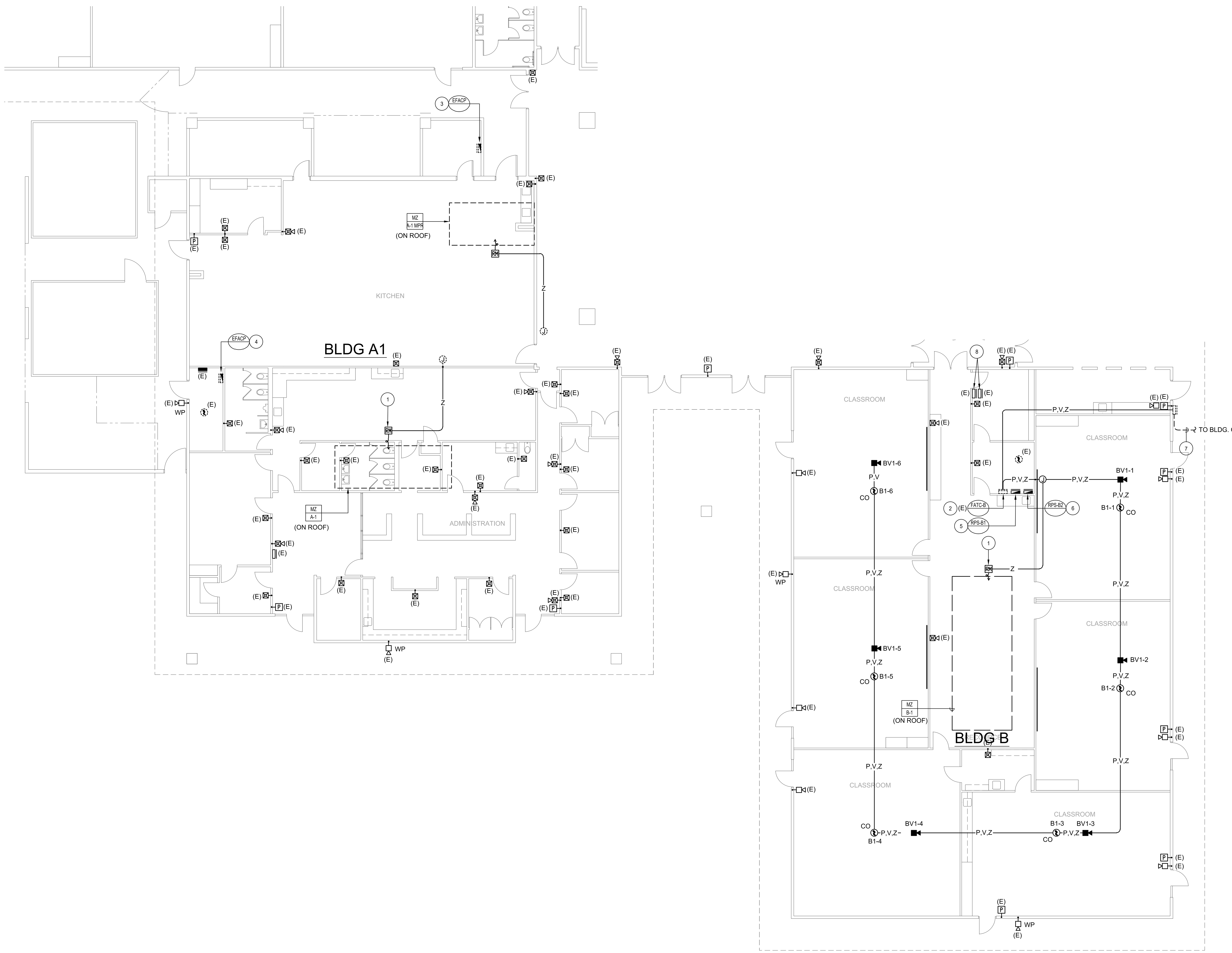


PLAN NOTES

1. PROVIDE AND INSTALL NEW FIRE ALARM ADDRESSABLE RELAY MODULE WITH PAM RELAY AND CONNECT TO HVAC UNIT FOR SHUTDOWN.
2. EXISTING FIRE ALARM TERMINAL CABINET.
3. EXISTING CAMPUS FIRE ALARM CONTROL PANEL (A#04 115588).
4. EXISTING CAMPUS FIRE ALARM CONTROL PANEL (A#04 101099).
5. PROVIDE AND INSTALL NEW FIRE ALARM REMOTE POWER SUPPLY FOR CO VISUAL DEVICE POWER.
6. PROVIDE AND INSTALL NEW FIRE ALARM REMOTE POWER SUPPLY FOR CO SOUNDER BASE CIRCUIT POWER.
7. REFER TO SITE PLAN SHEET ES-1.1 FOR CONTINUATION.
8. EXISTING FIRE ALARM SYSTEM REMOTE POWER SUPPLY AND TERMINAL CABINET TO REMAIN.

GENERAL NOTE:
FOR FIRE STOP PENETRATION THROUGH FIRE RATED WALL, REFER TO DETAIL "5" ON SHEET E-0.3 FOR MORE INFORMATION.

FIRE ALARM RACEWAY SCHEDULE

WIRETAG	CONDUCTORS/CABLE	MINIMUM CONDUIT SIZE
B	2#14 THHN SOLID (MISC)	3/4"C.
P	2#14 THHN SOLID (24VDC)	3/4"C.
V	2#12 THHN SOLID (STROBE CKT.)	3/4"C.
Z	2#16 TP SOLID-FPL-(SLC CKT.)	3/4"C.

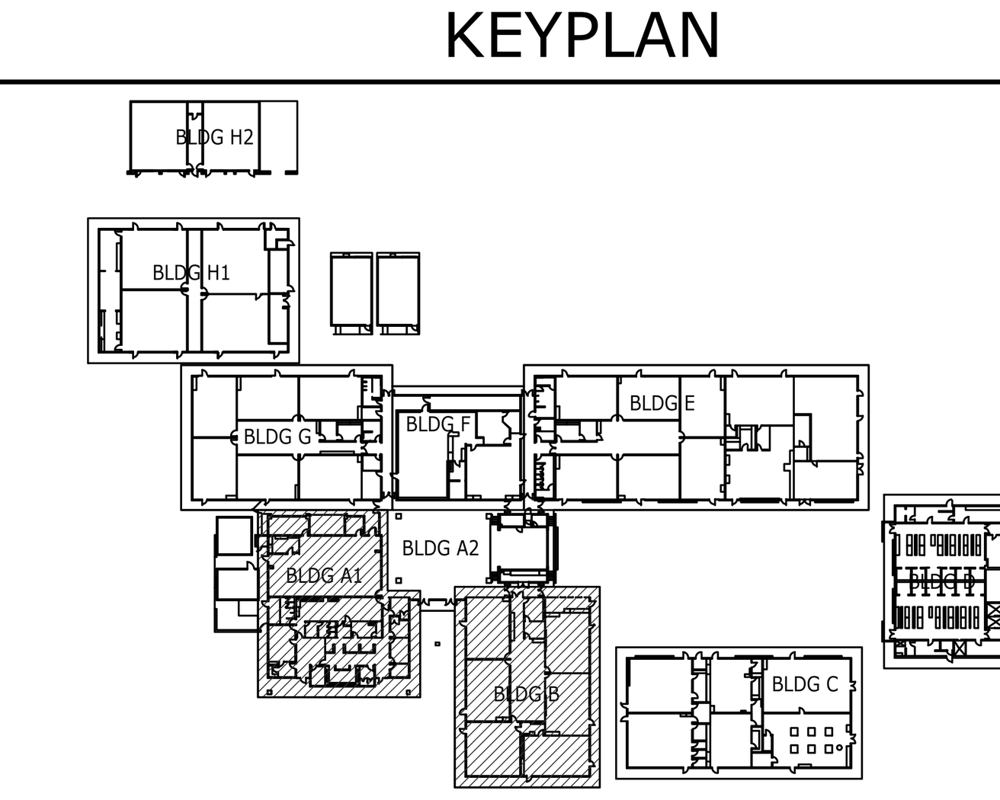
NOTE:
1. ALL UNDERGROUND CABLING / WIRE SHALL BE TYPE THWN OR AQUASEAL TYPE APPROVED FOR WET LOCATION. MINIMUM CONDUIT SIZE FOR ALL UNDERGROUND CONDUITS SHALL BE 2" UNLESS OTHERWISE NOTED ON PLANS.
2. ALL FIRE ALARM CABLING SHALL BE INSTALLED IN RED CONDUIT.

TP = TWISTED PAIR
TPNS = TWISTED UNSHEILDED PAIR
TSP = TWISTED SHEILDED PAIR

DEMOLITION GENERAL NOTES

1. DISCONNECT AND TEMPORARILY REMOVE EXISTING LIGHT FIXTURES, LIGHTING CONTROL SENSORS, AND ASSOCIATED CONDUIT AND CONDUCTORS FROM CEILINGS IN CLASSROOMS RECEIVING NEW HVAC DUCT WORK. PROTECT IN-PLACE THE EXISTING BUILDING BRANCH CIRCUIT CONDUIT AND WIRING ABOVE CEILINGS FOR REUSE. STORE ALL ITEMS REMOVED IN A SECURED LOCATION. AFTER COMPLETION OF NEW HVAC SYSTEMS, REINSTALL AND RECONNECT ALL LIGHTING SYSTEMS TO PROVIDED FOR A COMPLETE AND OPERABLE LIGHTING SYSTEMS.
2. DISCONNECT AND TEMPORARILY REMOVE EXISTING CEILING MOUNTED FIRE ALARM DEVICES, PUBLIC ADDRESS SPEAKERS, INTRUSION DETECTION MOTION SENSORS, WIRELESS ACCESS POINT EQUIPMENT, AND ASSOCIATED CONDUIT AND CONDUCTORS FROM CEILINGS IN CLASSROOMS RECEIVING NEW HVAC DUCT WORK. PROTECT IN-PLACE THE EXISTING SIGNAL SYSTEMS CONDUITS AND CONDUCTORS ABOVE CEILINGS FOR REUSE. STORE ALL ITEM REMOVED IN A SECURED LOCATION. AFTER COMPLETION OF NEW HVAC SYSTSEMS, REINSTALL AND RECONNECT ALL CEILING MOUNTED SIGNAL SYSTEMS DEVICES TO PROVIDE FOR COMPLETE AND OPERABLE SIGNAL SYSTEMS.
3. PROTECT IN-PLACE EXISTING CEILING MOUNTED PROJECTORS, MOUNTING ASSEMBLIES AND ASSOCIATED CONDUIT AND CONDUCTORS.
4. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
5. WHERE THE WORK OF THIS CONTRACT REQUIRES REMOVAL OF CEILINGS TO FACILITATE DEMOLITION AND REWORK, THE CONTRACTOR SHALL LIMIT CEILING REMOVED AND REPLACE TO MAXIMUM 10% OF EXISTING ROOM SIZE. REMOVAL OF GRID SECTIONS SHALL BE LIMITED TO CROSS RUNNERS ONLY. MAIN RUNNERS TO REMAIN IN PLACE. REPLACE ALL DAMAGED CEILING TILES TO MATCH EXISTING.

KEYPLAN



FIRE ALARM PLANS - BLDGS A1 AND B | SCALE: 1/8"=1'-0" | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

FIRE ALARM PLANS - BLDGS A1 AND B

E1-2.1

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:27 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-2.1_FIRE ALARM PLANS - BLDGS A1 AND B.dwg

AGENCY APPROVAL
File No: ######A###-#######

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
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DATE: 04/09/2024

REGISTERED PROFESSIONAL ENGINEER – STEPHEN R. ZAJICEK – No. E 10372 – Exp. 09-30-24 – ELECTRICAL – STATE OF CALIFORNIA

LICENSED ARCHITECT – ROGER CLARKE – No. C-21340 – Exp. 10-31-25 – STATE OF CALIFORNIA

STAMPS

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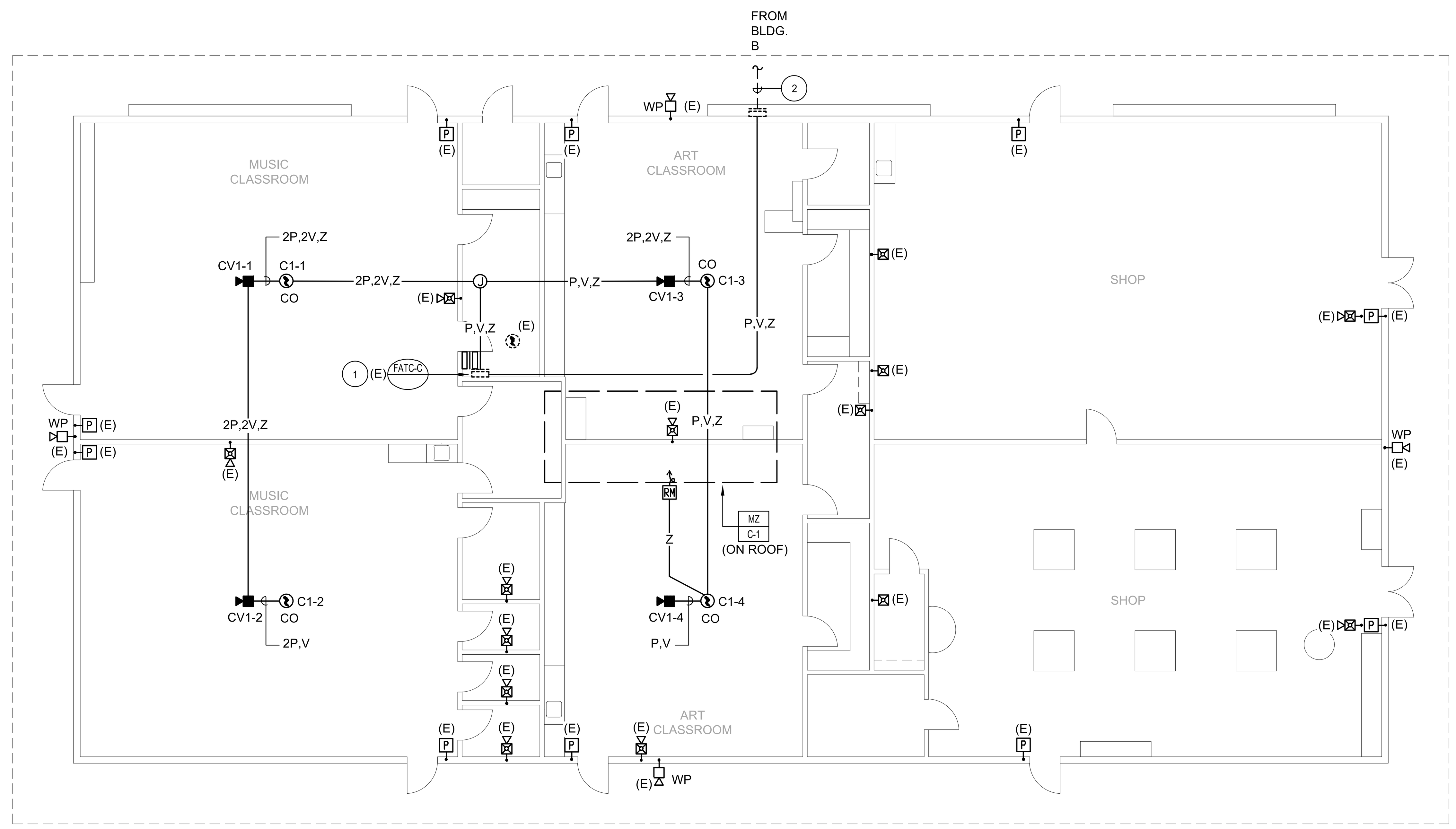
Consulting Electrical Engineers
150 Paularino Avenue Suite A120
Costa Mesa, CA 92626
949.852.9995 ● 949.852.1657 (fax)
fbaengr.com
FBA Job Number: 874.1097

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS



PLAN NOTES

1. EXISTING FIRE ALARM TERMINAL CABINET.
2. REFER TO SITE PLAN SHEET ES-1.1 FOR CONTINUATION.

GENERAL NOTE:
FOR FIRE STOP PENETRATION THROUGH FIRE RATED WALL, REFER TO DETAIL "5" ON SHEET E-0.3 FOR MORE INFORMATION.

FIRE ALARM RACEWAY SCHEDULE

WIRETAG	CONDUCTORS/CABLE	MINIMUM CONDUIT SIZE
B	2#14 THHN SOLID (MISC)	3/4"C.
P	2#14 THHN SOLID (24VDC)	3/4"C.
V	2#12 THHN SOLID (STROBE CKT.)	3/4"C.
Z	2#16 TP SOLID-FPL-(SLC CKT.)	3/4"C.

NOTE:
1. ALL UNDERGROUND CABLING / WIRE SHALL BE TYPE THWN OR AQUASEAL TYPE APPROVED FOR WET LOCATION. MINIMUM CONDUIT SIZE FOR ALL UNDERGROUND CONDUITS SHALL BE 2" UNLESS OTHERWISE NOTED ON PLANS.
2. ALL FIRE ALARM CABLING SHALL BE INSTALLED IN RED CONDUIT.

TP = TWISTED PAIR
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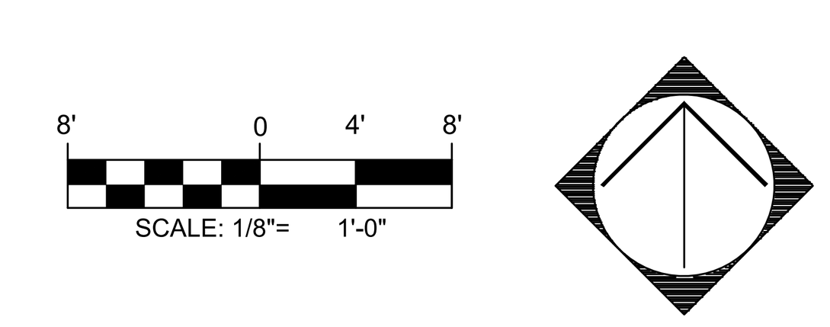
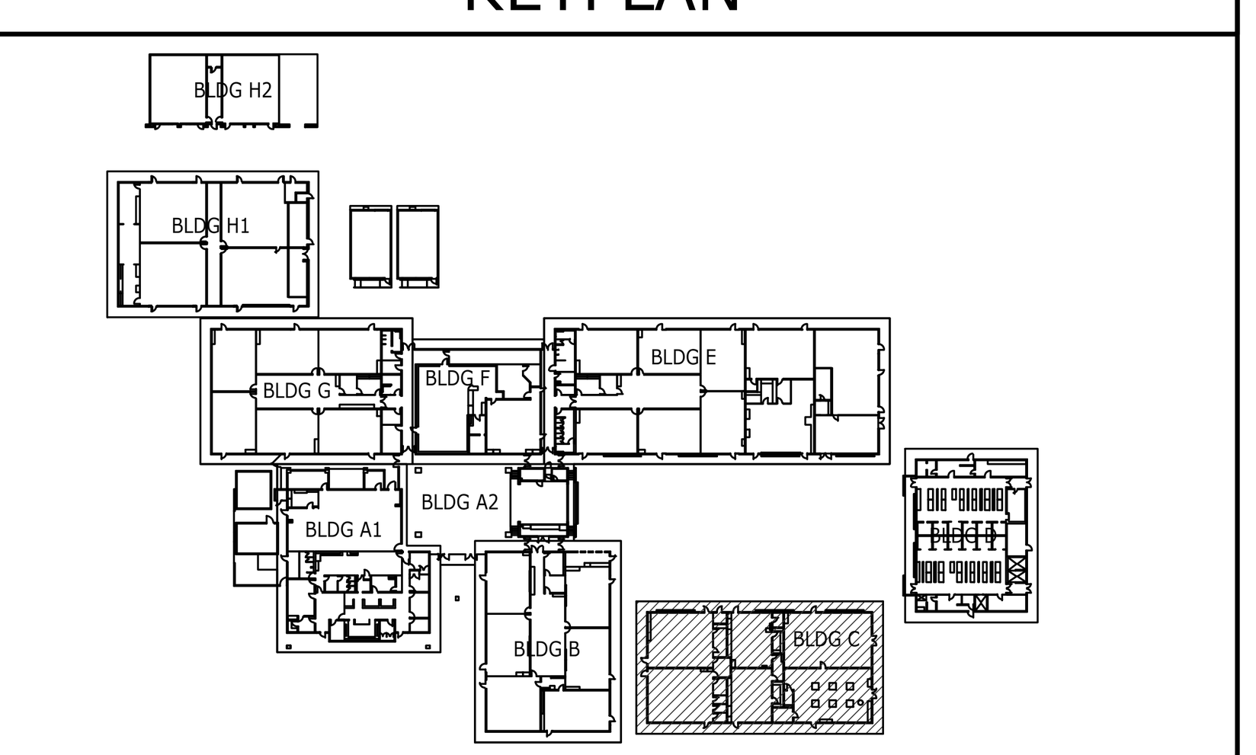
DEMOLITION GENERAL NOTES

1. DISCONNECT AND TEMPORARILY REMOVE EXISTING LIGHT FIXTURES, LIGHTING CONTROL SENSORS, AND ASSOCIATED CONDUIT AND CONDUCTORS FROM CEILINGS IN CLASSROOMS RECEIVING NEW HVAC DUCT WORK. PROTECT IN-PLACE THE EXISTING BUILDING BRANCH CIRCUIT CONDUIT AND WIRING ABOVE CEILINGS FOR REUSE. STORE ALL ITEMS REMOVED IN A SECURED LOCATION. AFTER COMPLETION OF NEW HVAC SYSTEMS, REINSTALL AND RECONNECT ALL LIGHTING SYSTEMS TO PROVIDED FOR A COMPLETE AND OPERABLE LIGHTING SYSTEMS.
2. DISCONNECT AND TEMPORARILY REMOVE EXISTING CEILING MOUNTED FIRE ALARM DEVICES, PUBLIC ADDRESS SPEAKERS, INTRUSION DETECTION MOTION SENSORS, WIRELESS ACCESS POINT EQUIPMENT, AND ASSOCIATED CONDUIT AND CONDUCTORS FROM CEILINGS IN CLASSROOMS RECEIVING NEW HVAC DUCT WORK. PROTECT IN-PLACE THE EXISTING SIGNAL SYSTEMS CONDUITS AND CONDUCTORS ABOVE CEILINGS FOR REUSE. STORE ALL ITEM REMOVED IN A SECURED LOCATION. AFTER COMPLETION OF NEW HVAC SYSTSEMS, REINSTALL AND RECONNECT ALL CEILING MOUNTED SIGNAL SYSTEMS DEVICES TO PROVIDE FOR COMPLETE AND OPERABLE SIGNAL SYSTEMS.
3. PROTECT IN-PLACE EXISTING CEILING MOUNTED PROJECTORS, MOUNTING ASSEMBLIES AND ASSOCIATED CONDUIT AND CONDUCTORS.
4. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
5. WHERE THE WORK OF THIS CONTRACT REQUIRES REMOVAL OF CEILINGS TO FACILITATE DEMOLITION AND REWORK, THE CONTRACTOR SHALL LIMIT CEILING REMOVED AND REPLACE TO MAXIMUM 10% OF EXISTING ROOM SIZE. REMOVAL OF GRID SECTIONS SHALL BE LIMITED TO CROSS RUNNERS ONLY. MAIN RUNNERS TO REMAIN IN PLACE. REPLACE ALL DAMAGED CEILING TILES TO MATCH EXISTING.



KEYPLAN



FIRE ALARM PLANS - BLDG C | SCALE: 1/8"=1'-0" | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

FIRE ALARM PLAN- BLDG C

E1-2.2

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:27 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-2.2_FIRE ALARM PLANS - BLDG C .dwg

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FBA Job Number: 874.1097

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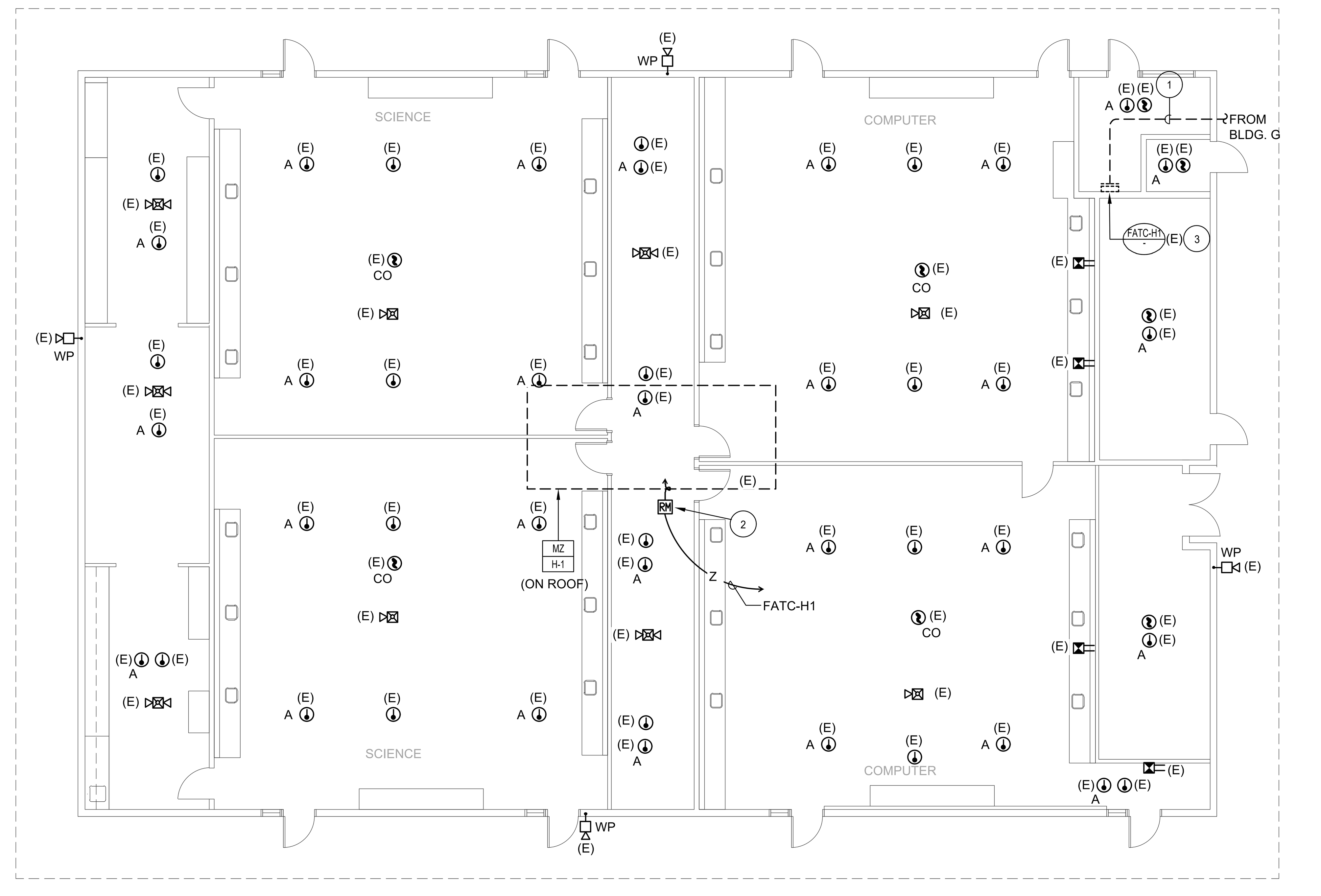
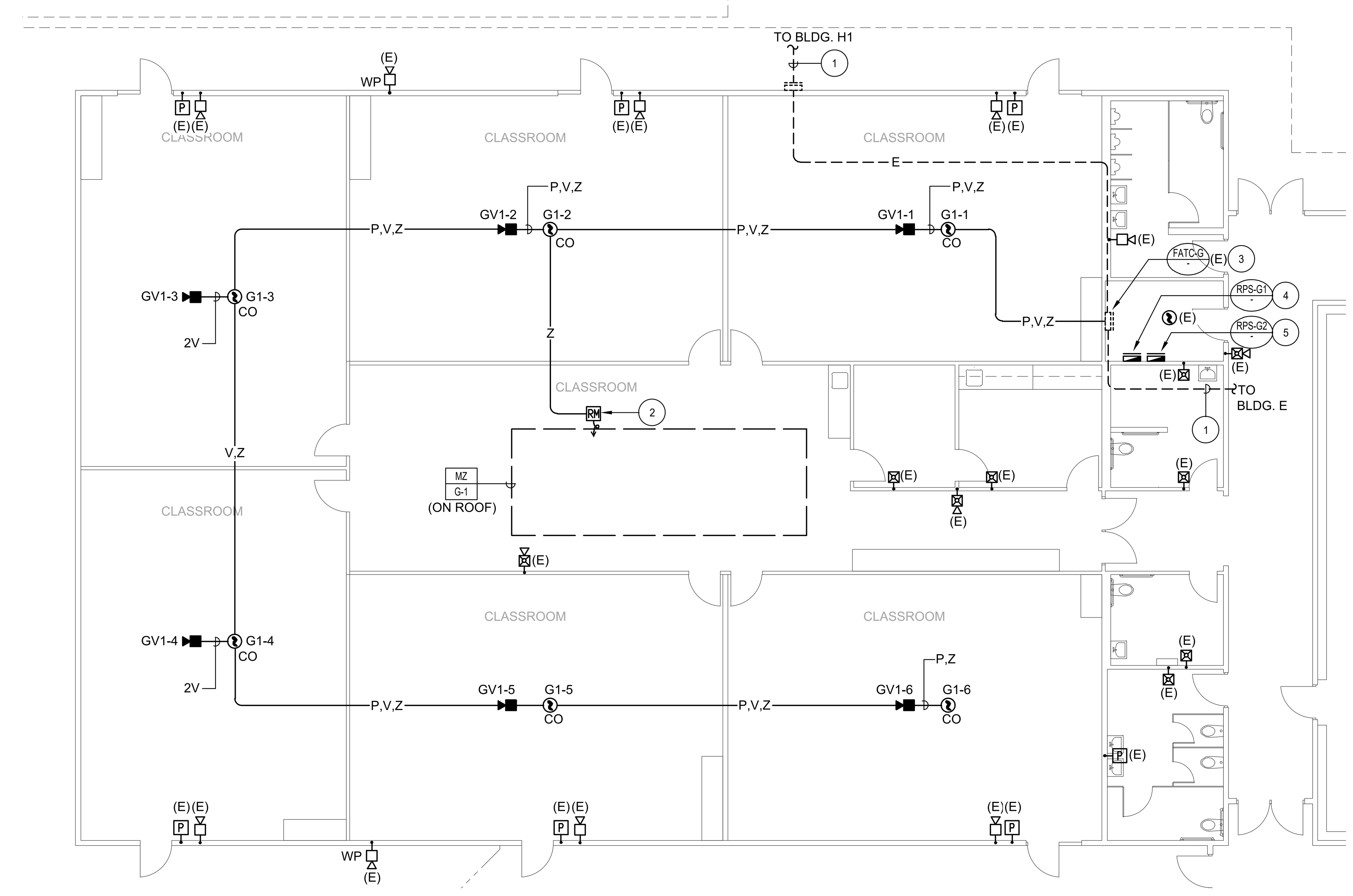


FIRE ALARM PLANS - BLDG H1 | SCALE: 1/8"=1'-0" | 2



FIRE ALARM PLANS - BLDG G | SCALE: 1/8"=1'-0" | 1

PLAN NOTES

1. REFER TO SITE PLAN SHEET ES-1.1 FOR CONTINUATION.
2. PROVIDE AND INSTALL NEW FIRE ALARM ADDRESSABLE RELAY MODULE WITH PAM RELAY AND CONNECT TO HVAC UNIT FOR SHUTDOWN.
3. EXISTING FIRE ALARM TERMINAL CABINET.
4. PROVIDE AND INSTALL NEW FIRE ALARM REMOTE POWER SUPPLY FOR CO VISUAL DEVICE POWER.
5. PROVIDE AND INSTALL NEW FIRE ALARM REMOTE POWER SUPPLY FOR CO SOUNDER BASE CIRCUIT POWER.

GENERAL NOTE:
FOR FIRE STOP PENETRATION THROUGH FIRE RATED WALL, REFER TO DETAIL "5" ON SHEET E-0.3 FOR MORE INFORMATION.

FIRE ALARM RACEWAY SCHEDULE

WIRETAG	CONDUCTORS/CABLE	MINIMUM CONDUIT SIZE
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P	2#14 THHN SOLID (24VDC)	3/4"C.
V	2#12 THHN SOLID (STROBE CKT.)	3/4"C.
Z	2#16 TP SOLID-FPL-(SLC CKT.)	3/4"C.

NOTE:
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DEMOLITION GENERAL NOTES

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3. PROTECT IN-PLACE EXISTING CEILING MOUNTED PROJECTORS, MOUNTING ASSEMBLIES AND ASSOCIATED CONDUIT AND CONDUCTORS.
4. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
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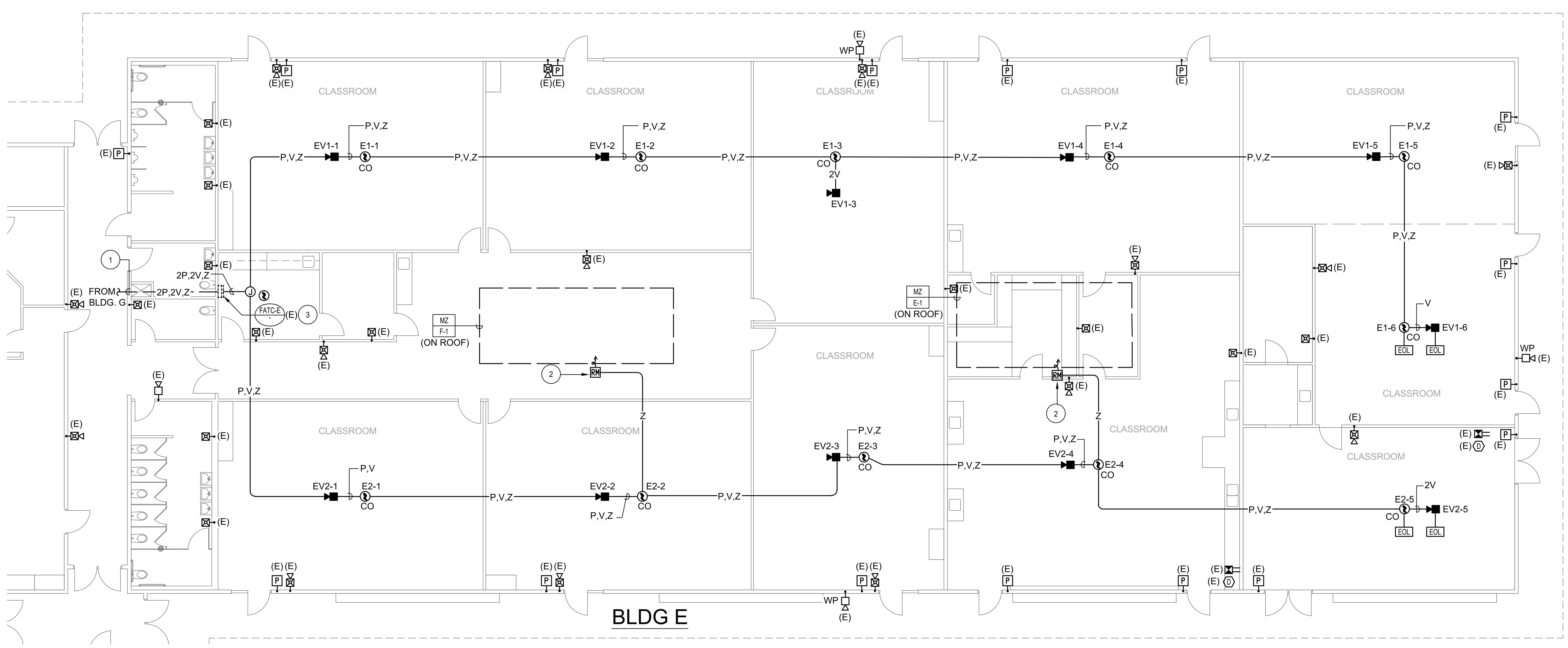
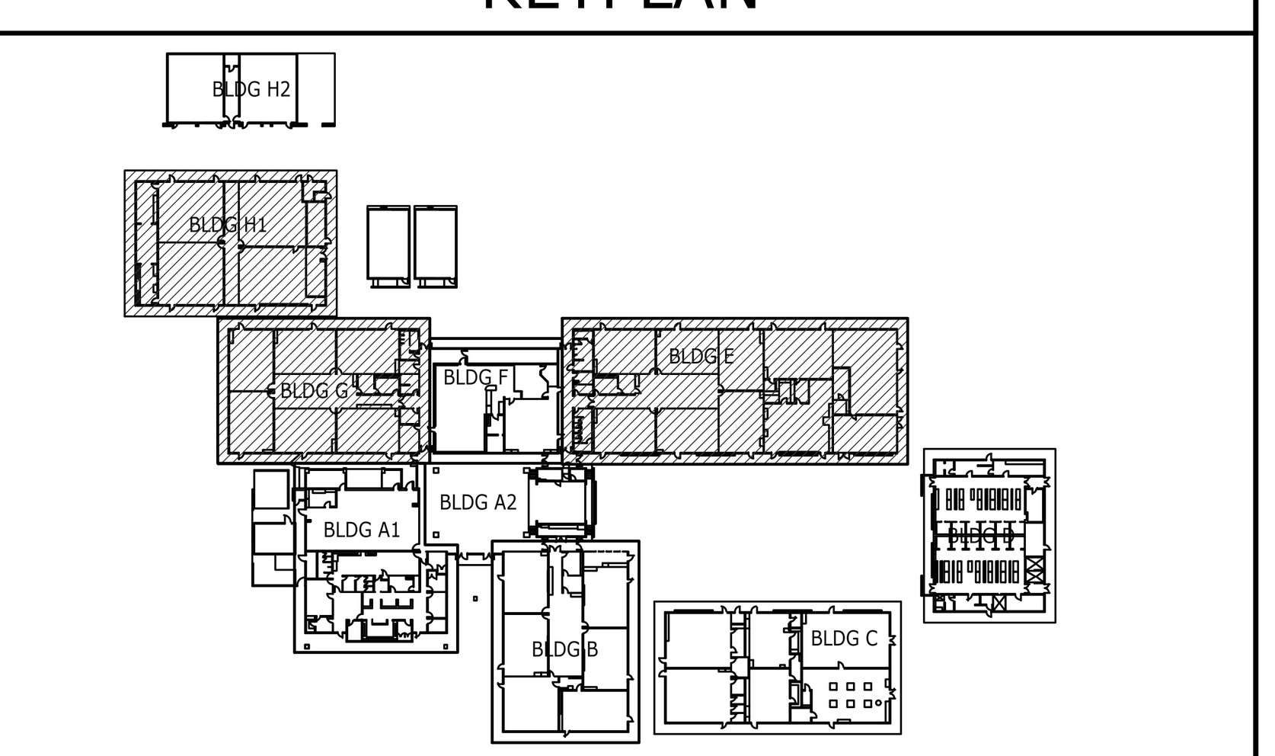


SCALE: 1/8"= 1'-0"

FIRE ALARM PLANS - BLDG E | SCALE: 1/8"=1'-0" | 3

KEYPLAN



RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

PROJECT No. :1-34-38
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RUHNAUCLARKE.COM
3775 TENTH STREET, RIVERSIDE CALIFORNIA 92501 (951) 684 4664 / 5751 PALMER WAY, SUITE C, CARLSBAD CALIFORNIA 92010 (760) 438 5899

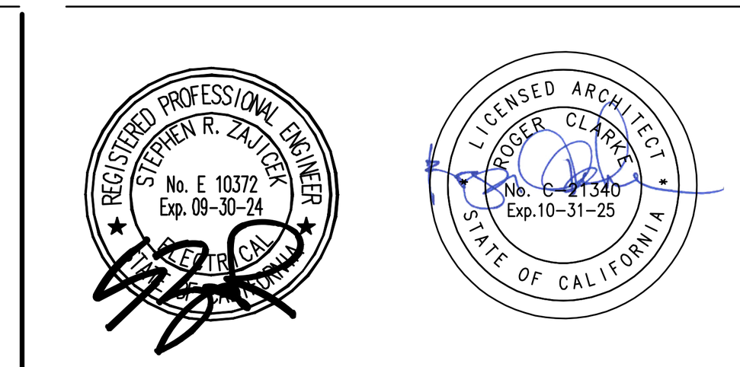
RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

FIRE ALARM PLANS - BLDGS E,G AND H1

E1-2.3

1-34-38

FBA Engineering / Plot Date: 3/4/2024 4:27 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-2.3_FIRE ALARM PLANS - BLDG C .dwg



STAMPS

AGENCY APPROVAL
File No: ######A###-#######

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 04-122954 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

FBA Engineering
Consulting Electrical Engineers
150 Paularino Avenue Suite A120
Costa Mesa, CA 92626
949.852.9995 ● 949.852.1657 (fax)
fbaengr.com
FBA Job Number: 874.1097

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

PLAN NOTES

1. INTERCEPT EXISTING POWER FEEDER CONDUIT WITH CONDUCTORS SERVING EXISTING MULTI-ZONE UNIT BEING REPLACED AND EXTEND WITH MATCHING SIZE NEW CONDUIT AND CONDUCTORS AS INDICATED.
2. CONNECT TO FUSED SAFETY DISCONNECT SWITCH PROVIDED WITH THE MULTI-ZONE UNIT AS PER MANUFACTURER REQUIREMENTS.
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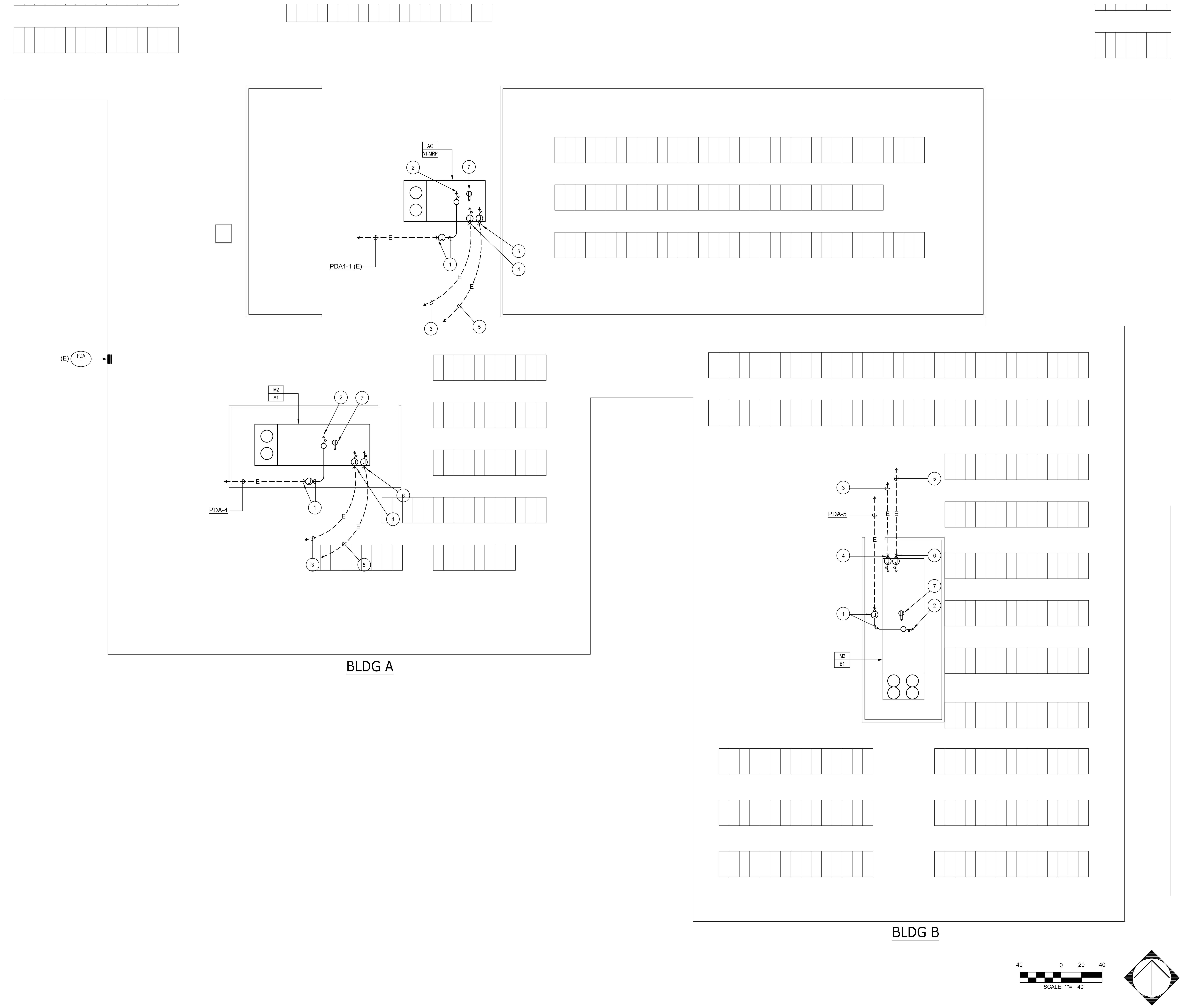

ROOF ELECTRICAL PLAN - BUILDING A1,A2 & B | SCALE: 1"=40'-0" | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

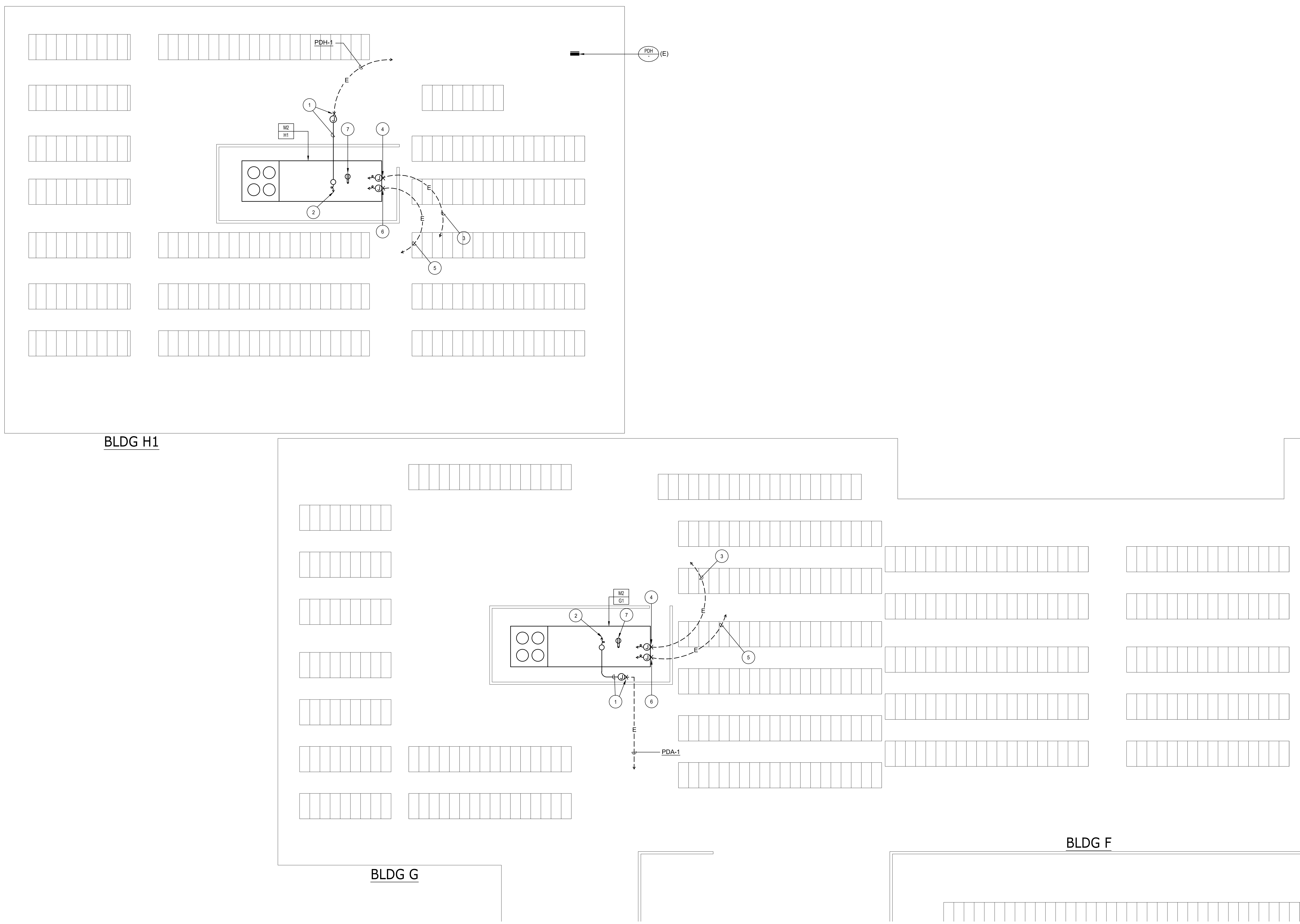
ROOF ELECTRICAL PLAN
BUILDING A1,A2 & B

E1-3.1

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:27 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-3.1_ROOF ELECTRICAL PLAN - BUILDING A1,A2 & B.dwg



ROOF ELECTRICAL PLAN - BUILDING H1,G & F | SCALE: 1"=40'-0" | 1

PLAN NOTES

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STAMPS

STEPHEN R. ZAJICEK — REGISTERED PROFESSIONAL ENGINEER — No. E 10372 — Exp. 09-30-24 — ELECTRICAL — STATE OF CALIFORNIA

ROGER CLARKE — LICENSED ARCHITECT — No. C-21340 — Exp.10-31-25 — STATE OF CALIFORNIA

AGENCY APPROVAL
File No: ######A###-#######

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FBA Engineering

CONSULTANT BRANDING

RUHNAU CLARKE ARCHITECTS

PROJECT No. :1-34-38
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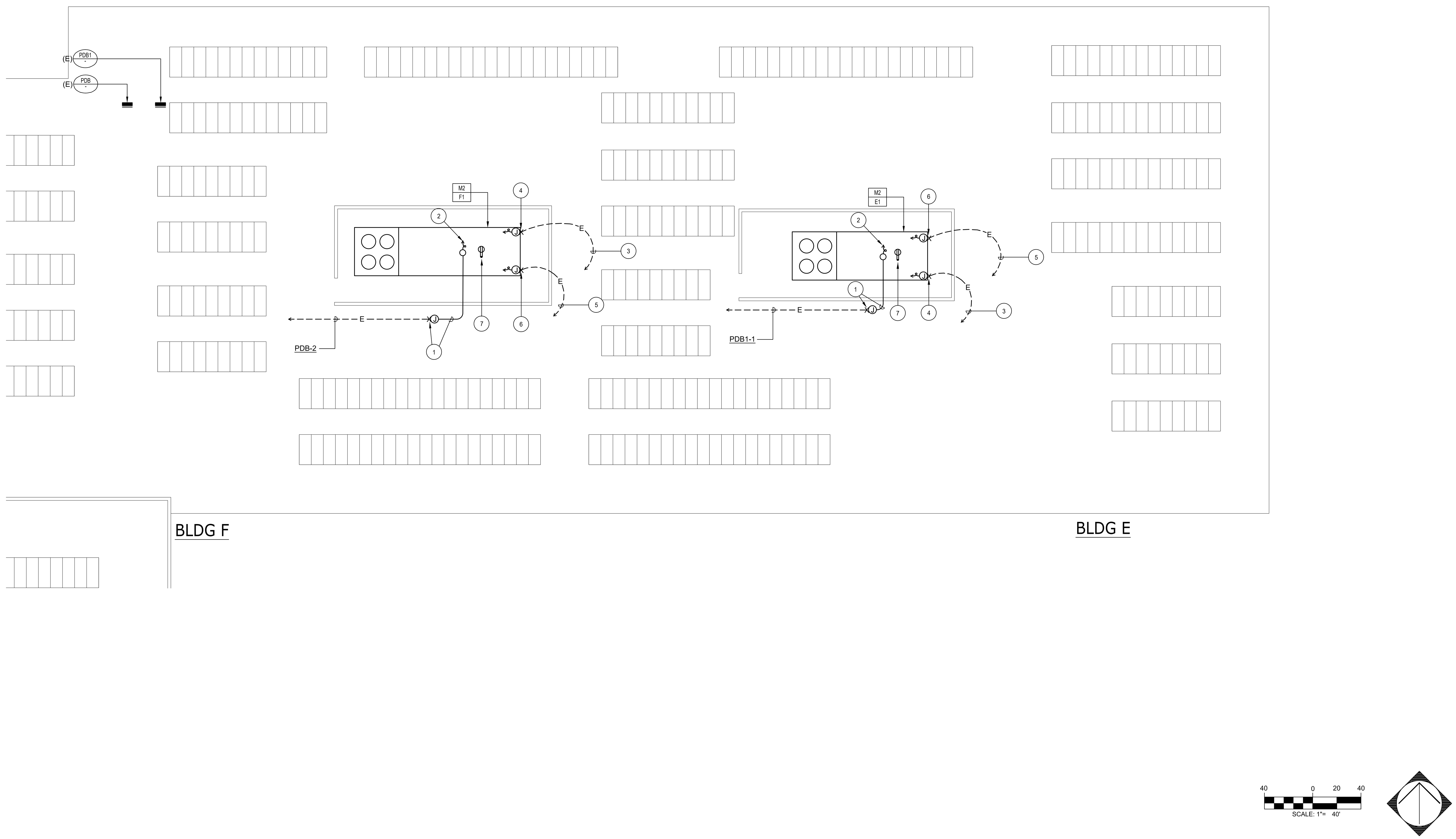
IRVINE UNIFIED SCHOOL DISTRICT

ROOF ELECTRICAL PLAN
BUILDING H1, G & F

E1-3.2

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:27 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-3.2_ROOF ELECTRICAL PLAN - BUILDING H1,G & F.dwg



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STAMPS

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ROOF ELECTRICAL PLAN - BUILDING E | SCALE: 1"=40'-0" | 1

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

STAMPS

REGISTERED PROFESSIONAL ENGINEER STEPHEN R. ZAJICEK No. E 10372 Exp. 09-30-24 ELECTRICAL STATE OF CALIFORNIA

LICENSED ARCHITECT ROGER CLARKE No. C-21340 Exp. 10-31-25 STATE OF CALIFORNIA

AGENCY APPROVAL
File No: ######A###-#######

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APP: 04-122954 INC:
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SS ☑ FLS ☑ ACS ☐
DATE: 04/09/2024

CONSULTANT BRANDING

FBA Engineering
Consulting Electrical Engineers
150 Paularino Avenue Suite A120
Costa Mesa, CA 92626
949.852.9995 ● 949.852.1657 (fax)
fbaengr.com
FBA Job Number: 874.1097

RUHNAU CLARKE ARCHITECTS

PLAN NOTES

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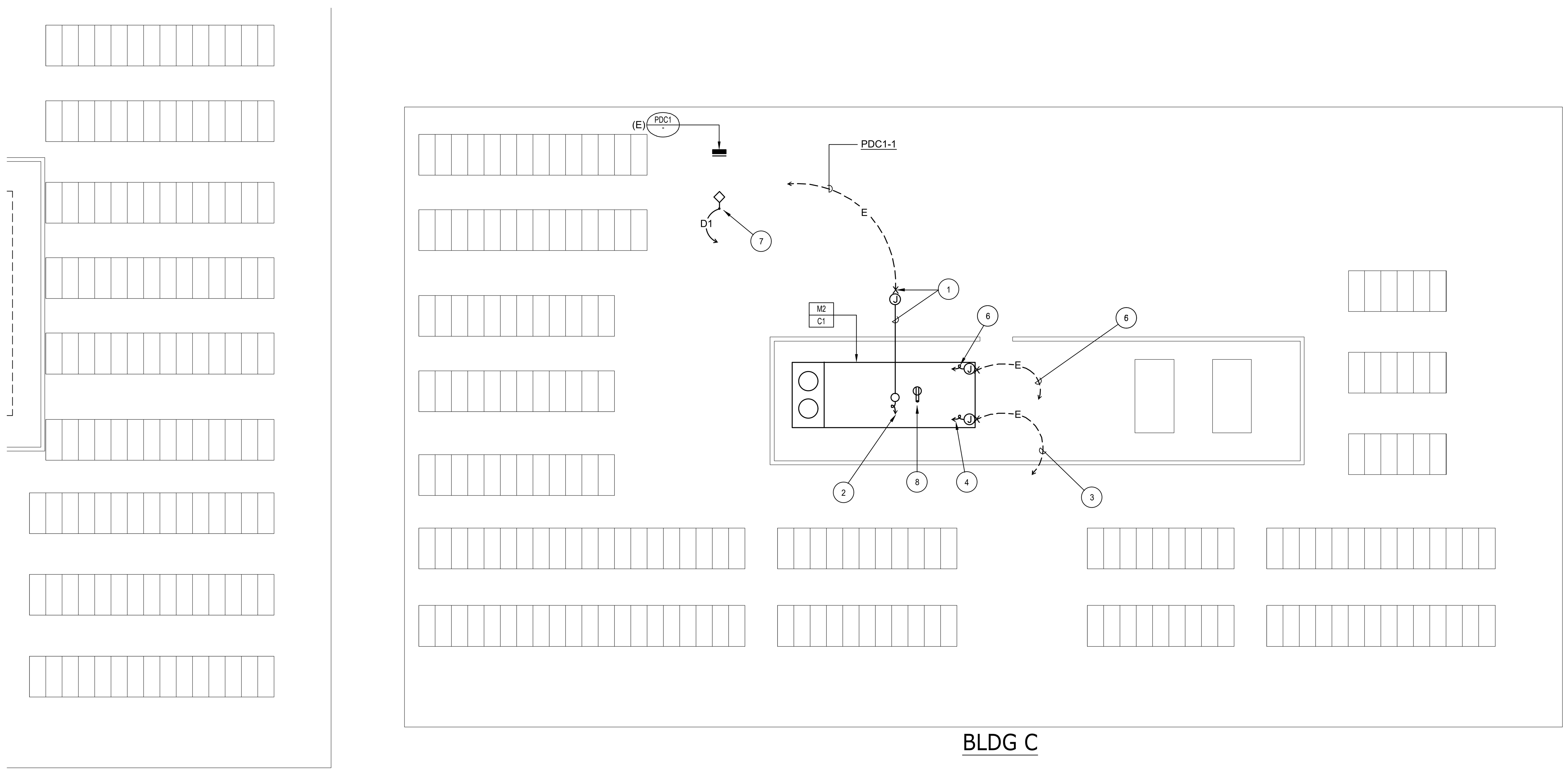
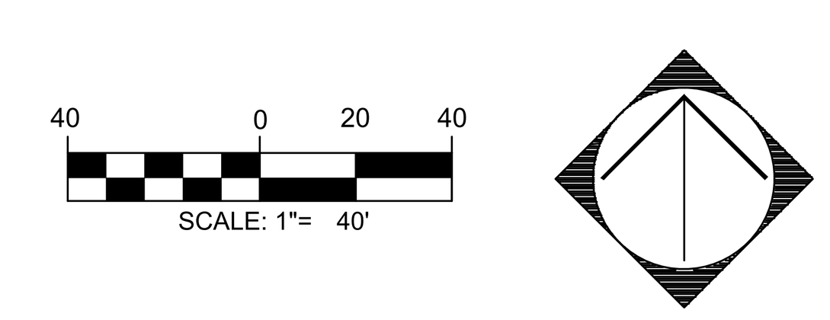
7. PROVIDE CAT 6 DATA CABLE WITH CONNECTOR FOR ENERGY MANAGEMENT CONTROL NETWORK ROUTER CONNECTION. EXTEND CAT 6 CABLE TO BUILDING IDF FOR TERMINATION. VERIFY THE EXACT LOCATION OF ROUTER PRIOR TO ROUGH-IN
8. A DUPLEX RECEPTACLE OUTLET IS BEING PROVIDED AS AN INTEGRAL PART OF THE NEW MULTI-ZONE HVAC UNIT SERVICING OF THE EQUIPMENT AND CONNECTED BY THE MANUFACTURER FOR 120V POWER OF THE OUTLET.



BLDG C



ROOF ELECTRICAL PLAN - BUILDING C | SCALE: 1"=40'-0" | 1

PROJECT No. :1-34-38
11/6/2023 10:02:43 AM

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RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT
RANCHO SAN JOAQUIN MIDDLE SCHOOL
4861 MICHELSON DR, IRVINE, CA 92612
IRVINE UNIFIED SCHOOL DISTRICT

ROOF ELECTRICAL PLAN
BUILDING C

E1-3.4

1-34-38

RANCHO SAN JOAQUIN MS: HVAC REPLACEMENT:

FBA Engineering / Plot Date: 3/4/2024 4:28 PM / Plotted by: Josue Saldana / Drawing Location: I:\874\1097\E1-3.4_ROOF ELECTRICAL PLAN - BUILDING C.dwg

RUHNAU CLARKE ARCHITECTS

April 15, 2024

ADDENDUM NO. 01

TO THE CONTRACT DOCUMENTS

FOR

RANCHO SAN JOAQUIN MS – HVAC REPLACEMENT

FOR THE
IRVINE UNIFIED SCHOOL DISTRICT
5050 BARRANCA PKWY
IRVINE, CA 92604

DSA #04-122954 FILE #30-48 RCA Project No. 1-34-38

NOTICE TO BIDDERS
This Addendum forms a part of the Contract and modifies the original bid documents issued on March 24, 2024. It is intended that all work affected by the following modifications shall conform with related provisions and general conditions of the contract of the original drawings and specifications. Modify the following items wherever appearing in any drawing or sections of the specifications. Acknowledge receipt of Addendum No. 01 in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

CHANGES TO THE SPECIFICATIONS –

Item No. 1.1 Reference Project Manual:

1.1 Replace Project Manual in its entirety per attached DSA approved Project Manual. The following sections were revised as part of the DSA approved specifications:

a. 01 41 00 – Regulatory Requirements: Code References changed to 2022 Code.
b. 01 45 33 – Code-Required Special Instructions: Code References changed to 2022 Code.
c. 26 01 00 – Electrical General Provisions: Code References changed to 2022 Code.

CHANGES TO THE DRAWINGS –

Item No. 1.2 Reference the Bid Set Drawings:

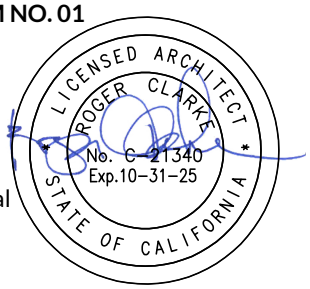
1.2.1 Replace existing Bid Set Drawings in their entirety per attached DSA Approved Drawings. Changes include but are not limited to the following:

a. Sheet M0-0.2: Added Multizone & Custom AC Units Dimension Comparison Chart per DSA request.

Specification: **DSA Approved Project Manual**

Sheets: **G-1, AS-2.0, A1-3.0, A1-3.1, A1-3.2, A1-3.3, M0-0.1, M0-0.2, M1-1.0, M1-1.1, M1-1.2, M1-2.0, M1-3.0, M1-3.1, M1-3.2, M1-3.3, M2-1.0, M2-1.1, M2-1.2, M2-1.3, MT-0.1, MT-0.2, MT-0.3, E0.1, E0.2, E0.3, E0.4, E0.5, ES-1.0, ES-1.1, E1-2.1, E1-2.2, E1-2.3, E1-3.1, E1-3.2, E1-3.3, E1-3.4**

END OF ADDENDUM NO. 01



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Roger Clarke, Principal

C-21340