

# FRESNO COUNTY SHERIFF AREA 2 SUBSTATION

1129 N. Armstrong Avenue  
Fresno, CA 93727

Contract # 19-S-04

**The County of Fresno**  
**Department of Public Works and Planning**  
2220 Tulare St., 8<sup>th</sup> Floor  
Fresno, California 93721

## PROJECT MANUAL

Pre-bid Conference: Wednesday, June 10, 2020, 10:00 a.m.

Bid Date: Thursday, June 25, 2020, 2:00 p.m.

Budget / Account – (0400 / 10053 / 8853 / 8150 / 91285)



*Development Services & Capital Projects Division*

---

*Department of Public Works & Planning*

CONTRACT # 19-S-04

This page is intentionally left blank.


**FRESNO COUNTY SHERIFF AREA 2 SUBSTATION**

Contract # 19-S-04

Buddy Mendes, Chairman  
Steve Brandau, Vice Chairman  
Brian Pacheco  
Sal Quintero  
Nathan Magsig

4<sup>th</sup> District  
2<sup>nd</sup> District  
1<sup>st</sup> District  
3<sup>rd</sup> District  
5<sup>th</sup> District

Jean M. Rousseau, County Administrative Officer

  
\_\_\_\_\_  
Steven White, Director  
Department of Public Works and Planning



05/26/2020  
Date Signed

**Architect of Record:** \_\_\_\_\_  
Office: (559) 600-4477  
[ndavidson@fresnocountyca.gov](mailto:ndavidson@fresnocountyca.gov)

Noel Roger Davidson II, #C27818  
License Renewal 10/31/21

**Fresno County Department of Public Works and Planning  
Development Services & Capital Projects Division**  
2220 Tulare Street, 8<sup>th</sup> Floor  
Fresno, CA 93721-2104



5-26-2020  
Date Signed

**Structural Engineer:**  
Office: (559) 323-1023  
[bparrish@ppeng.com](mailto:bparrish@ppeng.com)

Robert S. Parrish, #S2331  
License Renewal 03/31/21

**Parrish Hansen Structural Engineers**  
**A Division of Provost & Pritchard Consulting Group**  
418 Clovis Ave.  
Clovis, CA 93612



5/28/2020  
Date Signed

**Civil Engineer:**  
Office: (559) 264-3590  
[Bret@giannettaengineering.com](mailto:Bret@giannettaengineering.com)

Bret Giannetta, #56567  
License Renewal 06/30/21

**Gary G. Giannetta**  
**Civil Engineering & Land Surveying**  
1119 S Street  
Fresno, CA 93721



05-28-2020  
Date Signed

**Plumbing and Mechanical Engineer:**  
Office: (559) 431-0101  
[mike@legfresno.com](mailto:mike@legfresno.com)

Mike Cantelmi, #M23588  
License Renewal 09/30/21

**Lawrence Engineering Group**  
7084 N. Maple Ave., Ste. 101  
Fresno, CA 93720

FRESNO COUNTY SHERIFF AREA 2 SUBSTATION  
FRESNO, CA.

SEALS PAGE  
SECTION 000107 - 3



05/26/2020

Date Signed

**Electrical Engineer:**

Office: (559) 323-4995  
[sd@hardin-davidson.com](mailto:sd@hardin-davidson.com)

C. Scott Davidson, #E17850  
License Renewal 06/30/22

**Hardin-Davidson Engineering**

356 Pollasky Ave., Ste. 200  
Clovis, CA 93612

This page is intentionally left blank.

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 000100	COVER PAGE	1
SECTION 000107	SEALS PAGE	3
SECTION 000110	TABLE OF CONTENTS	5
SECTION 000300	CONSTRUCTION DRAWING SHEET INDEX	4
SECTION 001113	NOTICE TO BIDDERS	4
SECTION 002113	INSTRUCTION TO BIDDERS	6
SECTION 002213	BIDDERS CHECKLIST	2
SECTION 004213	PROPOSAL	2
SECTION 004323	BID SECURITY FORM	1
SECTION 004336	SUBCONTRACTOR LIST	7
SECTION 004519	NON-COLLUSION DECLARATION	1
SECTION 005213	AGREEMENT	6
	EXHIBIT A - SELF DEALING TRANSACTION DISCLOSURE FORM	2
SECTION 006319	CONTRACTOR REQUEST FOR CLARIFICATION	1
SECTION 006536	GUARANTY	1
SECTION 007200	GENERAL CONDITIONS	61

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 015213	TEMPORARY FACILITIES	3
----------------	----------------------	---

DIVISION 02 – EXISTING CONDITIONS

SECTION 024119	SELECTIVE DEMOLITION	4
----------------	----------------------	---

DIVISION 03 – CONCRETE

SECTION 031000	CONCRETE FORMWORK	4
SECTION 032000	CONCRETE REINFORCEMENT	3
SECTION 033000	CAST-IN-PLACE CONCRETE	8
SECTION 033053	MISCELLANEOUS CAST-IN-PLACE CONCRETE	8
SECTION 033900	CONCRETE CURING	2

DIVISION 04 – MASONRY

SECTION 042200	CONCRETE UNIT MASONRY	13
SECTION 047300	MANUFACTURED MASONRY VENEER	5

DIVISION 05 – METALS

SECTION 051200	STRUCTURAL STEEL FRAMING	9
SECTION 054000	COLD-FORMED METAL FRAMING	4
SECTION 055000	METAL FABRICATIONS	4
SECTION 055150	METAL ROOF ACCESS LADDER	5
SECTION 057500	DECORATIVE FORMED METAL	8

DIVISION 06 – WOOD AND PLASTICS

SECTION 061053	MISCELLANEOUS ROUGH CARPENTRY	3
SECTION 064116	PLASTIC-LAMINATE FACED ARCHITECTURAL CABINETS	5
SECTION 066400	PLASTIC PANELING	2

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 071500	UNDER SLAB MEMBRANE	3
SECTION 071900	WATER REPELLANTS	4
SECTION 072100	THERMAL INSULATION	4
SECTION 072500	WEATHER BARRIER	3
SECTION 074116	INSULATED METAL ROOF AND WALL PANELS	6
SECTION 074117	METAL BUILDING ACCESSORIES	5
SECTION 075420	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING	10
SECTION 076200	SHEET METAL FLASHING AND TRIM	14
SECTION 077230	ROOF HATCH	3
SECTION 077240	LADDER SAFETY POST	3
SECTION 077250	ROOF HATCH SAFETY RAIL SYSTEM	2
SECTION 079200	JOINT SEALANTS	12
SECTION 079219	ACOUSTICAL JOINT SEALANT	3

DIVISION 08 – DOORS AND WINDOWS

SECTION 081113	HOLLOW METAL DOORS AND FRAMES	6
SECTION 081216	ALUMINUM FRAMES	3
SECTION 081416	FLUSH WOOD DOORS	4
SECTION 083113	ACCESS DOORS AND FRAMES	4
SECTION 083323	OVERHEAD COILING DOORS	7
SECTION 083600	SECTIONAL OVERHEAD DOORS	6
SECTION 084113	ALUMINUM ENTRANCES AND WINDOWS	12
SECTION 084413	EXTERIOR SUN CONTROL DEVICE FOR CURTAIN WALL	6
SECTION 088000	GLAZING	9
SECTION 088300	MIRRORS	4



DIVISION 09 – FINISHES

SECTION 092090	PLASTER ACCESSORIES	5
SECTION 092216	NON-STRUCTURAL METAL FRAMING	9
SECTION 092400	CEMENT PLASTERING	5
SECTION 092900	GYPSON BOARD	5
SECTION 093000	CERAMIC TILE	10
SECTION 095113	ACOUSTICAL PANEL CEILINGS	4
SECTION 096513	RESILIENT BASE AND ACCESSORIES	4
SECTION 096519	RESILIENT TILE FLOORING	4
SECTION 096536	STATIC – CONTROL RESILIENT FLOORING	5
SECTION 096813	CARPET TILE	4
SECTION 097200	WALL COVERINGS	3
SECTION 099113	EXTERIOR PAINTING	8
SECTION 099123	INTERIOR PAINTING	9

DIVISION 10 – SPECIALTIES

SECTION 101423.13	ROOM-IDENTIFICATION SIGNAGE	7
SECTION 102113.19	PLASTIC TOILET COMPARTMENTS	6
SECTION 102600	WALL PROTECTION	5
SECTION 102800	TOILET ACCESSORIES	8
SECTION 104413	FIRE PROTECTION CABINETS	3
SECTION 104416	FIRE EXTINGUISHER	3
SECTION 104450	ACCESSIBILITY SIGNAGE	3
SECTION 106520	FOLDING PANEL PARTITION	5
SECTION 107113	EXTERIOR SUN CONTROL DEVICES	8
SECTION 107516	GROUND-SET FLAGPOLE	4

DIVISION 11 – EQUIPMENT

SECTION 113100	KITCHEN APPLIANCES	3
----------------	--------------------	---

DIVISION 12 – FURNISHINGS

SECTION 123661.19	QUARTZ AGGLOMERATE COUNTERTOPS	3
SECTION 129300	SITE FURNISHINGS	4

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 130700	BULLET RESISTANT COMPOSITE	4
SECTION 133419	METAL BUILDING SYSTEMS	8

DIVISION 14 – CONVEYING SYSTEMS

NOT USED

DIVISION 20 – MECHANICAL

SECTION 200100	GENERAL MECHANICAL PROVISIONS - OFFICE	10
SECTION 200100	GENERAL MECHANICAL PROVISIONS - STORAGE	10

DIVISION 21 – FIRE SPRINKLERS

SECTION 210000	FIRE SPRINKLERS - OFFICE	5
SECTION 210000	FIRE SPRINKLERS - STORAGE	5

DIVISION 22 – PLUMBING

SECTION 220400	PLUMBING - OFFICE	15
SECTION 220400	PLUMBING - STORAGE	10

DIVISION 23 – HVAC

SECTION 230800	HEATING, VENTILATING & AIR CONDITIONING – OFFICE	27
SECTION 230800	HEATING, VENTILATING & AIR CONDITIONING – STORAGE	13

DIVISION 25 – CONTROLS

SECTION 250900	DIRECT DIGITAL CONTROL SYSTEM - OFFICE	10
SECTION 250900	DIRECT DIGITAL CONTROL SYSTEM - STORAGE	10

DIVISION 26 – ELECTRICAL

SECTION 260000	ELECTRICAL	8
SECTION 260500	COMMON WORK RESULTS FOR ELECTRICAL	11
SECTION 262000	LOW VOLTAGE ELECTRICAL TRANSMISSION	7
SECTION 265000	LIGHTING	5
SECTION 280000	ELECTRONIC SAFETY AND SECURITY	7
SECTION 283100	FIRE ALARM	6

DIVISION 31 - EARTHWORK

SECTION 312000	EARTH MOVING	10
----------------	--------------	----

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 321216	ASPHALT PAVING	8
SECTION 321313	CONCRETE PAVING	13
SECTION 321373	CONCRETE PAVING JOINT SEALANTS	6
SECTION 321713	PARKING BUMPERS	2
SECTION 321723	PAVEMENT MARKING	3
SECTION 321726	TACTILE WARNING SURFACING	4
SECTION 323113	CHAIN LINK FENCE AND GATES	9
SECTION 323119	DECORATIVE METAL SECURITY FENCES AND GATES	9

END OF SECTION 000110

This page is intentionally left blank.

SHERIFF SUBSTATION OFFICE BUILDING

ARCHITECTURAL

1	A0.1	COVER
2	A0.2	NOTES AND ABBREVIATIONS
3	A0.3	NOTES
4	A0.4	GREEN BUILDING GUIDELINES
5	A1.1	SITE PLAN
6	A1.2	SITE PLAN - SOUTH
7	A1.3	SITE PLAN - NORTH
8	A1.4	SITE DETAILS
9	A1.5	SITE DETAILS
10	A1.6	SITE DETAILS
11	A2.1	CODE PLAN
12	A2.2	FLOOR PLAN - OVERALL
13	A2.3	FLOOR PLAN - AREA A
14	A2.4	FLOOR PLAN - AREA B
15	A2.5	FLOOR PLAN - AREA C
16	A2.6	FLOOR PLAN - AREA D
17	A2.7	REFL CEILING PLAN - OVERALL
18	A2.8	REFL CEILING PLAN - AREA A
19	A2.9	REFL CEILING PLAN - AREA B
20	A2.10	REFL CEILING PLAN - AREA C
21	A2.11	REFL CEILING PLAN - AREA D
22	A2.12	ROOF PLAN
23	A3.1	EXTERIOR ELEVATIONS
24	A3.2	EXTERIOR ELEVATIONS
25	A3.3	BUILDING SECTIONS
26	A3.4	BUILDING SECTIONS
27	A4.1	DOORS AND WINDOWS
28	A4.2	DOOR AND WINDOW DETAILS
29	A4.3	DOOR AND WINDOW DETAILS
30	A4.4	DOOR AND WINDOW DETAILS
31	A5.1	INTERIOR FINISH SCHEDULE
32	A5.2	INTERIOR FINISH PLAN
33	A5.3	ENLARGED PLANS
34	A5.4	INTERIOR ELEVATIONS
35	A5.5	INTERIOR ELEVATIONS
36	A5.6	INTERIOR ELEVATIONS
37	A5.7	ACCESSIBILITY
38		A6.1 INTERIOR DETAILS
39	A6.2	INTERIOR DETAILS
40	A6.3	INTERIOR DETAILS
41	A6.4	INTERIOR DETAILS
42	A7.1	EXTERIOR DETAILS
43	A7.2	EXTERIOR DETAILS
44	A7.3	EXTERIOR DETAILS
45	A8.1	FURNITURE PLAN (FOR REFERENCE ONLY)

STRUCTURAL

46	S1.0	GENERAL NOTES
47	S1.1	TYPICAL DETAILS
48	S2.0	FOUNDATION PLAN
49	S3.0	FOUNDATION DETAILS
50	S4.0	ENTRY TOWER PLANS & DETAILS
51	S5.0	FOLDING WALL PLAN & DETAILS
52	S6.0	DETAILS

PLUMBING

53	P1.1	PLUMBING SITE PLAN
54	P2.1	OVERALL PLUMBING PLAN
55	P2.2	ENLARGED PLUMBING PLAN
56	P2.3	ENLARGED PLUMBING PLAN
57	P2.4	ENLARGED PLUMBING PLAN
58	P3.1	SCHEDULES AND DETAILS

MECHANICAL

59	M1.1	AIR CONDITIONING PLAN - OVERALL
60	M1.2	AIR CONDITIONING PLAN - AREA A
61	M1.3	AIR CONDITIONING PLAN - AREA B
62	M1.4	AIR CONDITIONING PLAN - AREA C
63	M1.5	AIR CONDITIONING PLAN - AREA D
64	M2.1	MECHANICAL SCHEDULES
65	M3.1	MECHANICAL DETAILS
66	M4.1	TITLE 24 DOCUMENTS
67	M4.2	TITLE 24 DOCUMENTS
68	M4.3	TITLE 24 DOCUMENTS
69	M4.4	TITLE 24 DOCUMENTS
70	M4.5	TITLE 24 DOCUMENTS

ELECTRICAL

71	E1.0	ELECTRICAL SYMBOLS AND GENERAL NOTES
72	E1.1	LIGHT FIXTURE SCHEDULES AND DETAILS
73	E1.2	ELECTRICAL DETAILS AND SCHEDULES
74	E1.3	ELECTRICAL DETAILS AND SCHEDULES
75	E1.4	PANEL SCHEDULES
76	E1.5	PANEL SCHEDULES
77	E1.6	PANEL SCHEDULES
78	E2.0	LIGHTING SITE PLAN
79	E2.1	POWER SITE PLAN
80	E2.2	LOW VOLTAGE SYSTEMS SITE PLAN
81	E3.0	LIGHTING PLAN
82	E3.1	POWER AND LOW VOLTAGE PLAN
83	E3.2	MECHANICAL POWER PLAN
84	E3.3	FIRE ALARM PLAN [FOR REFERENCE ONLY]

85	E4.0	ENERGY COMPLIANCE DOCUMENTS
86	E4.1	ENERGY COMPLIANCE DOCUMENTS

FIRE PROTECTION

87	F1.1	FIRE PROTECTION SITE PLAN
88	F2.1	FIRE SPRINKLER PIPING PLAN
89	F3.1	FIRE PROTECTION BUILDING SECTIONS
90	F4.1	FIRE PROTECTION RISER DETAILS
91	F5.1	FIRE PROTECTION STEEL STRUCTURAL DETAILS
92	F6.1	FIRE PROTECTION INSTALLATION DETAILS

CIVIL [FOR REFERENCE ONLY]

93	C1.1	GRADING PLAN
94	C1.2	UTILITY PLAN

LANDSCAPING

95	LA-1.0	PLANTING SCHEDULE AND NOTES
96	LA-1.1	PLANTING PLAN
97	LA-1.2	PLANTING PLAN
98	LA-1.3	PLANTING DETAILS
99	LA-2.0	IRRIGATION SCHEDULE AND NOTES
100	LA-2.1	IRRIGATION PLAN
101	LA-2.2	IRRIGATION PLAN
102	LA-2.3	IRRIGATION DETAILS
103	LA-2.4	IRRIGATION DETAILS

SHERIFF SUBSTATION STORAGE BUILDING

ARCHITECTURAL

1	A0.1	COVER
2	A0.2	NOTES
3	A1.1	SITE PLAN
4	A2.1	CODE PLAN
5	A2.2	FLOOR PLAN
6	A2.3	REFLECTED CEILING PLAN
7	A2.4	ROOF PLAN
8	A3.1	EXTERIOR ELEVATION
9	A3.2	BUILDING SECTIONS
10	A4.1	DOORS
11	A5.1	INTERIOR DETAILS
12	A5.2	INTERIOR DETAILS
13	A6.1	EXTERIOR DETAILS
14	A6.2	EXTERIOR DETAILS

STRUCTURAL

15	S1.0	GENERAL NOTES
16	S1.1	TYPICAL DETAILS
17	S2.0	FOUNDATION PLAN
18	S3.0	FOUNDATION DETAILS

PLUMBING

19	P1.1	PLUMBING SITE PLAN
20	P2.1	OVERALL PLUMBING PLAN
21	P3.1	SCHEDULES AND DETAILS

MECHANICAL

22	M1.1	AIR CONDITIONING PLAN
23	M2.1	AIR CONDITIONING SCHEDULES & DETAILS

ELECTRICAL

24	E1.0	ELECTRICAL SYMBOLS AND GENERAL NOTES
25	E1.1	ELECTRICAL DETAILS AND SCHEDULES
26	E1.2	PANEL SCHEDULES
27	E1.3	FIRE ALARM SYMBOLS AND NOTES
28	E2.0	LIGHTING PLAN (SOUTH)
29	E2.1	LIGHTING PLAN (NORTH)
30	E2.2	POWER AND LOW VOLTAGE PLAN (SOUTH)
31	E2.3	POWER AND LOW VOLTAGE PLAN (NORTH)
32	E2.4	FIRE ALARM PLAN (SOUTH) [FOR REFERENCE ONLY]
33	E2.5	FIRE ALARM PLAN (NORTH) [FOR REFERENCE ONLY]
34	E3.0	ENERGY COMPLIANCE DOCUMENTS
35	E3.1	ENERGY COMPLIANCE DOCUMENTS

FIRE PROTECTION [FOR REFERENCE ONLY]

36	F1.1	FIRE PROTECTION SITE PLAN
37	F2.1	FIRE PROTECTION PIPING PLAN (SOUTH)
38	F2.2	FIRE PROTECTION PIPING PLAN (NORTH)
39	F3.1	FIRE PROTECTION BUILDING SECTIONS
40	F4.1	FIRE PROTECTION RISER DETAILS
41	F5.1	FIRE PROTECTION STEEL STRUCTURAL DETAILS
42	F6.1	FIRE PROTECTION INSTALLATION DETAILS

END OF SECTION 000300



**BOARD OF SUPERVISORS COUNTY OF FRESNO STATE OF CALIFORNIA**

**NOTICE TO BIDDERS**

Sealed proposals from bidders who have been pre-qualified to bid on this Project will be received at:

<https://www.bidexpress.com/businesses/36473/home>

and at the Fresno County Department of Public Works and Planning (Department), Office of the Design Engineer, Seventh Floor, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721 until

**2:00 P.M., (1400 hours and 00 seconds)  
Thursday, June 25, 2020**

at which time the bidding will be closed.

A prequalification process was conducted for this project and is now closed. The following is the list of bidders who have been prequalified to bid on this project as prime contractors: (No prequalification is necessary in order to bid as a subcontractor on this project.)

Bernards Bros.  
Bowe Contractors Inc  
Seals Construction Inc  
Ardent General Inc.  
Klassen Corporation  
BMY Construction Group  
Davis Moreno Construction, Inc  
Harris Construction Co. Inc.  
Solpac Construction Inc.

A detailed list containing the contact information for the prequalified bidders is available at:  
<http://www.co.fresno.ca.us/planholders>.

**Due to the COVID-19 restrictions and guidelines, the Department's bid reception desk may be closed and all bidders are encouraged submit bids online through Bid Express.**

**If a bidder is unable to submit online, please mail bid or e-mail [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov) or call (559) 600-9908 in advance, so that arrangements may be made to hand deliver your bid.**

Promptly following the closing of the bidding all timely submitted bids will be publicly opened and viewable via a livestream (the link for which will be posted at <http://www.co.fresno.ca.us/planholders>) for construction in accordance with the project specifications therefor, to which special reference is made as follows:

## **FRESNO COUNTY SHERIFF AREA 2 SUBSTATION**

**1129 N. ARMSTRONG AVENUE  
FRESNO, CA 93727  
Contract No.: 19-S-04**

The work to be done consists of construction of a new Sheriff Substation, a Vehicle and Evidence Storage building, parking lot and associated site improvements. The project consists of steel-framed, single-story buildings of approximately 22,700 square feet for the Sheriff Substation and 35,520 square feet for the Vehicle and Evidence Storage building on a site of approximately 6.5 acres.

Electronic versions of the contract documents are available online at: <https://www.bidexpress.com/businesses/36473/home> and bids may be submitted electronically through that website.

A virtual pre-bid conference will be held at **10:00 a.m.**, on **WEDNESDAY, JUNE 10, 2020** via on online Zoom Meeting at:

<https://zoom.us/j/98278196899?pwd=SkUzU0hKU1pFSkdEcVphVTB2RS9DQT09>

The Meeting ID is: 982 7819 6899 and the Password is: county

A discussion of the project will be held and visual media may be shared. The meeting will be recorded and questions raised during the meeting will be fully addressed in writing subsequent to the meeting. Attendance at the pre-bid conference is not mandatory; however, the scheduled pre-bid conference will be the only opportunity for prospective bidders and subcontractors to discuss the project with County staff. Prior to the pre-bid conference, contractors are encouraged to visit the project site which is located on the West side of North Armstrong Avenue between East Turner Avenue and East Harvey Avenue.

**The County of Fresno is committed to increasing the availability of employment and training opportunities, and requires that the Contractor and each subcontractor employed on this Project shall use their best efforts to ensure that thirty-three percent (33%) of apprentice hours are performed by qualified participants in state approved apprenticeship programs who also are current or former "Welfare-to-Work" participants in the CalWORKs program. Attention is directed to "Apprentices" in Section 2.55 of the General Conditions.**

**Incentives whereby the Contractor or subcontractor receives partial reimbursement for the wages paid to apprentices who qualify may be available. The incentive program is administered by the County of Fresno, Department of Social Services, Employment Resource Center. For questions regarding the incentive program, contact the Employment Resource Center at (559) 600-5370.**

Known Planholder and exchange/publication names may be obtained from the Fresno County website at <http://www.co.fresno.ca.us/planholders>.

Electronic copies (in ".pdf" file format) of the official project plans and specifications and such additional supplemental project information as may be provided, are available to view, download, and print at <http://www.co.fresno.ca.us/planholders>.

A Summary of Bids and a list of subcontractors for the apparent low bidder will be posted at the above listed website, generally within 24 hours of the Bid Opening.

All requests for substitutions (refer to Section 012500, Substitution Procedures) and questions regarding this project shall be in writing and shall be received by the Department of Public Works and Planning, Design Division, no later than 2:00 P.M. on the tenth (10th) calendar day prior to bid opening. All substitution requests and questions received after this deadline will not receive a response unless the Department of Public Works and Planning elects to issue an addendum to revise the bid opening date. In the event that the bid opening date is revised, the deadline for questions will be extended to no later than 2:00 P.M. on the tenth (10th) calendar day before the revised bid opening date. Questions shall be submitted on the "CONTRACTOR REQUEST FOR CLARIFICATION" form provided in Section 006319 of these contract specifications. E-mail substitution requests and questions to [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov).

Any changes to, or clarification of, the Contract documents and specifications, including approved substitutions, shall be in the form of a written addendum issued to planholders of record. Questions that prompt a change or clarification shall be included in the addendum with the subsequent answer.

Any oral explanation or interpretations provided with regard to this project are not binding.

Prospective bidders may select the project on:  
<https://www.bidexpress.com/businesses/36473/home>.

Those that are pre-qualified to bid on the Project will be added to the planholders list, and receive notifications and addenda issued for the project.

If a bidder is unable to submit a bid via Bid Express, bids shall be submitted in a sealed, opaque envelope addressed to the Department and labeled with the name of the bidder, the name of the project, the contract number, and the statement 'Do Not Open Until The Time Of Bid Opening.'

Bid security in the amount of ten (10) percent of the amount of the bid, and in the form of a bid bond issued by an admitted surety insurer licensed by the California Department of Insurance, cash, cashier's check or certified check shall accompany the bid. Bid security shall be made in favor of the County of Fresno. You must either attach an electronic bid bond or provide an original bid bond (or other form of bid security authorized by Public Contract Code Section 20129(a)), prior to the bid opening, in accordance with the detailed directions set forth in Section 1.04 ("PREPARATION OF PROPOSALS") of the Instructions to Bidders.

No contract will be awarded to a contractor who has not been licensed in accordance with the provisions of the Contractors State License Law, California Business and Professions Code, Division 3, Chapter 9, as amended, or whose bid is not on the proposal form included in the

contract document. A valid California Contractor's License, **Class B, (General Building)** is required for this Project.

Asbestos certification from the Contractors State License Board and registration with the Division of Occupational Safety and Health is not required to bid this Project. [Health and Safety Code 25914.2]

The Contractor and his subcontractors shall comply with all applicable statutes and regulations, and all provisions of Sections 2.51, 2.52, and 2.55 of the General Conditions, regarding payment of wages, hours of work and all other labor compliance issues.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at County of Fresno , Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno, CA 93721-2104 and available from the California Department of Industrial Relations website at <http://www.dir.ca.gov/DLSR/PWD>. Future effective general prevailing wage rates, which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

This project shall be subject to monitoring and enforcement by the County of Fresno and the Department of Industrial Relations (DIR), including the obligation to submit certified payroll records to the County of Fresno and directly to the DIR Compliance Monitoring Unit (CMU) at least monthly using the CMU's eCPR system. Detailed information may be obtained on the State of California's Department of Industrial Relations website, <http://www.dir.ca.gov/public-works/publicworks.html>.

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

No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Bids are required for the entire work described herein, including a bid for the base bid and a bid for each of the additive bids. Bids will be compared, for purposes of identifying the apparent low bidder for proposed award of the project, on the basis of the sum total of the base bid plus all of the additive bids; provided, however, that the ultimate scope of the project, as subsequently determined by the Board of Supervisors at the time of award, may or may not include all or any of the additive bids.

In addition to the bid bond required by law of all bidders on public works projects, the successful bidder shall furnish a faithful performance bond, a payment bond, and a warranty bond in accordance with the provisions of Section 007200, General Conditions, Article 2.36, Performance Bond, Labor and Material Payment Bond and Warranty Bond. The faithful performance bond and the payment bond each shall be in the amount of 100 percent of the Contract Value; and the One Year Warranty Bond shall be in the amount of 10 percent of the Final Contract Sum, as defined in General Conditions Article 2.36, Section A. Each bond specified in this Notice (bid bond, faithful performance bond, payment bond and warranty bond) shall meet the requirements of all applicable statutes, including but not limited to those specified in Public Contract Code section 20129 and Civil Code section 9550.

Each bond specified in this Notice shall be issued by a surety company designated as an admitted surety insurer in good standing with and authorized to transact business in this state by the California Department of Insurance, and acceptable to the County of Fresno. Bidders are cautioned that representations made by surety companies will be verified with the California Department of Insurance. Additionally, the County of Fresno, in its discretion, when determining the sufficiency of a proposed surety company, may require the surety company to provide additional information supported by documentation. The County generally requires such information and documentation whenever the proposed surety company has either a Best's Key Rating Guide of less than **A** and a financial size designation of less than **VIII**. Provided, however, that the County expressly reserves its right to require all information and documentation to which the County is legally entitled from any proposed surety company.

Pursuant to Public Contract Code Section 22300, substitution of securities for any moneys withheld by the County of Fresno to ensure performance under the contract shall be permitted.

The Board of Supervisors reserves the right to reject any or all bids.

Board of Supervisors, County of Fresno

Jean Rousseau, County Administrative Officer

Bernice E. Seidel, Clerk of the Board

Issue Date: May 26, 2020

END OF SECTION

This page is intentionally left blank.

## INSTRUCTIONS TO BIDDERS

### 1.01 EXPLANATION TO BIDDERS

An explanation desired by bidders regarding the meaning or interpretation of the bid documents must be requested in writing no later than 14 days prior to the bid opening.

Oral explanations given before the award of the contract will not be binding. Any interpretation made will be in the form of an addendum to the bid documents, said addendum will only be issued by the County's Director of Public Works and Planning ("Director"). A copy of the addendum will be furnished to each registered holder of a set of the bid documents and its receipt shall be acknowledged on the Bid Proposal. Each addendum will also be posted on the Fresno County website at <http://www.co.fresno.ca.us/planholders>.

### 1.02 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK

The bidder is required to examine carefully the site of the proposed work, the proposal, plans, specifications, special provisions, and contract forms for submitting a proposal. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the bidder has made such examination and is satisfied with the conditions to be encountered in performing the work and as to the requirements of the plans, specifications, and special provisions of the contract documents.

### 1.03 PROPOSAL GUARANTEE

The bidder shall furnish a proposal guarantee, consisting of a bid bond, cash, certified check, or cashier's check, for ten percent (10%) of the total amount bid, including additives.

If security is provided in the form of a certified check or cashier's check, the County may make such disposition of same as will accomplish the purpose for which submitted. Checks deposited by unsuccessful bidders will be returned as soon as practicable after the bid opening.

### 1.04 PREPARATION OF PROPOSALS

The bidder shall prepare a proposal on the blank proposal form furnished by the County.

The bidder's proposal shall be executed by the individual, by one or more partners of the partnership, or by one or more of the officers of the corporation submitting it. If the proposal is made by an individual, a name and post office address must be shown. If made by a partnership, the name of each member of the partnership must be shown. If made by a corporation, the proposal must show the name of the state under which the corporation was chartered and the name of the president, vice president, secretary and treasurer.

A. Electronic Bid Submittal

The bidder has the option to submit the bid for this Project electronically. The bidder must either attach an electronic bid bond or provide an original bid bond (or other form of bid security authorized by Public Contract Code Section 20129(a)), prior to the bid opening.

Bidders submitting online may use one of the accepted electronic sureties (SurePath or Surety 2000) to submit their bid bond; or may submit cash, cashier's check, certified check, or a bidder bond to Design Services at 2220 Tulare St., Seventh Floor, Fresno, CA 93721. Those submitting bid bonds directly to Design Services must submit their bid bond:

1. Under sealed cover
2. Marked as a bid-bond
3. Identifying the contract number and the bid opening date on the cover

Note: While it is strongly encouraged that you comply with the above bidding requirements if at all possible, it is acknowledged that this bid opening is occurring during the COVID-19 State of Emergency in Fresno County, the ongoing impact of which continues to be disruptive. If, as a result of the emergency, you are unable to provide the original bid security or electronic bid bond prior to the bid opening (and if your bid is otherwise appropriately responsive to bid requirements), then staff will request that the Board of Supervisors consider exercising its discretion to waive the bidding irregularity (regarding the time of delivery of the bid security) **IF** you: **(1)** attach a scanned copy of the original bid security to the Bid; and **(2)** provide for hand-delivery of the original bid security to the County within 24 hours of the bid opening. **If necessary, please e-mail [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov) or call (559) 600-9908, so that arrangements may be made to hand deliver your bid bond.**

B. Bid Submittal by Personal Delivery or by Mail

The bidder has the option to submit the bid by personal delivery or by mail. The bidder shall specify, on the blank Proposal form, a lump sum price in both words and figures for each bid item, including alternates, additives and supplemental items. If the bid is not submitted electronically, then all words and figures shall be written on the Proposal form in ink. In the case of a discrepancy between the prices written in words and those written in figures, the written words shall govern. The bidder's proposal shall be signed in ink by the individual executing the bid on behalf of the bidder.

The required proposal guarantee must accompany the proposal.

Because of the above-referenced COVID-19 State of Emergency, bidders submitting their bids by personal delivery may not have access to the County Plaza Building; and in such case, the bidder will need to either e-mail [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov) or call (559) 600-9908 sufficiently in advance, so that arrangements may be made to allow County staff to come downstairs to accept hand-delivery of your bid prior to the bid deadline.

1.05 SUBCONTRACTORS

Every person submitting a bid to perform the work called for in the bid request shall set forth in this bid:



- A. The name and the location of the place of business, and the California contractor's license number, and the public works contractor registration number issued pursuant to Section 1725.5 of the Labor Code, of each subcontractor who will perform work or labor or render service to the general contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent (1%) of the general contractor's total bid; and
- B. The portion of the work which will be done by each subcontractor.

The attention of bidders is directed to the provisions of Public Contract Code Section 4100 et seq which set forth the consequences and possible penalties which may result from a failure to comply strictly with the foregoing requirements for listing of subcontractors.

#### 1.06 SUBMISSION OF PROPOSAL

Each proposal shall be submitted in a sealed envelope labeled to clearly indicate the contract and contents.

When sent by mail, a sealed proposal must be addressed to the Fresno County Department of Public Works and Planning, Office of the Design Engineer, Seventh Floor, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721. All proposals shall be filed prior to the time and at the place specified in the NOTICE TO BIDDERS. Proposals received after the time for opening of the proposals will be returned to the bidder unopened.

#### 1.07 IRREGULAR PROPOSALS

Proposals that do not conform to bid requirements may be rejected as nonresponsive. Proposals shall be considered irregular and may be rejected for various reasons, including but not limited to the following:

- A. The proposal forms furnished by the County are not used or are altered.
- B. There are unauthorized additions, conditional or alternate proposals or irregularities of any kind which tend to make the proposal incomplete or indefinite.
- C. The bidder adds any provision reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.
- D. The bid fails to contain a price for each bid component.

#### 1.08 DISQUALIFICATION OF BIDDERS

Any one or more of the following may be considered to constitute sufficient cause for disqualification of a bidder and rejection of that bidder's proposal:

- A. More than one proposal for the same work from an individual, partnership or corporation.

- B. Evidence of collusion among bidders. Participants in such collusion will receive no recognition as bidders for any future work of the County until such participant shall have been reinstated as a qualified bidder.
- C. Lack of competency or inadequate machinery, plant or other equipment as considered necessary to perform this project, as may be revealed by financial statement if required.
- D. Unsatisfactory performance record as shown by past work for the County, judged from the standpoint of workmanship and progress.
- E. Prior commitments or obligations which in the judgment of the County might hinder or prevent the prompt completion of the work.
- F. Failure to pay, or satisfactorily settle, all bills due for labor or materials which remain pending under any former contract(s) at the time of submittal of the bid for this project.
- G. Failure to comply with any prequalification requirements of the County.
- H. Failure to furnish full amount of Proposal Guarantee with bid or failure to sign bid bond.

#### 1.09 WITHDRAWAL OR REVISION OF PROPOSALS

A bidder may, without prejudice, withdraw a proposal after it has been deposited, provided the request for such withdrawal is received in writing before the time set for opening proposals. The request shall be executed by the bidder or the bidder's duly authorized representative and shall include the name of the individual authorized to receive the withdrawn proposal. Said individual shall be required to present photo identification prior to withdrawing the proposal. The bidder may then submit a revised proposal provided it is received prior to the time set for opening proposals.

#### 1.10 PUBLIC OPENING OF PROPOSALS

Proposals will be opened and read publicly at the time and place indicated in the Notice to Bidders. Bidders or their authorized agents are invited to be present.

#### 1.11 BID PROTEST PROCEDURE / RELIEF OF BIDDER

##### A. BID PROTEST PROCEDURE

Any bid protest must be submitted in writing and delivered by the Bidder by either of the following means: (1) via e-mail to [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov); or (2) via certified mail, return receipt requested to the following address: Design Division,

Department of Public Works and Planning, 2220 Tulare Street, Sixth Floor, Fresno, CA 93721.

The bid protest must be received no later than 5:00 p.m. of the seventh (7th) calendar day following the deadline for submittal of the specific bid document(s) placed at issue by the protest. Any Bidder filing a protest is encouraged to submit the bid protest via e-mail, because the deadline is based on the Department's receipt of the bid protest. A bid protest accordingly may be rejected as untimely if it is not received by the deadline, regardless of the date on which it was postmarked. The Bidder's compliance with the following additional procedures also is mandatory:

The initial protest document shall contain a complete statement of the grounds for the protest, including a detailed statement of the factual basis and any supporting legal authority.

The protest shall identify and address the specific portion of the document(s) forming the basis for the protest.

The protest shall include the name, address and telephone number of the person representing the protesting party.

The Department will provide a copy of the initial protest document and any attached documentation to all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

The Board of Supervisors will issue a decision on the protest. If the Board of Supervisors determines that a protest is frivolous, the party originating the protest may be determined to be irresponsible and that party may be determined to be ineligible for future contract awards.

The procedure and time limits set forth herein are mandatory and are the Bidder's sole and exclusive remedy in the event of a bid protest. Failure by the Bidder to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including the subsequent filing of a Government Code Claim or legal proceedings.

## B. RELIEF OF BIDDER

A bidder who claims a mistake in his bid must follow the procedures in Public Contract Code Section 5100 et seq in seeking relief of his bid.

### 1.12 AWARD OF CONTRACT

The award of the contract, if it is awarded, will be to the lowest responsible bidder whose proposal complies with all the prescribed requirements. The award, if made, will be within 54 days after the opening of proposals.

If the County finds that it will be unable to award the contract within 54 calendar days after the opening of proposals, the Director may request any or all bidders to extend all terms of their proposal(s) to a specified date. It is possible that additional extensions may

subsequently be requested. If a bidder does not elect to extend the terms of his or her proposal beyond the 54 calendar days following opening of proposals, or does not respond within 10 days to any request for an extension, that bidder's proposal will be deemed as having expired 54 calendar days following opening of the proposals, and that bidder's proposal will not be considered for award of the contract.

The successful bidder will be notified in writing, by letter mailed to the address shown on the proposal, that the bid has been accepted and that the bidder has been awarded the contract.

The right is reserved by the County to reject any or all proposals, to waive technicalities (such as immaterial bid irregularities), to advertise for new proposals, or to proceed to do this work otherwise, if in the judgment of the awarding authority the best interests of the County will be promoted thereby.

#### 1.13 CANCELLATION OF AWARD

The awarding authority reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties without any liability against the County.

#### 1.14 CONTRACT BONDS

The bidder to whom the award is made shall, within ten days, enter into a written contract with the County. The bidder shall forfeit the proposal guarantee in case the bidder does not follow through with execution of the written contract within ten days after the contract is awarded.

The successful bidder shall furnish a faithful performance bond in the amount of 100 percent (100%) of the contract amount and a payment bond in the amount of 100 percent (100%) of the contract amount, and one-year Warranty Bond in the amount of 10 percent (10%) of the contract amount. Said bonds shall be submitted in triplicate.

The payment bond shall contain provisions such that if the Contractor or his/her subcontractors shall fail to pay (a) amounts due under the Unemployment Insurance Code with respect to work performed under the contract, or (b) any amounts required to be deducted, withheld and paid over to the Employment Development Department and to the Franchise Tax Board from the wages of the employees of the Contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, then the surety will pay these amounts. In case suit is brought upon the payment bond, the surety will pay a reasonable attorney's fee to be fixed by the court.

The contract form is attached hereto for the Contractor's information only. Execution of the contract by the successful bidder will not be required until after the bid award is made. Liability and Workers Compensation Insurance requirements shall be as set forth in the Agreement.

#### 1.15 BUILDERS RISK INSURANCE

The Contractor shall obtain and maintain in force Builder's Risk Insurance against loss or damage from all perils. The policy shall cover the entire structure on which the work of this contract is to be done, up to the full insurable value thereof (except that if the contract is for remodeling, alteration, repair, or maintenance, then the policy shall cover the value of the contract therefore), including items of labor and materials connected therewith on the site, materials in place or to be used as part of the permanent construction including materials stored and partially paid for by the County as provided in Division 01-General Requirements, surplus materials, shanties, protective fences, bridges, or temporary structures, miscellaneous materials and supplies incident to the work, and such scaffolding, stagings, towers, forms and equipment as are not owned or rented by the Contractor, the cost of which is included in the cost of the work. EXCLUDED: This insurance does not cover any tools owned by mechanics, any tools, equipment, scaffolding, staging, towers, and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the work, or any structures erected for the Contractor's administration of the project.

All subcontractors shall be insured to the extent of their portion of the work under the Contractor. The Contractor shall request, and is responsible to confirm with its insurer, that the County and all subcontractors are named, both as additional insured and as additional loss payees, on the Builder's Risk insurance policy. The County, Contractor, and all subcontractors waive all rights, each against the others, for damages arising from perils covered by the insurance required under the terms of this article, except such rights as they may have to the proceeds of the Builder's Risk insurance obtained and maintained by the Contractor. The Contractor shall file a certificate of such insurance with the County upon issuance of the policy, and with any subcontractors upon its request.

#### 1.16 POST-BID / PRE-AWARD INFORMATION AND REQUIREMENTS

Within eight calendar days after bid opening, the apparent low bidder shall submit the following information to the County:

- A. a cost distribution of the bid, with costs shown for major items of work as defined by either the project specification index, the Uniform Construction Index (UCI), or other method as appropriate for the project and approved by the County.
- B. the cost distribution shall distinguish between work to be done by the Contractor's own forces and work that will be subcontracted (including those who are to furnish materials or equipment fabricated to a special design); all subcontractors shall be named, regardless of the dollar amount of subcontracted work. Contractor's attention is also directed to California Public Contract Code Section 4100 et seq regarding subcontracting.

The County reserves the right to reject any proposed subcontractor, installer, or supplier who cannot show satisfactory evidence of meeting the qualifications required by the specification documents. In the event of such rejection, the apparent low bidder shall, within five working days, submit the name and qualifications of a replacement subcontractor, installer or supplier satisfactory to the County. Such replacement submittal shall be in accordance with all specification requirements.

No adjustment of bid prices shall be made in the event of such replacement.

If the project is awarded, the cost distribution will be used in determining amounts payable on progress payments and final payment.

The County may request that bidders other than the apparent low bidder submit similar cost distribution or qualification information, for the purpose of evaluating bids.

Upon completion of the bid evaluation process, cost distributions or qualification information submitted by other than the apparent low bidder will be returned upon request.

END OF SECTION

**BIDDERS' CHECKLIST (BUILDING CONTRACTS)**

Because of numerous technical irregularities resulting in rejected proposals for projects, the following checklist is offered for the bidders' information and use in preparing the proposal. This checklist is not to be considered as part of the contract documents. Bidders are cautioned that deleting or not submitting a form supplied in the bid documents (even if the form does not require signature) may result in an irregular bid.

**PROPOSAL/BID SHEET (Section 004213)**

Bidder name on each sheet. Price for each item including: each additive, deductive, supplemental or alternate items. Make no additions such as "plus tax", "plus freight", or conditions such as "less 2% if paid by 15th". Use ink or typewriter. Acknowledge addenda.

**BID SECURITY FORM - Read the Notices and Notes (Section 004313)**

Indicate type of bid security provided.  
Provide contract license information.

State business name and if business is a:

Corporation - list officers

Partnership - list partners

Joint Venture - list members

If Joint Venture members are corporations or partnerships, list their officers or partners.

Individual - list Owner's name and firm name style

Signature of Bidder –**BID MUST BE SIGNED!**

Corporation - by an officer

Partnership - by a partner

Joint Venture - by a member

Individual - by the Owner

If signature is by a Branch Manager, Estimator, Agent, etc., the bid must be accompanied by a power of attorney authorizing the individual to sign bids, otherwise the bid may be rejected.

Business Address - Firm's Street Address

Mailing Address - P.O. Box or Street Address

**BID SECURITY (PROPOSAL GUARANTEE)**

Ten percent (10%) of the total amount bid (to include supplemental or additive items).

Type of Bid Security:

Cash - Not recommended; cash is deposited in a clearing account and is returned to bidders by County warrant. This process may take several weeks.

Cashier's or Certified Checks - Will be held until the bid is no longer under consideration. If submitted by a potential awardee, they will be returned when the contract bonds are submitted and approved.

Bid Bonds - Must be signed by the bidder and by the attorney-in-fact for the bonding company. Signature of attorney-in-fact should be notarized and the bond should be accompanied by bonding company's affidavit authorizing attorney-in-fact to execute bonds. An unsigned bid bond will be cause for rejection. If the bid is submitted electronically, then the bidder must either attach an electronic bid bond or provide an original bid bond (or other form of bid security authorized by Public Contract Code Section 20129(a)), prior to the bid opening, as more thoroughly specified in the Instructions to Bidders, Section 1.04.A ("Electronic Bid Submittal").

**SUBCONTRACTOR LIST** (Section 004336)

One firm for each type of work to be subcontracted. Fill out as completely as possible. Name and location of place of business, California contractor's license number, public works contractor registration number issued pursuant to Section 1725.5 of the Labor Code, and description of work to be performed are required to be listed for each subcontractor in accordance with Public Contract Code section 4104.

**NON COLLUSION DECLARATION** (Section 004519)

Must be completed, signed, and returned with bid.

**GUARANTY OF WORK** (Section 006536)

Does not need to be submitted with the bid. (Must be signed and submitted by the successful bidder together with the executed contract and requisite bonds and insurance certificates, within ten days after award of the Project.)

**OTHER**

If the bid forms have been removed from the specifications booklet, staple the pages together.

Make sure the bid envelope is sealed and shows the project name, bid package and contract number.

If the bid is mailed, allow sufficient time for postal delivery prior to the bid closing time. Bids received after the scheduled time will be returned unopened. Be sure the statement "**DO NOT OPEN UNTIL TIME OF BID OPENING**", is on the envelope.

END OF SECTION



**PROPOSAL TO THE BOARD OF SUPERVISORS  
COUNTY OF FRESNO**

Contract: **Fresno County Sheriff Area 2 Substation**

Contract No.: **#19-S-04**

Fund / Subclass / Org / Account / Program or Memo No.:  
**0400 / 10053 / 8853 / 8150 / 91285 year 2020**

Work to be performed: **Construction of new Area 2 Sheriff Substation and Vehicle/Evidence Storage building.**

Building No.: **TBD**

Project Address:  
**1129 N. Armstrong Ave  
Fresno, CA 93727**

In case of a discrepancy between words and figures, the words shall prevail.

If this proposal shall be accepted and the undersigned shall fail to contract, as aforesaid, and to give the two bonds in the sums to be determined as aforesaid, each issued by a surety satisfactory to the Awarding Authority, within ten (10) days after the award of the contract, the Awarding Authority, at its option, may determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall operate and the same shall be the property of the County.

The undersigned, as bidder, declares that all addenda issued with respect to this bid have been received and incorporated into this Proposal. The bidder's signature on this Proposal also constitutes acknowledgement of all addenda.

The undersigned, as bidder, declares that the only persons, or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and he proposes and agrees if this proposal is accepted, that he will contract with the County of Fresno to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the contract in the manner and time therein prescribed, and according to the requirements of the County as therein set forth, and that he will take in full payment therefor the following lump sum price, to-wit:

**BIDDER:** \_\_\_\_\_

<b>Contract No.:</b> 19-S-04 <b>Project:</b> Fresno County Sheriff Area 2 Substation	
<b>Lump Sum Price Written In Words</b>	
1.) Base Bid – Substation and Site Work  _____ Dollars	\$ _____
2.) Additive Bid 1 – Vehicle/Evidence Storage Building  _____ Dollars	\$ _____
3.) Additive Bid 2 – Large Vehicle Canopy  _____ Dollars	\$ _____
4.) Total Bid (1+2+3)  _____ Dollars	\$ _____

<b>Acknowledgment of Addendum:</b>			
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____

END OF PROPOSAL FORM

END OF SECTION

**BID SECURITY FORM**

**CONTRACT:** FRESNO COUNTY SHERIFF AREA 2 SUBSTATION

**CONTRACT: #19-S-04**

Accompanying this proposal is security (check one only) in an amount equal to at least ten percent (10%) of the total amount of the bid:

Bid Bond ; Certified Check ; Cashier's Check ; Cash (\$ \_\_\_\_\_ )

The names of all persons interested in the foregoing proposal as principals are as follows:

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners comprising the firm; if bidder or other interested person is an individual, state first and last name in full.

**FIRM NAME** \_\_\_\_\_

Licensed in accordance with an act providing for the registration of Contractors,

Class \_\_\_\_\_ License No. \_\_\_\_\_ Expires \_\_\_\_\_

Department of Industrial Relations Registration No: \_\_\_\_\_

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Dated

**NOTE:** If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation; if bidder is a co-partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts on behalf of the co-partnership; and if bidder is an individual, his signature shall be placed above. If signature is by an agent, other than an officer of a corporation or a member of a partnership, a Power of Attorney must be on file with the Owner prior to opening bids or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

BUSINESS ADDRESS: \_\_\_\_\_  
Zip Code

MAILING ADDRESS: \_\_\_\_\_  
Zip Code

BUSINESS PHONE: (\_\_\_\_\_) \_\_\_\_\_ FAX NUMBER: (\_\_\_\_\_) \_\_\_\_\_

EMAIL: \_\_\_\_\_

END OF SECTION

CONTRACT # 19-S-04

This page is intentionally left blank.

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTORS**

The following named subcontractor(s) will perform with labor, or otherwise render services to the general contractor in or about the construction of the work or improvement in an amount in excess of one-half of one percent of the total bid presented herewith. Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board. Submission of subcontractor's name, location of business and description of work, California contractor's license number and public works contractor registration number issued pursuant to Section 1725.5 of the Labor Code, all are REQUIRED, by Section 4104 of the California Public Contract Code, to be submitted prior to bid opening. (The "location of business" must specify the city in which the subcontractor's business is located, and the state if other than California.) All other requested information shall be submitted, either with the bid or within 24 hours after bid opening.

Please fill out as completely as possible when submitting your bid. Use subcontractor's business name style as registered with the License Board.

**FAILURE TO LIST SUBCONTRACTORS AS DIRECTED MAY RENDER THE BID NON-RESPONSIVE, OR MAY RESULT IN ASSESSMENT OF A PENALTY AGAINST THE BIDDER IN ACCORDANCE WITH SECTION 4110 OF THE CALIFORNIA PUBLIC CONTRACT CODE.**

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>

**BIDDER:** \_\_\_\_\_

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**BIDDER:** \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_

**SUBCONTRACTOR:** \_\_\_\_\_

Item No. or Description of Work: \_\_\_\_\_

Dollar Amount or Percentage of Total Bid \_\_\_\_\_

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

Class \_\_\_\_ License No. \_\_\_\_\_ DIR Registration No. \_\_\_\_\_



**BIDDER:** \_\_\_\_\_

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>

**BIDDER:** \_\_\_\_\_

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>

**BIDDER:** \_\_\_\_\_

<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>
<p><b>SUBCONTRACTOR:</b> _____</p> <p>Item No. or Description of Work: _____</p> <p>Dollar Amount or Percentage of Total Bid _____</p> <p>Business Address: _____</p> <p>Class ____ License No. _____ DIR Registration No. _____</p>

This page is intentionally left blank.

**CONTRACT:** FRESNO COUNTY SHERIFF AREA 2 SUBSTATION  
**CONTRACT NO.:** 19-S-04

To the Board of Supervisors, County of Fresno:

NONCOLLUSION DECLARATION TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID \*

The undersigned declares:

I am the \_\_\_\_\_ of  
(Owner, Partner, Corporate Officer (list title), Co-Venturer)

\_\_\_\_\_, the party making the  
foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, and has not paid, and will not pay, any person or entity for that purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_, 2020,

at \_\_\_\_\_, \_\_\_\_\_."  
[city] [state]

\_\_\_\_\_  
(Printed or Typed Name)

\_\_\_\_\_  
(Signature)

(See Title 23 United States Code Section 112; Calif Public Contract Code Section 7106)

\* NOTE: Completing, signing, and returning the Non-collusion Affidavit is a required part of each Proposal. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

END OF SECTION

CONTRACT # 19-S-04

This page is intentionally left blank.

## AGREEMENT

THIS AGREEMENT is made at Fresno, in Fresno County, California, by and between \_\_\_\_\_, hereinafter "Contractor", and the County of Fresno, hereinafter "Owner".

WITNESSETH, the Contractor and the Owner, for the consideration hereinafter named, agree as follows:

**ARTICLE I.** The Contractor agrees to furnish all labor, equipment and materials, including tools, implements, and appliances required, and to perform all the work in a good and workmanlike manner, free from any and all liens and claims of mechanics, materialmen, subcontractors, artisans, machinists, teamsters, and laborers required for:

### **Fresno County Sheriff Area 2 Substation Contract No. 19-S-04**

Located at 1129 North Armstrong Avenue, Fresno, California, all in strict compliance with the plans, drawings, and specifications therefore prepared by the Director of the Fresno County Department of Public Works and Planning and his authorized representatives, hereinafter called the Project Manager, and other contract documents relating thereto.

**ARTICLE II.** The Contractor and the Owner agree that the Advertisement (Notice to Bidders), the Wage Scale, the Proposal hereto attached, the Instructions to Bidders, the General Conditions of the contract, the Technical Specifications, the Drawings, and the Addenda and Bulletins thereto, the Contract Bonds and Certificates of Liability and Workers Compensation Insurance, and the Contract Change Orders, together with this Agreement form the Contract Documents, and they are as fully a part of the contract as if hereto attached or herein repeated. The Specifications and Drawings are intended to cooperate so that any work exhibited in the drawings and not mentioned in the specifications, or vice versa, is to be executed the same as if both are mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications when taken together. Provided, however, that no part of said specifications that is in conflict with any portion of this Agreement, or that is not actually descriptive of the work to be done thereunder, or of the manner in which the said work is to be executed, shall be considered as any part of this Agreement, but shall be utterly null and void, and anything that is expressly stated, delineated or shown in or upon the specifications or Detailed Scope of Work shall govern and be followed, notwithstanding anything to the contrary in any other source of information or authority to which reference may be made.

**ARTICLE III.** The Contractor agrees that the work under the contract shall be completed as determined by the Owner within **Three Hundred and Twenty Two (322) CALENDAR DAYS** from the date shown in the Notice to Proceed. Time of performance shall be deemed as of the essence hereof and it is agreed that actual damages to the Owner from any delay in completion beyond the date provided for herein, or any extension thereof until the work is completed or accepted, shall be all provable damages plus liquidated damages in the amount of **One Thousand Five Hundred and 00/100 DOLLARS (\$1500.00)** per day; that said liquidated damage was arrived at by a studied estimate of loss to the Owner in the event of a delay considering the following damage items which are extremely difficult or impossible to determine: Additional construction expense resulting from delay of completion including, but not limited to, engineering, inspection, rental and utilities; provided, however, the Owner may conditionally

accept the work and occupy and use the same if there has been such a degree of completion as shall in its opinion render the same safe, fit and convenient for the use for which it is intended and in such cases the Contractor and Surety shall not be charged for liquidated damages for any period subsequent to such conditional acceptance and occupation by the Owner but Owner may assess actual damages caused by failure of total completion during such period. The time during which the Contractor is delayed in said work by the acts or neglects of the Owner or its employees or those under it by contract or otherwise, or by the acts of God which the Contractor could not have reasonably foreseen and provided for, or by storms and inclement weather which delays the work, or by any strikes, boycotts, or like obstructive action by employee or labor organizations, or by any general lockouts or other defensive action by employers, whether general, or by organizations of employers, shall be added to the time for completion as aforesaid.

**ARTICLE IV. COMPENSATION:** The Owner agrees to make payments on account thereof as provided in the General Conditions in the total amount of \_\_\_\_\_ **AND** \_\_\_\_\_ **/100 DOLLARS (\$** \_\_\_\_\_ **)** in current funds for the performance of the contract which sum is computed as follows: **TOTAL BASE BID AND ADDITIVE BIDS**

**ARTICLE V.** The Contractor and the Owner agree that changes in this Agreement or in the work to be done under this Agreement shall become effective only when written in the form of a supplemental agreement or change order and approved and signed by the Owner and the Contractor. It is specifically agreed that the Owner shall have the right to request any alterations, deviations, reductions, or additions to the contract, plans, and/or specifications and the amount of the cost thereof shall be added to or deducted from the amount of the contract price aforesaid by fair and reasonable valuations thereof.

This contract shall be deemed completed when the work is finished in accordance with all Contract Documents as amended by such changes. No such change or modification shall release or exonerate any surety upon any guaranty or bond given in connection with this contract.

**ARTICLE VI.** In the event of a dispute between the Owner or Project Manager and the Contractor as to an interpretation of any of the specifications or as to the quality of sufficiency of material or workmanship, the decision of the Project Manager shall for the time being prevail and the Contractor, without delaying the job, shall proceed as directed by the Project Manager without prejudice to a final determination by negotiation, arbitration by mutual consent or litigation and should the Contractor be finally determined to be either wholly or partially correct, the Owner shall reimburse him for any added costs he may have incurred by reason of work done or material supplied beyond the terms of the contract as a result of complying with the Project Manager's directions as aforesaid. In the event the Contractor shall neglect to prosecute the work properly or fail to perform any provisions of this contract, the Owner, after three days' written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due to the Contractor, subject to final settlement between the parties as in this paragraph hereinabove provided.

**ARTICLE VII. TERMINATION:** If the Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he or any of his subcontractors should persistently violate any of the provisions of the contract, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper material, or if he should fail to make prompt payment to



subcontractors or for material or labor or persistently disregard laws, ordinances or the instructions of the Project Manager, then the Owner may, upon the certificate of the Project Manager, when sufficient cause exists to justify such action, serve written notice upon the Contractor and his surety of its intention to terminate the contract, such notice to contain the reasons for such intention to terminate the contract, and unless within five (5) days after the serving of such notice, such violations shall cease and satisfactory arrangements for correction thereof be made, the contract shall, upon the expiration of said five days, cease and terminate.

In the event of any such termination, the Owner shall immediately serve written notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the contract, provided, however, that if the surety within ten (10) days after the serving upon it of notice of termination does not give the Owner written notice of its intention to take over and perform the contract or does not commence performance thereof within the ten (10) days stated above from the date of the serving of such notice, the Owner may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of the Contractor, and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may without liability for so doing, take possession of and utilize in completing the work, such materials, appliances, plant and other property belonging to the Contractor as may be on the site or the work and necessary therefore. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished.

If the unpaid balance of the contract price shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and damage incurred through the Contractor's default, shall be certified by the Project Manager.

**ARTICLE VIII.** The Contractor and his subcontractors shall comply with Sections 1770 – 1780 of the California Labor Code and the provisions of Sections 2.52 and 2.55 of the General Conditions concerning the payment of wages to all workers and mechanics, and the employment and payment of apprentices by the Contractor or any subcontractor for all work performed under this Agreement.

**ARTICLE IX.** The Contractor and his subcontractors shall comply with Sections 1810 to 1815 of the California Labor Code and the provisions of Section 2.51 of the General Conditions, concerning hours of work and payment of overtime compensation for all work performed under this Agreement.

The Board of Supervisors hereby specifies that portions of the work can only be performed outside the regular working hours as defined in the applicable collective bargaining agreement filed with the Director of Industrial Relations in accordance with Labor Code Section 1773.1, and that the overtime requirements for Saturdays, and holidays are hereby waived for these portions of the work, as more particularly described in the specifications. However, this exemption shall not negate the overtime provisions specified in Labor Code Section 1815.

**ARTICLE X. INDEMNIFICATION:** To the fullest extent permitted by law, Contractor agrees to and shall indemnify, save, hold harmless and at County's request, defend County and its officers, agents and employees, and the Project Manager and their respective officers, agents and employees, from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to County, or the Project Manager in

connection with the performance, or failure to perform, by Contractor, its officers, agents or employees under this Agreement, and from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to any person, firm or corporation who may be injured or damaged by the performance, or failure to perform, of Contractor, its officers, agents or employees under this Agreement. In addition, Contractor agrees to indemnify County for Federal, State of California and/or local audit exceptions resulting from non-compliance herein on the part of Contractor.

In any and all claims against the County, the Project Manager, or any of their respective officers, agents or employees, initiated by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation set forth in the immediately preceding paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

**ARTICLE XI. INSURANCE:** Without limiting the Owner's right to obtain indemnification from Contractor or any third parties, Contractor, at its sole expense, in accordance with the provisions of Section 2.40 of the General Conditions, shall maintain in full force and effect the following insurance policies throughout the term of this Agreement, excepting only those policies for which a longer term is specified:

A. Course of Construction (Builder's All Risk) Insurance, with scope and amount of coverage as specified in Section 2.40 E.1 of the General Conditions.

B. Commercial General Liability Insurance, with scope and amount of coverage as specified in Section 2.40 E.2 of the General Conditions.

C. Automobile Liability Insurance, with scope and amount of coverage as specified in Section 2.40 E.2 of the General Conditions.

D. Professional Liability Insurance, with scope and amount of coverage as specified in Section 2.40 E.3 of the General Conditions.

E. Worker's Compensation Insurance, with scope and amount of coverage as specified in Section 2.40 E. 4 of the General Conditions.

The Certificate of Insurance shall be issued in triplicate, to the County of Fresno, and all other participating agencies, whether or not said agencies are named herein, who contribute to the cost of the work or have jurisdiction over areas in which the work is to be performed and all officers and employees of said agencies while acting within the course and scope of their duties and responsibilities.

**ARTICLE XII. MISCELLANEOUS PROVISIONS:**

1. AUDITS AND INSPECTIONS: The Contractor shall at any time during business hours, and as often as the Owner may deem necessary, make available to the Owner for examination all of its records and data with respect to the matters covered by this Agreement. The Contractor shall, upon request by the Owner, permit the Owner to audit and inspect all of such records and data necessary to ensure Contractor's compliance with the terms of this Agreement. If this Agreement exceeds ten thousand dollars (\$10,000.00), Contractor shall be subject to the

examination and audit of the Auditor General for a period of three (3) years after final payment under contract (Government Code Section 8546.7).

2. **INDEPENDENT CONTRACTOR:** In performance of the work, duties, and obligations assumed by Contractor under this Agreement, it is mutually understood and agreed that Contractor, including any and all of Contractor officers, agents, and employees will at all times be acting and performing as an independent contractor, and shall act in an independent capacity and not as an officer, agent, servant, employee, joint venture, partner, or associate of the Owner. Contractor and Owner shall comply with all applicable provisions of law and the rules and regulations, if any, of governmental authorities having jurisdiction over matters of the subject thereof. Because of its status as an independent contractor, Contractor shall have absolutely no right to employment rights and benefits available to Owner's employees. Contractor shall be solely liable and responsible for providing to, or on behalf of, its employees all legally-required employee benefits. In addition, Contractor shall be solely responsible and save Owner harmless from all matters related to payment of Contractor's employees, including compliance with social security, withholding, and all other regulations governing such matters. It is acknowledged that during the term of this Agreement, Contractor may be providing services to others unrelated to the Owner or to this Agreement.

3. **DISCLOSURE OF SELF-DEALING TRANSACTIONS:** This provision is only applicable if the Contractor is operating as a corporation (a for-profit or non-profit corporation) or if during the term of the agreement, the Contractor changes its status to operate as a corporation. Members of the Contractor's Board of Directors shall disclose any self-dealing transactions that they are a party to while Contractor is providing goods or performing services under this agreement. A self-dealing transaction shall mean a transaction to which the Contractor is a party and in which one or more of its directors has a material financial interest. Members of the Board of Directors shall disclose any self-dealing transactions that they are a party to by completing and signing a Self-Dealing Transaction Disclosure Form, attached hereto as Exhibit A and incorporated herein by reference, and submitting it to the Owner prior to commencing with the self-dealing transaction or immediately thereafter.

**ARTICLE XIII.** The Contractor represents that he has secured the payment of Workers Compensation in compliance with the provisions of the Labor Code of the State of California and Paragraphs B.3, C.3 and E.4 of Article 2.40 of the General Conditions, and that he will continue so to comply with such statutory and contractual provisions for the duration and entirety of the performance of the work contemplated herein.

This Contract, **19-S-04**, was awarded by the Board of Supervisors on \_\_\_\_\_, 2020. It has been reviewed by the Department of Public Works and Planning and is in proper order for signature of the Chairman of the Board of Supervisors.

IN WITNESS WHEREOF, they have executed this Agreement this \_\_\_\_\_ day of \_\_\_\_\_, 2020

\_\_\_\_\_  
(CONTRACTOR)

COUNTY OF FRESNO  
\_\_\_\_\_  
(OWNER)

\_\_\_\_\_  
(Taxpayer Federal I.D. No.)

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

Name: \_\_\_\_\_

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

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

Ernest Buddy Mendes, Chairman  
of the Board of Supervisors of the  
County of Fresno

ATTEST:  
Bernice E. Seidel  
Clerk of the Board of Supervisors  
County of Fresno, State of  
California

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

Deputy

FOR ACCOUNTING USE ONLY  
VARIOUS ORGS.  
0400/10053/8853/8150/91285

END OF SECTION

## **SELF-DEALING TRANSACTION DISCLOSURE FORM**

In order to conduct business with the County of Fresno (hereinafter referred to as "County"), members of a corporation's board of directors of the Consultant, must disclose any self-dealing transactions that they are a party to while providing goods, performing services, or both for the County. A self-dealing transaction is defined below:

*"A self-dealing transaction means a transaction to which the corporation is a party and in which one or more of its directors has a material financial interest"*

The definition above will be utilized for purposes of completing this disclosure form.

### INSTRUCTIONS

- (1) Enter board member's name, job title (if applicable), and date this disclosure is being made.
- (2) Enter the board member's company/agency name and address.
- (3) Describe in detail the nature of the self-dealing transaction that is being disclosed to the County. At a minimum, include a description of the following:
  - a. The name of the agency/company with which the corporation has the transaction; and
  - b. The nature of the material financial interest in the Corporation's transaction that the board member has.
- (4) Describe in detail why the self-dealing transaction is appropriate based on applicable provisions of the Corporations Code.
- (5) Form must be signed by the board member that is involved in the self-dealing transaction described in Sections (3) and (4).

<b>(1) Company Board Member Information:</b>			
<b>Name:</b>		<b>Date:</b>	
<b>Job Title:</b>			
<b>(2) Company/Agency Name and Address:</b>			
<b>(3) Disclosure (Please describe the nature of the self-dealing transaction you are a party to):</b>			
<b>(4) Explain why this self-dealing transaction is consistent with the requirements of Corporations Code 5233 (a):</b>			
<b>(5) Authorized Signature</b>			
<b>Signature:</b>		<b>Date:</b>	

**CONTRACTOR REQUEST FOR CLARIFICATION**  
**Project: Fresno County Sheriff Area 2 Substation**  
**Contract No.: 19-S-04**

Requests for clarification of the drawings and specifications regarding this project shall be submitted on this form. Any change or clarification shall be in the form of a written addendum issued to Bid Document holders of record. Contractors requesting clarification shall complete the following:

Email to: [DesignServices@fresnocountyca.gov](mailto:DesignServices@fresnocountyca.gov)

FIRM NAME: \_\_\_\_\_

SENDER / CONTACT NAME: \_\_\_\_\_

MAILING ADDRESS: \_\_\_\_\_

Zip Code

BUSINESS PHONE: (\_\_\_\_) \_\_\_\_\_ FAX NUMBER: (\_\_\_\_) \_\_\_\_\_

Drawing No.:	Spec Section:
--------------	---------------

**Question** Type or print one question below

**Response**

The following section is for County use only.

Response By: \_\_\_\_\_ Date: \_\_\_\_\_

Included in Addendum No. \_\_\_\_\_ Date: \_\_\_\_\_

Date Received: \_\_\_\_\_ Time Received: \_\_\_\_\_ am / pm RFC Number: \_\_\_\_\_

This form may be removed from the project specifications and/or reproduced as needed.

This page is intentionally left blank.



**CONTRACT NO: 19-S-04**

This guaranty shall be executed by the successful bidder in accordance with Section 2.32 of the General Conditions. The bidder may execute the guaranty on this page at the time of submitting the bid or may, in the alternative, submit it with the insurance certificates and bonds within ten (10) days after award.

**GUARANTY**

To the Owner: County of Fresno

The undersigned guarantees the construction and installation of the following work included in this project:

**ALL WORK**

Should any of the materials or equipment prove defective or should the work as a whole prove defective, due to faulty workmanship, material furnished or methods of installation, or should the work or any part thereof fail to operate properly as originally intended and in accordance with each individual Work Order Detailed Scope of Work and specifications, due to any of the above causes, all within 365 Calendar Days after the date on which the Work under this contract is accepted by the Owner, the undersigned agrees to reimburse the Owner, upon demand, for its expenses incurred in restoring said work to the condition contemplated in said project, including the cost of any such equipment or materials replaced and the cost of removing and replacing any other work necessary to make such replacement or repairs, or, upon demand by the Owner, to replace any such material and to repair said work completely without cost to the Owner so that said work will function successfully as originally contemplated.

The Owner shall have the unqualified option to make any needed replacement or repairs itself or to have such replacements or repairs done by the undersigned. In the event the Owner elects to have said work performed by the undersigned, the undersigned agrees that the repairs shall be made and such materials as are necessary shall be furnished and installed within a reasonable time after the receipt of demand from the Owner. If the undersigned shall fail or refuse to comply with his obligations under this guaranty, the Owner shall be entitled to all costs and expenses reasonably incurred by reason of said failure or refusal.

Name (Printed): \_\_\_\_\_

Signature: \_\_\_\_\_

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

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

Contractor: \_\_\_\_\_

END OF SECTION

This page is intentionally left blank.

## GENERAL CONDITIONS

### 2.01 IDENTIFICATION OF CONTRACT

- A. The Agreement shall be signed by the Contractor and the Owner.
- B. The Contract Documents are defined in ARTICLE II of the Agreement.
- C. The Contract Documents form the Contract for Construction ("Contract"). This Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined above. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Architect of record and the Contractor, but the Architect of record shall be entitled to performance of the obligations of the Contractor intended for their benefit and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner and any Subcontractor or Sub-subcontractor.

### 2.02 EXECUTION, CORRELATION, AND INTENT OF CONTRACT DOCUMENTS

- A. The Contract Documents are complementary and anything called for by one shall be supplied as if called for by all, providing it comes clearly within the scope of the Contract.
- B. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. Words and abbreviations that have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.
- C. Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with the local conditions under which the Work is to be performed, and has correlated personal observations with the requirements of the Contract Documents.
- D. All work and material shall be the best of the respective kinds specified or indicated. Should any workmanship or materials be required that are not directly or indirectly called for in the Contract Documents, but which nevertheless are necessary for proper fulfillment of the obvious intent thereof, said workmanship or materials shall be the same for similar parts that are detailed, indicated or specified, and the Contractor shall understand the same to be implied and provide for it in his/her tender as if it were particularly described or delineated.

### 2.03 OWNERSHIP AND USE OF DOCUMENTS

All Contract Documents and copies thereof furnished shall remain the property of the Owner. With the exception of one (1) contract set for each party to the Contract, such documents are to be returned by Contractor or suitably accounted for to the Owner upon request at the completion of the Work. Submission or distribution to meet official

regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's common law copyright or other reserved rights. The Owner's use of the documents will not increase the Architect's design liability beyond the Project and the site for which the design was originally intended.

## 2.04 DEFINITIONS

The following words, or variations thereof, as used in these documents have meanings as defined:

- A. The Work - The Work comprises the completed construction required of the Contractor by the Contract Documents, and includes all labor, materials, equipment and services necessary to produce such construction, and all materials, other permits and equipment incorporated or to be incorporated in such construction.
- B. The Project – The collective improvements to be constructed by the Contractor pursuant to the construction of the Sheriff Substation, Vehicle/Evidence Storage building, parking, and associated site improvements for Fresno County.
- C. Owner - The County of Fresno, State of California, as represented by the Fresno County Board of Supervisors and so named in the Agreement. The term Owner additionally includes the Owner's authorized representative (also known as the Project Manager) for this Project.
- D. Architect of record – The Owner and his/her authorized representative, as defined in Section 2.04C, or a duly California licensed Architect.
- E. Contractor - When used in the General Conditions refers to person(s) or entity (partnership or corporation) so named in Agreement and when used in the body of the Specifications, refers to the Contractor for that specific work, whether it be the General Contractor, Subcontractor, or other Contractor. The term Contractor means the Contractor or the Contractor's authorized representative.
- F. Subcontractor - Person, persons, entity, co-partnership or corporation having direct contract with Contractor to perform any of the Work at the site. The term Subcontractor means a Subcontractor or a Subcontractor's authorized representative. The term Subcontractor does not include any separate contractor or any separate contractor's subcontractors.
- G. Sub-subcontractor – Person, persons, entity, co-partnership or corporation having a direct or indirect contract with a Subcontractor to perform any of the Work at the site (i.e. a second-tier, third-tier or lower-tier Subcontractor). The term Sub-subcontractor means a Sub-subcontractor or an authorized representative thereof.
- H. Notice to Proceed - A written notice issued by the Owner directing the Contractor to proceed with construction activities to complete the Project.

- I. Technical Specifications – Contains the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.
- J. Days- All days shall be measured in calendar days unless specifically noted otherwise in these documents or referenced codes.
- K. Year- One year shall be measured in terms of 365 calendar days.

## 2.05 SPECIFICATIONS AND DRAWINGS

- A. Precedence – Anything mentioned in the Specifications and not shown on the Drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. Subject to Section 2.02, in cases of discrepancy concerning dimension, quantity and location, the Drawings shall take precedence over the Specifications. Explanatory notes on the Drawings shall take precedence over conflicting drawn indications. Large scale details shall take precedence over smaller scale details and figured dimensions shall take precedence over scaled measurement. Where figures are not shown, scale measurements shall be followed but shall in all cases be verified by measuring actual conditions of Work already in place. In cases of discrepancy concerning quality and application of materials and non-technical requirements over materials, the specifications shall take precedence over Drawings.
- B. Division of Specifications - For convenience of reference and to facilitate the letting of independent contracts, this specification may be separated into certain sections; such separation shall not operate to oblige the Owner, Architect or Professional Consultant to establish the limits of any contract between the Contractor and Sub-Contractor each of whom shall depend upon his/her own contract stipulations. The General Conditions apply with equal force to all work, including extra work.
- C. Governing Factors - Dimensions figured on drawings shall be followed in every case in preference to scale of drawings.
- D. Discrepancies - Should the Contractor, at any time, discover a discrepancy in a drawing or specification, or any variation between dimensions on drawings and measurements at site, or any lacking of dimensions or other information, he/she shall report at once to the Project Manager requesting clarification and shall not proceed with the work affected thereby until such clarification has been made. If the Contractor proceeds with work affected by such discrepancies, without having received such clarification, he/she does so at his/her own risk. Any adjustments involving such circumstances made by the Contractor, prior to approval by the Project Manager, shall be at the Contractor's risk and the settlement of any complications or disputes arising therefrom shall be at the Contractor's sole expense and Contractor shall indemnify, hold harmless and defend Owner, Owner's representatives, and Project Manager from any liability or loss with respect to said adjustments.
- E. Scope of Drawings – The drawings shall be held to determine the general character of the Work as well as its details. Parts not detailed shall be constructed in accordance with best standard practice for work of this class,

so as to afford the requisite strength and logically complete the parts they compose. Where it is obvious that a drawing illustrates only a part of a given work or of a number of items, the remainder shall be deemed repetitious and so construed. The Contractor shall be responsible for all errors made in using any drawings which have been superseded.

F. Shop Drawings, Product Data and Samples –

1. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work. Samples are physical examples that illustrate materials, equipment or workmanship, and establish standards by which the work will be judged.
2. The Contractor shall prepare, review, approve and submit to the Project Manager, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.
3. By preparing, approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that the Contractor has determined and verified all materials, field measurements and field construction criteria related thereto, or will do so with reasonable promptness, and has checked and coordinated the information contained within such submittals with the requirements of the Work, the Project, the Work Order and the Contract Documents.
4. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's review of Shop Drawings, Product Data or Samples, unless the Contractor has specifically informed the Project Manager in writing of such deviation at the time of submission and the Architect has reviewed the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's review of them.
5. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications. The cost of such certifications shall be borne by the Contractor. Owner may elect to have an independent certification performed at its own expense. The Owner shall have final approving authority for performance-based items.
6. The Contractor shall direct specific attention, in writing or on resubmitted Shop drawings, Product Data, or Samples, to revisions other than those requested by the Architect on previous submittals.

7. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Architect. All such portions of the Work shall be in accordance with reviewed submittals.
8. Submission of Shop Drawings and Samples to the Project Manager is required for only those items specifically mentioned in the Specification Sections. If Contractor submits Shop Drawings for items other than the above, the Project Manager will not be obligated to distribute or review them. Contractor shall be responsible for the procuring of Shop Drawings for his/her own use as he/she may require for the progress of the Work.
9. The term "Shop Drawings" as used herein also includes but is not limited to fabrication, erection, layout and setting drawings, manufacturer's standard drawings, descriptive literature, catalogs, brochures, performance and test data, wiring and control diagrams, all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and the positions and layout of each conform to the Contract requirements. As used herein the term "manufactured" applies to standard units usually mass-produced, and the term "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements. Shop Drawings shall establish the actual detail of all manufactured or fabricated items; indicate proper relation to adjoining work; amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure; and incorporate minor changes of design or construction to suit actual conditions.
10. Drawings: Following Contractor's review and approval, Contractor shall submit to the Project Manager for approval four (4) minimum to six (6) maximum prints and/or pdf submission of the same information via email. (Required delivery methods and quantities of submittals will be determined at the time of the Pre-Construction Meeting.) The Project Manager will check the submittal to see if it is complete. If complete, the Project Manager will forward the drawings to the Owner and the Architect. The Architect and Owner will check the drawings and note Architect and Owner comments and affix a stamp to the drawing s indicating the status of acceptance, and will return same to the Project Manager, each retaining prints for his/her records. The Architect or his/her consultants, as applicable, will review the Shop Drawings; mark the prints with required revisions; stamp the prints and indicate "No Exceptions Taken", "Make Corrections Noted", "Revise and Resubmit", "Submit Specified Item", or "Rejected", and return the prints. The Project Manager will return the prints to the Contractor. The Contractor shall then print and distribute the appropriate number of copies to his/her job personnel as required. If a drawing is stamped "Rejected" or "Revise and Resubmit", the Contractor shall correct and resubmit as outlined above. When stamped "Make Corrections Noted", or similar instructions, the Contractor shall correct and resubmit for record only, three (3) prints of each drawing. Also see Technical Specifications, Division I, General Requirements.

11. Samples: Following Contractor's review and approval, Contractor shall submit to the Architect, five (5) minimum samples of all materials in quantities and sizes as specified herein as requested by the Architect. Submittals shall be given to the Architect at a time determined by the Contractor, which allows for any necessary resubmittal and which will not cause any delay in the Work. Samples will be forwarded to the Architect. If a sample is stamped "Rejected" or "Revise and Resubmit", one sample so noted will be returned to the Contractor. The Contractor shall correct and resubmit as outlined above. If a sample is stamped "Make Corrections Noted", one sample so noted will be returned. Corrected samples shall be resubmitted for approval as per the original submittal. Also see Technical Specifications and General Requirements.
  12. Brochures: Following Contractor's review and approval, Contractor shall submit to the Architect, five (5) copies of all manufacturer's catalogs or brochures as required. Brochures will be forwarded to the Architect for review. If a brochure is stamped "No Exception Taken", two (2) copies will be returned to the Contractor. If stamped "Rejected", one marked copy and two (2) unmarked copies will be returned. Corrected copies shall be resubmitted for approval as per the original submittal. Also see General Requirements.
  13. Manufacturer's Instructions: Where any item or work is required by Specifications to be furnished, installed or performed in accordance with a specified product manufacturer's instructions, Contractor shall procure and distribute the necessary copies of such instructions to all concerned parties.
- G. Materials - All materials, unless otherwise specified, shall be new and of good quality, proof of which shall be furnished by the Contractor; in case of doubt as to kind or quality required, samples shall be submitted to the Architect through the Project Manager who will specify the kind and use of the material appropriate to the location and the function of the item in question. Contractor shall furnish such item accordingly. Before final payment, all material rejected by the Architect or Project Manager shall be promptly removed from the premises by the Contractor, whether or not completely installed, and promptly and properly replaced with correct materials, including any other work adjoining if disturbed, in accordance with the contract and without expense to the Owner; the Contractor also shall pay for work of other Contractors as is affected by such removals and replacements.

## 2.06 THE ARCHITECT

- A. The Owner may delegate all or a portion of its rights and responsibilities to a California licensed Architect as deemed necessary.
- B. The Architect advises the Project Manager in all aspects of the construction phase of the Project. The Architect's functions include advice and assistance to the Project Manager in the correct interpretation and application of the Contract Documents. The Architect is not authorized independently to issue Addenda, Clarifications, Field Orders, Work Authorizations, or Supplemental Work Orders, or in any other way to bind the Owner in discussions with the Contractor.



- C. The Contractor shall deliver all correspondence relating to the proper execution of the Work to the Project Manager. The Project Manager reserves the right to consult with the Architect and Owner prior to responding to the Contractor's correspondence.
- D. When discussions between the Contractor and the Project Manager occur either on the site or elsewhere, but the Architect is not present, the Project Manager reserves the right to consult with the Architect and Owner prior to issuing his/her final decision or instruction.
- E. The Architect shall review or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for conformance with the design concept of the Work and the information given in the Contract Documents. Such action shall generally be taken within ten (10) working days, however under certain circumstances such as very complex submittals or if large number of submittals are submitted at one (1) time it may take longer. In this case the Contractor will be notified and given the opportunity to advise the Architect of priorities. The Architect's review of a specific item shall not indicate review of an assembly of which the item is a component.

## 2.07 THE PROJECT MANAGER

- A. The Project Manager is the authorized representative of the Owner in all aspects of administering the construction contract on behalf of the Owner. All communications from and to the Contractor will be channeled through the Project Manager. However, the Project Manager does not have the authority to bind the Owner in matters affecting adjustments to the time or cost of the Project as defined in the Agreement for Construction.
- B. The Project Manager will be the Owner's representative during the construction and warranty periods, and until final payment to all contractors is due. The Project Manager will advise and consult with the Owner. All instructions to the Contractor shall be forwarded through the Project Manager. The Project Manager will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument.
- C. The Project Manager will be on site during construction to monitor the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents. On the basis of on-site observations and communication with the Contractor, the Project Manager will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.
- D. The Project Manager shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so that the Project Manager may perform its functions under the Contract Documents.

- E. Based on the Project Manager's observations, and an evaluation of the Contractor's Application for Payment, the Project Manager will determine the amount owing to the Contractor and will issue to the Owner Certificates for Payment incorporating such amount.
- F. The Project Manager will be the initial interpreter of the requirements of the Contract Documents and the initial judge of the performance hereunder by the Contractor. The Owner will have final authority of all such matters.
- G. The Project Manager will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and in accordance with agreed upon time limits. Either party to the Contract may make written request to the Project Manager for such interpretations.
- H. Claims, disputes and other matters in question between the Contractor and the Project Manager relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred to the Owner (or his/her designee).
- I. All interpretations and decisions of the Project Manager will be in writing or in graphic form, and shall be both consistent with the intent of the Contract Documents and reasonably inferable therefrom.
- J. The Project Manager will have the authority to reject, or recommend to the Owner the rejection, of any work that does not conform to the Contract Documents. Whenever, in the Project Manager's opinion, it is considered necessary or advisable for the implementation of the intent of the Contract Documents, the Project Manager will have authority to require special inspection or testing of the Work whether or not such work be then fabricated, installed or completed.
- K. The Project Manager will receive from the Contractor and review all Shop Drawings, Product Data and Samples, and forward same to Architect and Owner for review.
- L. Following consultation with the Owner, the Project Manager will take appropriate action on changes, and will have authority to order minor changes in the Work as provided herein.
- M. The Project Manager will conduct inspections to determine the date of Completion, and will receive and forward to the Owner for the Owner's review written warranties and related documents required by the Contract Documents and assembled by the Contractor. The Project Manager will issue a final Project Certificate for Payment upon compliance with the requirements for completion and final payment. The Project Manager will monitor the warranty for a period of 365 Calendar Days from and after the date of acceptance of the Work, unless otherwise specified as a longer term.
- N. The duties, responsibilities and limitations of authority of the Project Manager as the Owner's representative during construction, as set forth in the Contract Documents, will not be modified or extended without written consent of the Owner, the Contractor and the Project Manager, which consent shall not be unreasonably withheld. Failure of the Contractor to respond within ten (10) business days to a written request shall constitute consent by the Contractor.

- O. In case of the termination of the employment of the Project Manager, the Owner may appoint a successor Project Manager, whose status and duties under the Contract Documents shall be the same as those of the former Project Manager.

## 2.08 OWNER

### A. Information and Services Required of the Owner

1. Unless otherwise provided in the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
2. Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.
3. The Owner shall forward all instructions to the Contractor through the Project Manager.

### B. Owner's Right to Stop the Work

If the Contractor fails to correct defective work as required by Section 2.42 herein or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of any contractor or any other person or entity, except to the extent required by Section 2.12.C.

### C. Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails after written notice from the Owner to correct such default or neglect with diligence and promptness, the Owner may, after an additional written notice and without prejudice to any other remedy the Owner may have, make good such deficiencies. In such case an appropriate Contract Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the additional services of the Architect or other professionals made necessary by such default, neglect or failure. Such action by the Owner and the amount charged to the Contractor are both subject to the prior approval of the Architect. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner, or Owner may require payment by the surety on the performance or warranty bonds as appropriate. Such action shall, in no way, affect the status of either party under contract, nor be held as a basis of any claim by the Contractor for damages or extension of time.

## 2.09 CONTRACTOR RESPONSIBILITIES

### A. Review of Contract Documents and Field Conditions

1. The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Project Manager any discrepancy or inconsistency that may be discovered. The Contractor shall not be liable to the Owner or the Project Manager for any damage resulting from any such inconsistencies or discrepancies in the Contract Documents unless the Contractor recognized such inconsistencies or discrepancies and knowingly failed to report it to the Project Manager. The Contractor shall perform no portion of the Work at any time unless authorized by the Contract Documents or, where required, approved Shop Drawings, Product Data or Samples for such portion of the Work.
2. Neither the Owner nor the Project Manager or Architect assume any responsibility for an understanding or representation made by any of their agents or representation prior to the execution of the Agreement unless (1) such understanding or representations are expressly stated in the Agreement, and (2) the Agreement expressly provides that responsibility therefor is assumed by the Owner.
3. Failure by the Contractor to acquaint himself/herself with all available information will not relieve him/her from responsibility for estimating properly the difficulty or cost of successfully performing the Work.
4. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Any inconsistencies or discrepancies discovered by the Contractor shall be reported to the Project Manager at once.
5. Before submitting any Request for Information (RFI), or other contractor-initiated request for information, the Contractor shall determine that the information requested is not clearly provided in the Contract Documents. RFI's shall be submitted to the Project Manager only from the Contractor, or Owner, and not from any subcontractor, supplier or other vendor, and shall be on a form approved by the Project Manager. The Contractor shall provide a revised and updated RFI Priority Schedule on a weekly basis. The RFI Priority Schedule shall rank RFI's in order of priority and include a brief statement of reason for priority. Owner initiated RFI's will not be listed on the Contractor's RFI Priority Schedule. The Owner will provide the Architect a separate list of Owner initiated RFI's upon request of the Architect. The Architect will endeavor to respect the order of priorities as requested by the Contractor or Owner for the overall benefit of the Project. The RFI process is for information and clarification only and may not be utilized to obtain approval for changes in Work Order Price or time. Also see Division 01 - General Requirements.

### B. Supervision Procedures

1. The Contractor shall efficiently supervise and direct the Work, using therein the Contractor's best skill and diligence for which he/she is remunerated in the Contract Price. The Contractor shall carefully inspect the site and study and compare the Contract Documents, as ignorance of any phase of any of the features or conditions affecting the Contract will not excuse him/her from carrying out its provisions to its full intent.
  2. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed upon written request in each case. The Superintendent who begins the Project shall remain on the Project until the Project is completed, as long as the Contractor employs that person. The Superintendent shall not be replaced without the approval of the Owner.
  3. The Contractor shall be responsible to the Owner for the acts and omissions of his/her employees, subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.
  4. The Contractor shall at all times enforce strict discipline and good order among his/her employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him/her.
  5. The Contractor shall not be relieved from his/her obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Owner or the Architect in his/her administration of the Contract, or by inspections, tests or approvals required or performed by persons other than the Contractor.
  6. Contractor shall alert and inform their employees that State law requires that the identities of inmates/wards/patients/clients be kept confidential. Revealing the identities of inmates/wards/patients/clients is punishable by law.
- C. Construction Procedures
1. Means and Methods - The Contractor shall be solely responsible for and control of construction means, methods, techniques, sequences, coordination and procedures for all the Work of this contract. Additionally, the Contractor shall be responsible for safety precautions and programs in connection with the Work.
  2. Laws of County and State - The Contractor must comply with all laws, rules, regulations, provisions and ordinances of the County in which the Work is being done, and all State laws pertaining to the Work.
  3. Safeguards - The Contractor shall provide, in conformity with all local codes and ordinances and as may be required, such temporary walls,

- fences, guard-rails, barricades, lights, danger signs, enclosures, etc., and shall maintain such safeguards until all work is completed.
4. Housekeeping - Contractor shall keep the premises free of excess accumulated debris. Clean up as required and as directed by the Project Manager. At completion of work all debris shall be removed from the site. Refer to General Requirements for additional requirements.
  5. Labor and Materials - Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
  6. The Contractor shall deliver to the Project Manager, prior to final acceptance of the Work as a whole, signed certificates from suppliers of materials and manufactured items stating that such items conform to the Contract Documents.
  7. The Contractor, immediately upon receipt of the Notice to Proceed (or where shop drawings, samples, etc., are required, immediately upon receipt of review thereof), shall place orders for all materials, work fabrication, and/or equipment to be employed by him/her in connection with that portion of the contracted Work . The Contractor shall keep all materials, work fabrications and/or equipment specified and shall advise the Project Manager promptly, in writing, of all orders placed and of such materials, work fabrications and/or equipment which may not be available in a timely manner for the purposes of the Contract.
  8. Any worker whose work is unsatisfactory to the Owner or the Architect, or are considered by the Owner or Architect to be careless, incompetent, unskilled or otherwise unfit shall be dismissed from work under the Contract upon written request to the Contractor from the Owner or the Architect.
  9. Temporary Facilities – Contractor may connect to existing water and electricity available on the site provided it is suitable to the Contractor's requirements. Water and electricity used will be paid by the Owner. Contractor shall bear all expenses for carrying the water or electricity to the appropriate locations and to connect or tap into existing lines. Toilet facilities may be available on a site to the workmen engaged in the performance of this contract. It shall be the responsibility of the Contractor to confirm with the Owner the availability of toilet facilities on the site. The use of such facilities may be revoked in the event of excess janitorial requirements.
  10. Contractor shall not perform any fire hazardous operation adjacent to combustible materials. Any fire hazardous operation shall have proper fire extinguisher close by and the adjacent area shall be policed before stopping work for the day. Contractor shall provide not less than one

OSHA/NFPA Class 6-ABC fire extinguisher for each 9,000 square feet of Project area or fraction thereof.

11. Contractor shall erect temporary dust separation partitions and floor mats as necessary to confine dust and debris within area of work. Contractor shall post signs, erect and maintain barriers and warning devices for the protection of the general public and Owner personnel.
12. Trenching and Excavation - In accordance with Section 7104 of the California Public Contract Code, the following provisions shall apply to any contract involving digging of trenches or other excavations that extend deeper than four feet below the surface:
  - a. The Contractor shall promptly, and before the following conditions are disturbed, notify the Owner, in writing, of any:
    - i. Material that the contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
    - ii. Subsurface or latent physical conditions at the Project site differing from those indicated by information about the site made available to bidders prior to the deadline for submitting bids.
    - iii. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.
  - b. The Owner shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the contractor's cost of, or the time required for, performance of any part of the work, shall issue a Contract Change Order in accordance with the provisions of Section 2.09 of the General Conditions.
  - c. In the event that a dispute arises between the Owner and the contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the contractor's cost of, or time required for, performance of any part of the work, the contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

## 2.10 SUBCONTRACTORS

- A. Agreements - Agreements between the Contractor, Subcontractors, and Subcontractors of lower tier shall be subject to the approval of the Owner, but in no case does such approval relieve the Contractor of any conditions imposed by the Contract Documents. The Contractor shall only use those subcontractors that are required to be listed and included in his/her sealed bid Subcontractor List, section 004336, unless any proposed substitution is first approved by the Owner pursuant to statute. The Contractor shall not use any subcontractor who is ineligible to perform work on a Public Works Project pursuant to section 1777.1 or 1777.7 of the Labor Code. Notwithstanding any other provision of the Contract Documents, subcontractors may be added, deleted or substituted only in accordance with the provisions of Public Contract Code Section 4100 et seq.
- B. Relation with Subcontractor – By an appropriate agreement, written where legally required for enforceability, the Contractor shall bind every Subcontractor and require therein that every Subcontractor agrees to be bound by the terms of the Contract Documents to carry out their provisions insofar as applicable to their work; and the Contractor further agrees to pay to each Subcontractor promptly upon issuance of Certificate of Payment, his/her or their due portion. Said agreement shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor Agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, under the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with their Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Paragraph and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of Contract Documents available to their Sub-subcontractors. Nothing contained herein shall be deemed to create an agency relationship between the Owner and any Subcontractor or material supplier.
- C. Owner's Relation - Neither the acceptance of the name of Subcontractor nor the suggestion of such name nor any other act of the Owner or Architect nor anything contained in any Contract Document is to be construed as creating any contractual relation between the Owner (or Owner's authorized representatives) and any Subcontractor of any tier nor as creating any contractual relation between the Architect and any Subcontractor of any tier.
- D. All Subcontractors employed by the Contractor shall be appropriately licensed in conformity with the laws of the State of California.
- E. Jurisdictional disputes between Subcontractors or between Contractor and Subcontractor shall not be mediated or decided by the Owner, Architect or the Architect. The Contractor shall be responsible for the resolution of all such disputes based upon his/her contractual relationship with his/her Subcontractors.



2.11 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

- A. The Owner reserves the right to perform work related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other work on the site under these or similar Conditions of the Contract. If the Contractor claims that the Owner's action results in delay, damage or additional cost attributable thereto, the Contractor shall make such claim as provided elsewhere in the Contract Documents.
- B. When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.
- C. The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.
- D. Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract.

2.12 MUTUAL RESPONSIBILITY

- A. The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- B. When any part of the Contractor's Work depends upon proper execution or results of the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Project Manager any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractor's work as fit and proper to receive the Work, except as to defects which may subsequently become apparent in such work by others.
- C. If, following the reporting of any discrepancy or defect as required herein above, the Contractor suffers damage due to disruption or delay caused by the separate contractor, without fault by the Owner, the Contractor's remedy shall be limited to seeking recovery from the separate contractor.

- D. Any costs caused by defective or ill-timed work shall be borne by the Contractor responsible therefor.
- E. Should the Contractor cause damage to the work or property of the Owner, or to other work or property on the site, the Contractor shall promptly remedy such damage as provided herein.
- F. Should the Contractor wrongfully delay or cause damage to the work or property of any separate contractor, the Contractor shall, upon due notice, promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues the Owner on account of any delay or damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings, and if any judgment or award against the Owner (or Owner's authorized representatives) arises therefrom, the Contractor shall pay or satisfy such judgment or award in full and shall reimburse the Owner for all costs which the Owner has incurred in connection with such matter.

#### 2.13 OWNER'S RIGHT TO CLEAN UP

If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required in the Contract Documents, the Owner may clean up and the contractor responsible shall pay Owner such portions of the cost as the Project Manager shall determine to be just.

#### 2.14 GOVERNING LAW

The Contract shall be governed by the law of the State of California.

#### 2.15 INSPECTION

- A. All material and workmanship (if not otherwise designated by the Contract Documents) shall be subject to inspection, examination, and test by the Owner and Project Manager at any and all times during manufacture and/or construction and at any and all places where such manufacture and/or construction are carried on. The Owner and Project Manager shall have the right to reject defective material and workmanship or require its correction.
- B. The Contractor shall furnish promptly without additional charge, all reasonable facilities, labor, and materials necessary for the safe and convenient inspection and tests that may be required by the Owner and Project Manager.
- C. Where the Contract Documents, instructions by the Owner, laws, ordinances, or any public authority having jurisdiction requires work to be inspected, tested or approved before work proceeds, such work shall not proceed, nor shall it be concealed prior to inspection.
- D. The Contractor shall give the Project Manager at least two (2) business days advance notice of the readiness for any Contract compliance inspection by the Inspector. The Contractor shall give notice as required by all other inspecting and testing agencies of jurisdiction for Code and regular compliance inspection.

In all cases, the Contractor shall schedule inspections so as not to delay the Work.

- E. If the Project Manager determines that any work requires additional special inspection beyond that identified in the specifications, the Project Manager will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided above. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Project Manager's additional services, testing or inspections made necessary by such failure; otherwise the Owner shall bear such costs, and an appropriate Contract Change Order shall be issued.
- F. Should it be considered necessary or advisable by the Project Manager at any time either before acceptance of the entire Work or after acceptance and within the guaranty period to make an examination of work already completed, by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any material respect, due to the fault of the Project Manager or his/her Subcontractors, he/she shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, any compensation deemed appropriate shall be handled by issuance of a Contract Change Order to the Contractor and he/she shall, in addition, if completion of the work has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- G. Required certificates of inspection, testing or approval shall be secured by the Contractor and the Contractor shall promptly deliver them to the Project Manager for review and evaluation of compliance with the appropriate specifications and standards.
- H. When the work is completed the Contractor shall notify the Project Manager in writing that the work will be ready for final inspection and test on a definite date which shall be stated in such notice.

#### 2.16 TAXES, PERMITS, FEES, AND INDEMNIFICATION FOR PATENT INFRINGEMENT CLAIM

- A. The Contractor shall pay for and include all Federal, State and local taxes direct or indirect for the work or portions thereof provided by the Contractor which are legally enacted at the time the Notice to Proceed is issued, whether or not yet enacted, and secure and pay all fees and charges for permits and licenses, unless otherwise specified.
- B. Royalty and license fees incidental to the use of any patented material, device or process shall be paid by the Contractor and in the event of a claim of alleged infringement of patent copyright, or Trade Secret rights, the Contractor shall indemnify, save the Owner (and Owner's authorized representatives) free and harmless, and defend, at the Contractor's own expense, any and all suits that may be brought in such connection.

- C. Unless otherwise provided in the Contract Documents, the Owner shall secure and pay for the building permit, permanent utility connection fees, and right-of-way encroachment permit. The Contractor shall secure and pay for temporary construction utilities, and all other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.
- D. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work.
- E. It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, the Contractor shall promptly notify the Project Manager in writing, and any necessary changes shall be accomplished by appropriate Modification.
- F. If the Contractor performs any work knowing it to be contrary to any laws, ordinances, rules and regulations, without notice to the Project Manager, the Contractor shall assume full responsibility therefor and shall bear all costs attributable thereto.
- G. Any reference in the Contract Documents to codes, standard specifications or manufacturer's instructions shall mean the latest printed edition of each in effect at the Contract date.

## 2.17 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Within thirty (30) calendar days after receipt of Notice to Proceed, the Contractor shall submit a Construction Schedule in CPM (Critical Path Method) form to the Project Manager for approval. The Construction Schedule shall be sufficiently detailed to accurately depict all the work required by the Contract. CPM Construction Schedule shall reflect shop drawings; submittals due and return dates, fabrication and delivery times, cost loading, crew mix, and equipment loading data. The Contractor shall thereafter adhere to the Construction Schedule, as updated monthly, or as necessary in accordance with the Contract Documents, including any scope changes or changes in the work approved by the Owner during the course of construction. "Slack" or "float" time on the CPM Construction Schedule is not intended, and shall not be, for the sole benefit of either the Owner or Contractor.
- B. Within fourteen (14) calendar days after the pre-construction conference, the Contractor shall provide a Submittal and Procurement Schedule indicating time periods for review of Shop Drawings, Data, Samples, and procurement of material and equipment required for the Work. Contractor shall allow time for submittal review in accordance with the General Requirements Section – Construction Progress Documentation. All items that require review by the Project Manager and/or are not readily available from stock and requiring more than thirty-five (35) days lead-time shall be included in the Submittal and Procurement Schedule. Items listed in the Submittal and Procurement Schedule shall also be identified as activities on the CPM Construction Schedule. Contractor shall identify items requiring coordination with work of

separate contractors. The working day to calendar date correlation shall be based upon the Contractor's proposed work week with adequate allowance for legal holidays, days lost due to abnormal weather, and any special requirements of the Project.

- C. The Construction Schedule shall be prepared and maintained by the Contractor.
- D. The Owner, Project Manager, Contractor and other Contractor(s) shall jointly review the progress of the work weekly. Should this review, in the opinion of the Project Manager, indicate that the work is behind the schedule established by currently reviewed Construction Schedule, the Contractor shall either (1) provide a plan to the Project Manager indicating the steps the Contractor intends to take in order to recover the time behind schedule and conform to the reviewed Construction Schedule; or (2) submit a revised Construction Schedule for completion of the work, remaining within the contract completion time, to the Project Manager for review by the next weekly meeting. If the Contractor's recovery or revised schedule requires work to occur during other than normal working hours, the Contractor will be responsible for any resulting costs incurred by the Owner, including but not limited to, the costs for construction management, contract administration, inspection, testing and staffing.
- E. The Contractor shall deliver copies of his/her daily job logs to the Project Manager and Owner on a weekly basis or as otherwise agreed to by Owner. At a minimum, the Contractor's daily job log should include the sub-contractors working onsite, number of workers and their trade classification, description of work, visitors, temperature and weather conditions, accidents, delays, and any other important information pertaining to the Project that day. The Contractor will schedule and coordinate the Work of all sub-contractors on the Project. The Contractor will keep the Sub-contractors informed of the Construction Schedule to enable the Contractor to plan and perform the Work properly.

#### 2.18 RECORDS, DOCUMENTS AND SAMPLES AT THE SITE

- A. The Contractor shall maintain all records of required Review Agencies, County or State inspections and shall promptly notify the Project Manager of the results of any inspection. Copies of all such records shall be provided to the Owner.
- B. The Contractor shall secure and maintain required certificates of inspection, testing or approval and shall promptly deliver them to the Project Manager.
- C. The Contractor shall maintain at the Project site, on a daily basis, one (1) record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and reviewed Shop Drawings, Product Data and Samples. These shall be available to the Project Manager and the Owner and reviewed weekly, and shall be delivered to the Project Manager for forwarding to the Owner upon completion of the Project. The Contractor shall advise the Project Manager on a current basis of all changes in the Work made during construction. Payment may be withheld from Contractor for failure to maintain current Record Documents.

2.19 USE OF SITE

- A. The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents, and shall not unreasonably encumber the site with any materials or equipment.
- B. The Contractor shall coordinate all of the Contractor's operations with, and secure approval from, the Project Manager before using any portion of the site. Also see Technical Specifications, Division 01, General Requirements.

2.20 CUTTING AND PATCHING OF WORK

- A. The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.
- B. The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor consent to cutting or otherwise altering the Work.
- C. The Contractor in all cases shall exercise extreme care in any cutting operations, and perform such operations under adequate supervision by competent mechanics skilled in the applicable trade. Openings shall be neatly cut and shall be kept as small as possible to avoid unnecessary damage. Careless and/or avoidable cutting damage, etc., will not be tolerated, and the Contractor will be held responsible for such avoidable or willful damage.
- D. All replacing, patching and repairing of all materials and surfaces cut or damaged in the execution of the Work shall be performed by experienced mechanics of the several trades involved. All work of such nature shall be done with the applicable materials, in such a manner that all surfaces so replaced, repaired, or patched, will, upon completion of the Work, match the surrounding similar surfaces.

2.21 CLEANING UP

- A. The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Contractor's operations. At the completion of the Work, the Contractor shall remove all the Contractor's waste materials and rubbish from and about the Project as well as all the Contractor's tools, construction equipment, machinery and surplus materials.
- B. If the Contractor fails to clean up at the completion of the Work, the Owner may do so, and the cost thereof shall be paid by the Contractor.

## 2.22 INDEMNIFICATION

- A. To the fullest extent permitted by law, Contractor agrees to and shall indemnify, save, hold harmless and at Owner's request, defend Owner and its officers, agents and employees, and the Architect and Consultants and their respective officers, agents and employees, from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to Owner, the Architect or Consultants in connection with the performance, or failure to perform, by Contractor, its officers, agents or employees under this Agreement, and from any and all costs and expenses, attorney fees and court costs, damages, liabilities, claims and losses occurring or resulting to any person, firm or corporation who may be injured or damaged by the performance, or failure to perform, of Contractor, its officers, agents or employees under this Agreement. In addition, Contractor agrees to indemnify Owner for Federal, State of California and/or local audit exceptions resulting from non-compliance herein on the part of Contractor.
- B. In any and all claims against the Owner, the Architect or Consultants, or any of their respective officers, agents or employees, initiated by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation set forth in the immediately preceding paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

## 2.23 FAIR EMPLOYMENT PRACTICES CLAUSE

Nondiscrimination: In connection with the performance of Work under the contract, the Contractor agrees (as prescribed in Chapter 6 of Division 3 of Title II of the Government Code of the State of California, commencing at Section 12900 and by Labor Code Section 1735) not to discriminate against any employee or applicant for employment because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status or sex. The aforesaid provisions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees and applicants for employment, Notices to be provided by the County, setting forth the provisions of this discrimination clause. The Contractor further agrees to insert the foregoing provisions in all subcontracts hereunder, except subcontracts for standard commercial supplies of raw materials.

## 2.24 PAYMENT

### A. CONTRACT SUM

The Contract Sum is stated in the Owner-Contractor Agreement ("the Agreement"), Section 005213, and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

B. SCHEDULE OF VALUES

Before the first Application for Payment, the Contractor shall submit to the Project Manager a Schedule of Values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Project Manager may require. This schedule, unless objected to by the Project Manager, shall be used only as a basis for the Contractor's Applications for Payment.

C. APPLICATIONS FOR PAYMENT

The Owner will make progress payments to the Contractor upon completion of portions of the Work, as covered by the Contract Documents, in accordance with established Owner procedures. Before submitting an Application for Payment (Final or Partial) the Contractor shall reach an agreement with the Project Manager (in consultation with the Architect) concerning the percentage complete of the Work and the dollar value for which the Application for Payment may be submitted.

1. On or about the twentieth (20th) day of the month in which the work was performed, the Contractor shall submit to the Project Manager an itemized Application for Payment, notarized if required, supported by such data substantiating the Contractor's right to payment as the Owner or the Project Manager may require, including appropriate updates to the Construction Schedule, and reflecting retainage, if any, as provided elsewhere in the Contract Documents. Payment is expressly conditioned upon submission by the Contractor of conditional and unconditional waivers and release of lien rights upon progress payment as the Owner or the Architect may require. Waiver and Release forms must be submitted on forms approved by the Owner. Copies of said forms shall comply with Civil Code Section 8132 through 8138, inclusive.
2. Unless otherwise provided in the Contract Documents, payments may be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site and, if approved in advance by the Owner, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance and transportation to the site for those materials and equipment stored off the site.
3. The Contractor warrants that title to all work, materials and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, stop notices, claims, security interest or encumbrances, hereinafter referred to as "liens"; and that no work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing work at the site or furnishing materials



and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

4. On or about the twentieth (20<sup>th</sup>) day of the month following the month in which the work was performed, the Owner shall pay to the Contractor ninety-five percent (95%) of the value of said work in place, as checked and approved by the Project Manager. The balance of five percent (5%) of the estimate shall be retained by the Owner until the time of final acceptance of said work. In lieu of the five percent (5%) retainage, the Contractor may substitute securities as provided herein below.
  - a. If the Owner does not pay the Contractor within thirty (30) days after receipt of an undisputed and properly submitted payment request for a progress payment, excluding that portion of the final payment designated by the contract as retention earnings, then the Owner shall pay interest to the Contractor as provided by Public Contract Code Section 20104.50. Said interest penalty is the sole recourse of Contractor and Contractor shall have no right to stop the Work until payment of the amount owing has been received, nor shall the contract completion time be extended, nor shall the Contract Sum be increased in any way, including by reason of any costs incurred by Contractor, except to the extent of said interest payment.
  - b. Pursuant to Public Contract Code Section 7107, in the event of a dispute between the Owner and Contractor, the Owner may withhold from the final payment an amount not to exceed one hundred and fifty percent (150%) of the disputed amount. Except as so provided, the Owner shall release the retention withheld within sixty (60) days after the date of completion of the Work, as "completion" is defined in Public Contract Code Section 7107. In the event that retention payments are not made within the time periods required by Public Contract Code Section 7107, the Owner may be subject to the interest provisions of Public Contract Code Section 7107.
5. Security Substitutions and Escrow for Moneys Withheld to Insure Contractor's Performance. Pursuant to Public Contract Code section 22300, the Contractor may deposit in an escrow, equivalent securities for any moneys withheld to ensure performance and have said moneys paid directly to Contractor, or, in the alternative, have the Owner deposit such moneys directly into an escrow. Upon the closing of any such escrow, Contractor shall pay to each Subcontractor, not later than twenty (20) days after receipt of the closing payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount of retention withheld to insure the performance of the Contractor. Any escrow established pursuant to this article shall be with a state or federally chartered bank, shall be at the sole expense of the Contractor, and shall be established using an escrow agreement in substantially the following form:

//  
//

(Begin Escrow Agreement)

---

**ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION**

---

This Escrow Agreement is made and entered into by and between the County of Fresno, (hereinafter called "Owner"), \_\_\_\_\_, (hereinafter called \_\_\_\_\_ "Contractor"); and \_\_\_\_\_, a state or federally chartered bank in California, (hereinafter called "Escrow Agent").

For the consideration hereinafter set forth, the Owner, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between the Owner and Contractor for \_\_\_\_\_ in the amount of \$ \_\_\_\_\_, and dated \_\_\_\_\_ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within ten (10) days of the deposit. The market value of the securities at the time of the substitution, as valued by the Owner, shall be at least equal to the cumulative total cash amount then required to be withheld as retention under the terms of the contract between Owner and Contractor. If the Owner determines that the securities are not adequate it will notify Contractor and Escrow Agent, and Contractor shall deposit additional security as further determined by the Owner. Securities shall be held in the name of the Owner and shall designate the Contractor as the beneficial owner.
2. Securities eligible for investment under subdivision (c) of the above-referenced Section 22300 shall include those listed in Section 16430 of the Government Code, and shall also include bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, and standby letters of credit. Deposit of any other type of security may be permitted only by mutual agreement of the Contractor and the Owner, evidenced by an amendment to this agreement executed by all of the parties hereto.
3. Upon the deposit of adequate securities, Owner shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions.
4. When the Owner, at Contractor's written request, makes payment of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the Owner pays the Escrow Agent directly.
5. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the Owner. The Owner, Contractor and Escrow Agent shall determine these expenses and payment terms.

6. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.
7. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.
8. The Owner shall have the right to draw upon the securities or any amount paid directly to Escrow Agent in the event of default by the Contractor. Upon seven (7) days written notice to the Escrow Agent from the Owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash, including any amounts paid directly to Escrow Agent, as instructed by the Owner. Escrow Agent shall not be concerned with the validity of any notice of default given by Owner pursuant to this paragraph, and shall promptly comply with Owner's instructions to pay over said escrowed assets. Escrow Agent further agrees not to interplead the escrowed assets in response to conflicting demands and hereby waives any present or future right of interpleader.
9. Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payment of fees and charges.
10. Escrow Agent shall rely on the written notifications from the Owner and Contractor pursuant to Sections (6), (7), (8) and (9) of this Agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.
11. The venue of any litigation concerning the rights and obligations of the parties to this agreement shall be the County of Fresno and the parties hereto waive the removal provisions of Code of Civil Procedure Section 394.
12. The names of the persons who are authorized to give written notice or to receive written notice on behalf of the Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

**On Behalf of Owner:**

Title – **Business Manager**

Name – **Lemuel Asprec**

Signature \_\_\_\_\_

Address: **2220 Tulare St, 6<sup>th</sup> Floor  
Fresno, CA 93721**

**On behalf of Contractor:**

Title

Name

Signature \_\_\_\_\_

Address:

**On behalf of Escrow Agent:**

Title

Name

Signature

Address

At the time the Escrow Account is opened, the Owner and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

**Owner:**

Title – **Steve White, Director  
Department of Public Works  
and Planning**

Signature \_\_\_\_\_

Address – **2220 Tulare St, 6<sup>th</sup> Floor  
Fresno, CA 93721**

**Contractor:**

Title

Name

Signature \_\_\_\_\_

Address

**Escrow Agent:**

Title

Name

Signature

Address

---

(End Escrow Agreement)

6. Itemized Breakdown: The Contractor shall submit a financial breakdown of the work, itemized by crafts or sections as designated by the Owner. The Contractor's payment shall be based upon the monthly percentage of completion of these items.
7. Lien Waivers: The Owner may require the Contractor to submit, along with the progress payment request, notarized lien waivers from each Subcontractor, materials or equipment supplier. Lien waivers shall comply with Civil Code Section 8132, et seq., and the aggregate sum thereof shall reflect all progress payments previously made.

D. CERTIFICATES FOR PAYMENT

1. The Project Manager shall, within seven (7) days after the receipt of the Project Application for Payment, review the Project Application for Payment and either issue a Project Certificate for Payment to the Owner for such amounts as the Project Manager determines are properly due, or notify the Contractor in writing of the reasons for withholding a Certificate provided in Part F of this Section 2.24.
2. The issuance of a Project Certificate for Payment will constitute a representation by the Project Manager to the Owner that, based on the Project Manager's observations at the site as provided herein and the data comprising the Project Application for Payment, the Work has progressed to the point indicated and that, to the best of the Project Manager's knowledge, information and belief, the quality and timeliness of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Completion of the Work, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in the Certificate); and that based upon all currently available information, the Contractor is entitled to payment in the amount certified. However, by issuing a Project Certificate for Payment, the Project Manager shall not thereby be deemed to represent that the Project Manager has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, has reviewed the construction means, methods, techniques, sequences or procedures, or has made any examination to ascertain how or for what purpose the Contractor has used the monies previously paid on account of the Contract Sum.

E. PROGRESS PAYMENTS

1. After the Project Manager has issued a Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents.
2. The Contractor shall promptly pay each Subcontractor upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, the amount to which Subcontractor is entitled, reflecting the percentage actually retained, if

any, from payments to the Contract on account of such Subcontractor's Work. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to their Sub-subcontractors in similar manner.

3. The Project Manager may on request of any Subcontractor, at the Project Manager's discretion, furnish to that Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Project Manager on account of Work done by such Subcontractor.
4. Neither the Owner nor the Project Manager shall have any obligation to pay or to see to the payment of any monies to any Subcontractor or Material Suppliers except as may otherwise be required by law.
5. Neither certification of a progress payment, delivery of a progress payment, nor partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not performed in accordance with the Contract Documents.

F. PAYMENTS WITHHELD

1. The Project Manager may decline to certify payment and may withhold the Certificate in whole or in part to the extent necessary to reasonably protect the Owner, if, in the Project Manager's opinion, the Project Manager is unable to make representations to the Owner as provided herein above for Certificates for Payment. If the Project Manager is unable to make representations to the Owner and certify payment in the amount of the Project Application, the Project Manager will notify the Contractor as provided herein. If the Contractor and the Project Manager cannot agree on a revised amount, the Project Manager will promptly issue a Project Certificate for Payment for the amount for which the Project Manager is able to make such representations to the Owner. The Project Manager may also decline to certify payment or, because of subsequently discovered evidence or subsequent observations, the Project Manager may nullify the whole or any part of any Project Certificate for Payment previously issued to such extent as may be necessary, in the Project Manager's opinion, to protect the Owner from loss because of:
  - a. Defective Work not remedied;
  - b. Third party claims filed or reasonable evidence indicating probable filing of such claims, including claims by separate contractors;
  - c. Failure of the Contractor to make payments properly to Subcontractors, or for labor, materials or equipment;
  - d. Architect's determination, based upon reasonable evidence, that the Work cannot be completed for the unpaid balance of the Contract Sum;
  - e. Damage to the Owner or another contractor;
  - f. Architect's determination, based upon reasonable evidence, that the Work will not be accomplished in compliance with the Work Order Completion Time;

- g. Persistent failure to carry out the Work in accordance with the Contract Documents;
  - h. Failure of the Contractor to submit Construction Schedules or Submittal and Procurement Schedules as required;
  - i. Failure of the Contractor to maintain record drawings on a current basis;
  - j. Failure of the Contractor to submit notarized lien waivers from each Subcontractor, materials or equipment supplier;
  - k. Failure of the Contractor to submit certified payroll reports;
  - l. Stop notice served upon the Owner.
2. A retention in the amount of one-thousand dollars (\$1,000) will be withheld from the Contractor's monthly progress payment for each and every required document not submitted in a timely manner by the Contractor or its subcontractors up to a maximum of ten-thousand dollars (\$10,000). For purposes of this Paragraph, the term "required document" includes, but is not limited to, certified payrolls, labor compliance documents, Disadvantaged Business Enterprise documents, and any other information or documents required to be submitted by the Contractor or any of its subcontractors under the terms of this Agreement or pursuant to applicable federal, state or local laws or regulations. The retention provided for in this Paragraph shall be in addition to any other deduction or retention allowed under this Agreement, and shall be in addition to any other remedy or consequence provided by law for untimely submission of any required document. Such retention shall remain in effect only until such time as the required documents have been submitted by the Contractor or its subcontractor(s) and have been determined by the Owner to be both complete and acceptable as to form.
  3. When the grounds as noted above are removed, payment shall be made for amounts withheld on the basis thereof.

G. COMPLETION AND FINAL PAYMENT

1. Following the Contractor's completion of the Work, the Contractor shall forward to the Project Manager a written notice that the Work is ready for final inspection and acceptance, and shall also forward to the Project Manager a final Application for Payment. Upon receipt, the Project Manager will promptly make such inspection. When the Project Manager finds the Work acceptable under the Contract documents and the Contract fully performed, the Project Manager will issue a Project Certificate for Payment which will certify the final payment due the Contractor. This certification will constitute a representation that, to the best of the Project Manager's knowledge, information and belief, and on the basis of observations and inspections, the Work has been completed in accordance with the Terms and Conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said Certificate, is due and payable. The Project Manager's certification of said Project Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth herein below have been fulfilled.

2. Neither the final payment nor the remaining retainage shall become due until the Contractor submits to the Project Manager (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment, and (3) other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designated by the Owner. If any Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against any such lien. The bond cannot be from the original surety insurer for the Project or any affiliate of the original surety. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such lien.
3. All provisions of this Agreement, including without limitation those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment, and the making of final payment shall not constitute a waiver of any claims by the Owner.
4. Upon completion and acceptance of all work whatsoever required, and upon the release of all claims against the Owner as specified, the Owner shall file a written Notice of Completion with the County Recorder as to the entire amount of work performed.
5. Final payment will be released within sixty (60) days after the date of acceptance of the Work as reflected in the Notice of Completion filed with the County Recorder's Office; provided, that Owner may withhold from the final payment, in the event of a dispute between Owner and Contractor, retentions in and amount not exceeding 150 percent of the disputed amount. At the Contractor's option, the Owner may release retention upon receipt of an unconditional lien release for the full value of the Work and any of its Contract Change Orders.
6. All manufacturers' warranties required by the Contract Documents shall commence on the date of the Notice of Completion for the Work. It shall be the Contractor's responsibility, through appropriate contractual arrangements with all subcontractors, materialmen and suppliers, to ensure compliance with this requirement.
7. The acceptance by the Contractor of the final payment, after the date of Notice of Completion of the Project, shall be and shall operate as a release to the Owner of all claims and of all liability to the Contractor, under the Contract Documents or otherwise, for all things done or furnished in connection with this Work, excepting only the Contractor's claims for interest upon final payment, if such final payment be improperly delayed. No payments, however, final or otherwise, shall operate to release the Contractor or his/her sureties from any



obligations under the Contract Documents, including but not limited to the Performance and Payment Bonds.

## 2.25 CHANGES TO THE WORK

- A. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletion or other revisions. All such changes in the Work shall be authorized by a Contract Change Order, and shall be performed under the applicable conditions of the Contract Documents.
- B. **CONTRACT CHANGE ORDER:** A Change Order issued to add or delete Work from the Contract. Only an executed Contract Change Order will effectuate change in either the Contract Sum and/or the contract time. A Change Order is a written order to the Contractor dually signed to show both the approval of the Architect and Authorization of the Owner, issued after execution of the Contract. A Change Order signed by the Contractor indicates the Contractor's agreement therewith, including any adjustment in the Contract Sum or the contract time, and the full and final settlement of all costs (direct, indirect and overhead) related to the Work authorized by the Change Order.
- C. All claims for additional compensation to the Contractor shall be presented in writing before the expense is incurred and will be adjusted as provided herein. No work shall be allowed to lag pending such adjustment, but shall be promptly executed as directed, even if a disputed claim arises. No claim will be considered after the work in question has been done unless a Contract Change Order has been issued or a timely written notice of claim has been made by Contractor.
- D. Costs mean an itemized breakdown of all labor (by crafts), materials, sales taxes, equipment rentals, etc., for each portion of the Work which comprises the Change Order including any Subcontractor's itemized breakdown, plus not more than twenty (20) percent to cover all profits and administration. The cost or credit to the Owner resulting from a change in the Work shall be determined in one or more of the following ways:
  - 1. By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
  - 2. By unit prices state in the Contract Documents or subsequently agreed upon;
  - 3. By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
  - 4. By the method provided under Article 2.26.
- E. The amount of credit to be allowed by the Contractor to the Owner, as confirmed by the Project Manager, for any deletion or change that results in a decrease in the Contract Sum will be the amount of the actual cost. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any, with respect to that change.

2.26 CHANGES TO THE CONTRACT (EXTRA WORK AT FORCE ACCOUNT)

- A. If none of the methods set forth in Section 2.25.D, is agreed upon, the Contractor, provided that a written order signed by the Owner is received, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Project Manager, on the basis of reasonable expenditures or savings of those performing the Work attributable to the change, including, in the case of an increase in the Contract Sum, not more than twenty percent (20%) for all overhead and profit. In such case, and also under Section 2.25.D, Paragraph 3, the Contractor shall keep and present, in such form as the Owner or the Project Manager may prescribe, an itemized accounting of actual cost together with appropriate supporting data for inclusion in a Contract Change Order. Unless otherwise provided in the Contract Documents, cost shall be limited to the following:
1. Labor Cost is the cost of labor for the workers (including working foremen) used in the actual and direct performance of the extra work, whether employed by the Contractor, or Subcontractors and Specialized Forces of any tier. Labor Cost shall include:
    - a. Actual Wages paid to the works, plus employer payments to or on behalf of the workers for health and welfare, pension, vacation, and training. If required by the Project Manager, certified payrolls shall be submitted with extra work reports as verification of wages paid to the workers.
    - b. A Labor Surcharge of 20 percent (35 percent for demolition work and roofing work) will be added to the Actual Wages as defined above. The Labor Surcharge shall constitute full compensation for all payments imposed by State and Federal laws, including Workers Compensation Insurance, Social Security, and Unemployment Insurance.
    - c. Subsistence and Travel Allowance if actually paid to the workers. Labor Surcharge will not be added to Subsistence and Travel Allowance.
  2. Equipment Cost is the payment made for the equipment actually used in the performance of the extra work.
    - a. Equipment valued at three hundred dollars (\$300) or less shall be considered as small tools, and no payment will be made therefor.
    - b. Equipment costs will be paid in accordance with the rental rates listed in the "Cal-Trans Equipment Rental Rates, County of Fresno, Department of Public Works and Planning," in effect at the time of bid, available from the Department, Suite 711, Fresno County Plaza Building, 2220 Tulare Street, Fresno, CA 93721.

- c. In the event that any of the equipment to be used is not listed in the above publication, the rental rate shall be agreed upon in writing by the Contractor and CM before the extra work is begun.
3. Materials Cost is the payment made for materials incorporated into the Work.
  - a. Materials Cost shall include sales tax, freight, and delivery charges, less any available discounts whether or not said discounts are taken.
  - b. Materials Cost shall be based upon supplier's or manufacturer's invoice. If invoices or other satisfactory evidence of cost are not furnished within sixty (60) days of delivery or within fifteen (15) days after acceptance of the Contract, whichever occurs first, then the Project Manager shall determine the Materials Cost, in his/her sole discretion, on the basis of available information and on his/her considered experience.
4. Specialized Services are those services or items of extra work that, by agreement of the Contractor and the Project Manager, cannot be performed by forces of the Contractor or his/her Subcontractors, and may be performed by a specialist.
  - a. Specialized Services may be paid for by invoice if the established practice of the specialized force industry does not provide complete itemization of Labor, Equipment and Materials Costs.
5. Markup for Profit, Home Office and Field Office Overhead, Bond Premium, insurance, taxes, and supervision will be added to the total of Labor Cost, Equipment Cost, Materials Cost, and Specialized Services.
  - a. Markup will be added only once on any Extra Work at Force Account, regardless of the number of contractors and subcontractors involved.
  - b. It is recognized that individual contractors and subcontractors have different overhead costs, profit requirements and bond premium rates. The amount to be added to Extra Work for markup shall include compensation for profit, overhead and bond premium without distinguishing among these items.
  - c. The markup to be added for Extra Work at Force Account on this Project shall be fifteen percent (15%) plus 1-1/2% for Performance and Payment Bonds for Contractor only.
6. Records shall be maintained by the Contractor and Subcontractors in such a manner as to provide a clear distinction between the costs of Extra Work paid for on a force account basis and the costs of other operations. From these records, the Contractor shall furnish the Project Manager a completed extra work report for each day's extra work to be paid for on a force account basis. Extra work reports shall

itemize the materials used, equipment rental charges, and specialized services costs, and shall provide names or identifications and classifications of workmen, the hourly rate of pay, and hours worked. Extra work reports shall be compiled and submitted to the Project Manager daily for verification and signature. Extra work reports shall be signed by the Contractor or his/her authorized representative.

7. If the Contractor disputes the Architect's cost determination, the Contractor may initiate a claim in compliance with the Claims and Disputes Resolution provisions of these General Conditions.

## 2.27 SITE CONDITIONS

- A. Where investigations have been conducted by the Owner of existing conditions on a site, including subsurface conditions, such investigations are made for the purpose of design only and for the information of bidders. The results of such investigations represent only the statement by the Owner as to the circumstance and character of materials actually encountered by the Owner during the investigations. The Owner makes no guarantee or warranty, express or implied, that the conditions indicated are representative of conditions existing throughout the site of a Project or any part of it, or that unanticipated conditions might not occur.
- B. All excavation work shall be performed on an "unclassified basis"; that is, such work shall include the removal of all material encountered including earth or rock formations, regardless of the type or hardness thereof, or groundwater conditions in the excavation, the cost of such excavations being included in the Contract Sum. Unclassified excavation Work includes drilling or blasting operations.
- C. If site conditions are discovered that materially differ from previous information that the Contractor has received, and that could not have been discovered by the Contractor through prudent and reasonable investigation prior to developing the Contract Sum for the Work, the Contractor shall be compensated for additional costs incurred in working with the unknown site conditions, but only to the extent that such previously unknown and undiscoverable site conditions cause the Contractor to incur costs in addition to the Contract Sum for that portion of the Work. The Contractor must be able to demonstrate clearly the original Contract Sum for that portion of the Work (plus any Contract Change Orders applicable to that portion of the Work) and the additional costs incurred as a direct result of the unknown site conditions. Only additional costs over and above the amount of the Contract Sum for that portion of the Work will be compensated upon a recommendation of approval by the Project Manager.

## 2.28 REQUEST FOR EQUITABLE ADJUSTMENT

- A. If the Contractor considers a Request for Equitable Adjustment is justified for any increase in the contract time, the Contractor shall promptly, upon first observance of the condition giving rise to the request, provide the Project Manager and Owner written notice of such condition and circumstance. This notice shall be given by the Contractor before proceeding to execute the Work,

except in emergency endangering life or property, in which case the Contractor shall proceed in accordance with the Emergency provisions of these General Conditions. No such request shall be valid unless so made. A Contract Change Order shall be required to authorize any change in the contract time resulting from such request for equitable adjustment.

- B. If the Contractor requests that additional cost or time is involved because of, but not limited to, (1) any written interpretation pursuant to Section 2.07.G, (2) any order by the Owner to stop the Work pursuant to Section 2.08 where the Contractor was not at fault, or any such order by the Project Manager as the Owner's agent, (3) any written order for a minor change in the Work issued pursuant to Section 2.29, the Contractor shall make such request for equitable adjustment as provided in Section 2.28.A.

#### 2.29 MINOR CHANGES IN THE WORK

The Project Manager will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or extension of the contract time and not inconsistent with the intent of the Contract Documents. Such changes shall be enacted by written order issued through the Project Manager, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly.

#### 2.30 SUCCESSORS AND ASSIGNS

The Owner and the Contractor, respectively, bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other.

#### 2.31 ASSIGNMENT OF MONEYS

The Contractor shall not assign moneys due or to become due him/her under the contract without the written consent of the Auditor-Controller of Fresno County. Any assignment of moneys shall be subject to all proper set-offs in favor of the County of Fresno and to all deductions provided for in the contract and particularly all money withheld, whether assigned or not, shall be subject to being used by the County of Fresno for the completion of the work in the event that the Contractor should be in default therein.

#### 2.32 GUARANTEE OF WORK

- A. The Contractor warrants to the Owner that all materials and equipment and the Work as a whole furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents, for a period of 365 Calendar Days from the date of acceptance of the Work as specified in the Notice of Completion, unless a longer period is otherwise specified. All manufacturer's

warranties required by the Contract Documents shall commence on the date of the filing of the Notice of Completion for the Work (which date necessarily will follow the performance under separate contracts). It shall be the Contractor's responsibility, through appropriate contractual arrangements with all subcontractors, material men and suppliers, to ensure compliance with this requirement. All Work not conforming to these requirements, including substitutions not properly reviewed and authorized, may be considered defective. If required by the Project Manager, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

- B. If repairs or changes are required in connection with guaranteed work within any guaranteed period, which, in the opinion of the Project Manager is rendered necessary as the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the Contract Documents, the Contractor shall, promptly upon receipt of notice from the Owner, and without expense to the Owner (1) place in satisfactory condition in every particular all of such guaranteed work, correct all defects therein, and (2) make good all damage to the building or site, or equipment or contents thereof, which, in the opinion of the Project Manager, is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the Contract Documents; and (3) make good any work or materials, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.
- C. If the Contractor disturbs any work guaranteed under another contract in fulfilling the requirements of the contract or of any guarantee, embraced in or required thereby, he/she shall restore such disturbed work to a condition satisfactory to the Project Manager and guarantee such restored work to the same extent as it was guaranteed under such other contract.
- D. The Owner may have the defects corrected if the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee and the Contractor and his/her surety shall be liable for all costs and expenses incurred in connection therewith.
- E. All special guarantees applicable to definite parts of the work that may be stipulated in the Contract Documents shall be subject to the terms of this Article 2.32 during the first (1<sup>st</sup>) year (365 Calendar Days) of the life of such special guarantee.

### 2.33 RESPONSIBILITY FOR DAMAGE

- A. Neither the Owner, the Architect, nor any officer or employee of the County, or officer or employee thereof, within the limits of which the work is being performed, shall be answerable or accountable in any manner, for any loss or damage that may happen to the work or any part thereof; or for any of the materials or other things used or employed in performing the work; or for injury to any person or persons, either workmen or the public, for damage to property from any cause which might have been prevented by the Contractor, or his/her workmen, or anyone employed by him/her, against all of which injuries or damages to persons and property the Contractor having control over such work must properly guard.

- B. The Contractor shall be responsible for any liability imposed by law for any damage to any person or property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before the issuance of the Notice of Completion.
- C. The Contractor shall indemnify and hold harmless the Owner, the Project Manager, the Architect, and all of their respective officers and employees, from all claims, lawsuits or actions of every kind and nature whatsoever, brought for, or on account of any injuries or damages received or sustained by any person or persons, resulting from any act or admission by the Contractor or his/her servants or agents, in the construction of the work or by or in consequence of any negligence in guarding the same, in improper materials used in its construction, or by or on account of any act or omission of the Contractor or his/her agents in the performance of Contractor's obligations under the Contract Documents. In addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall be considered necessary by the Owner may be retained by the Owner until disposition has been made of such claims, lawsuits or actions for damages as aforesaid.

#### 2.34 WRITTEN NOTICE

Subject to any additional requirements that may be applicable to claims under the immediately following Article 2.35 RESOLUTION OF CONTRACT CLAIMS AND DISPUTES, formal service, when required, of written notice shall be deemed to have been duly served if delivered in person, to the individual or member of the firm or entity or to an officer of the corporation for whom it was intended, or if sent by registered or certified mail to the listed address of that entity for the attention of such individual.

#### 2.35 RESOLUTION OF CONTRACT CLAIMS AND DISPUTES

- A. A Claim is a demand or assertion sent by registered mail or certified mail with return receipt requested by one (1) of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time, or a request for equitable adjustment or Contract Change Order which cannot be resolved per provisions of Section 2.25 - CHANGES TO THE WORK. Any Claim shall be reduced to writing and filed with the Project Manager, within ten (10) calendar days after the Contractor has notice of the condition giving rise to the Claim, and final action per Section 2.25 - CHANGES TO THE WORK procedures has taken place or has been declared as such in writing, by either party. Such ten (10)-day notice of an asserted claim is in addition to the requirement for prompt notice required per Section 2.25 - CHANGES TO THE WORK.
- B. The Contractor shall not claim or recover any overhead cost administrative or otherwise, particularly 'Home Office' expenses, 'Extended site overhead', or any other overhead cost on the basis of any 'Home Office' damages formula, 'Eichleay' formula, 'Total Cost' recovery formula or any other such formula.
- C. REQUIREMENTS FOR FILING A CLAIM. Claims shall be submitted to the Project Manager. Claims must be filed within the time specified above, but in

no event shall any claim be considered by the Project Manager that is filed later than the date of final payment of the Project. The claim shall be in writing and shall be a sum certain if known. If unknown, Contractor shall specify the basis for establishing the sum certain. Claim shall include a statement of the reasons for the asserted entitlement, and include the documents necessary to substantiate the claim. Such documents may include but are not limited to payroll records, purchase orders, quotations, invoices, estimates, subcontracts, daily logs, supplier contracts, subcontract billings, bid takeoffs, equipment rental invoices, ledgers, journals, daily reports, job diaries, and any documentation related to the requirements of Section 2.25 - CHANGES TO THE WORK. In the case of a continuing delay, only one (1) claim is necessary. If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the critical activities on the construction schedule. The Contractor shall certify, at the time of submission of a claim, as follows:

"I, \_\_\_\_\_, being \_\_\_\_\_ the  
\_\_\_\_\_ (MUST BE AN OFFICER) of  
\_\_\_\_\_ (GENERAL CONTRACTOR),  
declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; he supporting data is truthful and accurate; the amount requested accurately reflects the contract adjustment for which the Contractor believes the Owner is liable; and, further, that I am familiar with California Penal Code Section 72 and California Government Code Section 12560, et seq, pertaining to false claims, and further know and understand that submission or certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

By: \_\_\_\_\_  
(Contractor's signature) (Date)

- D. Nothing in this Article is intended to extend the time limit or supersede notice requirements otherwise provided by this contract or by applicable law for the filing of claims. Any formal claim shall be processed in accordance with the provisions of Public Contract Code Section 9204 and Section 20104 et. seq., each of which establishes a process for resolution of claims, the provisions of which are consistent with and effectively summarized by the following
1. The Owner (or his/her designee), shall review the facts pertinent to the claim, obtain additional information deemed necessary for a decision (if any), review recommendations of the Project Manager, coordinate with the contract administrator (if any) and secure assistance from legal and other advisors, and render a written decision on the claim within forty-five (45) days of receipt of the claim. If additional information or documentation is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the Owner (or his/her designee) and claimant. The Owner's (or his/her designee's) written response to the claim, as supplemented by any additional information and/or documentation provided by claimant,



shall be submitted to the claimant within fifteen (15) days after receipt of the further information and/or documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

- a. For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the Owner (or his/her designee), shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the Owner (or his/her designees) may have against the claimant.
  2. If the claimant disputes the written response of Owner (or his/her designee), or Owner fails to respond within the time prescribed, the claimant may so notify the Owner (or his/her designee), in writing, either within fifteen (15) days of receipt of the Owner (or his/her designee's) response or within fifteen (15) days of the Owner (or his/her designee's) failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the Owner (or his/her designee) shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.
  3. Within ten (10) business days following conclusion of the meet and confer conference, any unpaid portion of the claim remaining in dispute shall be submitted to nonbinding mediation, as that term is defined by Public Contract Code Section 9204(d)(2)(C).
  4. If following the conclusion of the meet and confer conference and mediation process, the claim or any portion thereof remains in dispute, the claimant may file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his/her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference and mediation process as described in the immediately preceding Paragraphs 2 and 3 of this Section D.
  5. In the event of any perceived conflict between the summary of the procedure set forth in this Article and the actual provisions of the Public Contract Code Section 9204 and Section 20104, et seq., the statutory provisions shall control; and in the event of any perceived conflict between the provisions of Section 9204 and Section 20104, et seq., the provisions of Section 9204 shall control.
- E. Procedures for Civil Actions to Resolve Disputed Claims: Non-binding Mediation: Within sixty (60) days, but no earlier than thirty (30) days, following the filing of a responsive pleading, the court shall submit the matter

to non-binding mediation unless waived by mutual stipulation by both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause shown to the court. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

**Judicial Arbitration:** If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of the code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subsection consistent with the rules pertaining to judicial arbitration. Arbitrators shall be experienced in construction law.

**Appeals:** As provided by statute (specifically Public Contract Code section 20104.4(b)(3) and Code of Civil Procedure section 1141.21), any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees, also pay the attorneys' fees on appeal of the other party.

- F. CLAIMS AND DISPUTES EXEMPT FROM FILING REQUIREMENTS. The requirements and procedures imposed by this Article do not apply to:
1. Any claims by the Owner; or
  2. Any claim for or respecting personal injury or death or reimbursement or other compensation arising out of or resulting from liability for personal injury or death; or
  3. Any claim or dispute relating to stop payment requests or stop notices; or
  4. Any claim or dispute related to the approval, refusal to approve, or substitution of Subcontractors, regardless of tier, and suppliers.
- G. PAYMENT OF UNDISPUTED PORTION OF CLAIM. Owner shall pay claimant such portion of a claim that is undisputed except as otherwise provided in the contract.
- H. CONTINUE WORK DURING DISPUTE. In the event of any disputed claim or other dispute between the Owner and the Contractor, the Contractor will not stop work but will prosecute the work diligently to completion in his/her manner directed by the Owner, and the dispute shall be resolved by a court of law after completion of the Work. However, Contractor must submit all disputes in accordance with the provisions of this Section 2.35.

- I. SUIT IN FRESNO COUNTY ONLY. Any litigation arising out of this Contract shall be brought in Fresno County and Contractor hereby waives the removal provisions of California Code of Civil Procedure Section 394.

2.36 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND AND WARRANTY BOND

A. The Contractor shall furnish Performance Bond in the amount of one hundred percent (100%) of the Contract Sum, and Payment Bond in the amount of one hundred percent (100%) of the Contract Sum and One Year Warranty Bond in the amount of ten percent (10%) of the Final Contract Sum, which is the cumulative amount that will have been paid to Contractor for all of the Work performed under the Contract once the Project has been completed and the Work has been accepted by the County.]

- B. All bonds required, whether Bid bonds, Performance, Payment, Warranty or other bonds, shall be issued by an admitted surety insurer authorized by the California Insurance Commissioner to transact surety insurance in the state. The same admitted surety insurer must issue the Bid Bond, Performance Bond, Payment Bond, and Warranty Bond. The payment, performance and warranty bonds required by these specifications will neither be accepted nor approved by the Owner unless the bonds are underwritten by an admitted surety and the requirements of California Code of Civil Procedure section 995.630 are met. The bonds must include a physical mailing address, phone number, FAX number, and contract person for the admitted surety insurer. The Owner further reserves the right to satisfy itself as to the acceptability of the surety and the form of bond. Upon request of the Owner, the bidder must submit the following documents:

1. The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument authorizing the person who executed the bond to do so.
2. A certified copy of the certificate of authority of the insurer issued by the California Insurance Commissioner.
3. A certificate from the county clerk that the certificate of authority has not been surrendered, revoked, canceled, annulled, or suspended, or in the event that it has, that renewed authority has been granted.
4. A financial statement of the assets and liabilities of the insurer to the end of the quarter calendar year prior to thirty (30) days next preceding the date of the execution of the bond, in the form of an officers' certificate as defined in Corporations Code section 173.

2.37 RIGHTS AND REMEDIES

- A. The duties and obligations imposed by the Contract Documents and the rights and remedies available hereunder shall be in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

- B. No action or failure to act by the Owner, or by the Project Manager or Architect, regarding any deficiency, breach or default in performance by the Contractor under the Contract Documents, shall be deemed or construed to constitute acquiescence of the Owner in connection therewith or with regard to any subsequent deficiency, breach or default in performance by the Contractor; nor shall any such prior act of failure to act by or on behalf of Owner be deemed or construed as a waiver of any rights in favor of Owner regarding any such deficiency, breach or default in performance by the Contractor, regardless of the similarity to the prior incident or circumstance when no action was taken regarding any alleged deficiency, breach or default in performance by the Contractor.

## 2.38 TIME, DELAYS AND LIQUIDATED DAMAGES

### A. DEFINITIONS

1. Unless otherwise provided, the contract time is the period of time allotted in the Contract Documents for completion of the Work, including authorized adjustments thereto.
2. The Date of Commencement of the Work is the date established in the Notice to Proceed.
3. The Date of Completion of the Work is the date on which the work is certified as complete by the Project Manager as specified in the Notice of Completion.
4. The term "day" as used in the Contract Documents shall mean calendar day unless specifically designated otherwise.

### B. PROGRESS AND COMPLETION

1. Time is of the essence regarding all time limits stated in the Contract Documents. By executing the Agreement, the Contractor confirms that the contract time is a reasonable period for performing the Work.
2. The Contractor shall begin the Work on the Date of Commencement. The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required herein to be furnished by the Contractor. The Date of Commencement of the Work shall not be changed by the effective date of such insurance.
3. The Contractor shall carry the Work forward expeditiously with adequate forces and shall achieve Completion of the Work within the contract time.

### C. DELAYS AND EXTENSIONS OF TIME

1. Delays in prosecution of parts or classes of the Work that are not demonstrated to prevent or delay completion of the entire Project or specific milestones within the contract time are not "unavoidable delays" for purposes of this section.

2. In all cases, the time authorized for extension of the contract time shall be no greater than the number of days directly attributable to the event or circumstances which causes unavoidable delay in the completion of the Project. Contractor shall be entitled, in the case of unavoidable delays, to an extension in the contract time, but not to any increase to the Contract Sum. "Unavoidable delay" for this purpose shall be defined as follows:
  - a. Unavailable Materials. That materials or articles called for in the Contract Documents are not obtainable within the time required for timely completion; provided that such materials or articles were listed by the Contractor in the schedule required by Section 2.17 - CONTRACTOR'S CONSTRUCTION SCHEDULE; that the Contractor demonstrates that the unavailability of the materials is in fact the cause for the delay, and could not have been avoided by an appropriate adjustment in the Construction Schedule; and that the unavailability of such materials is due to circumstances beyond the Contractor's control. If good cause for delay is demonstrated pursuant to this subsection, the Owner, at its sole discretion, may grant a time extension.
  - b. Force Majeure. That delays in construction have resulted from circumstances beyond the control of the Contractor and which the Contractor could not have provided against by the exercise of reasonable care, prudence, foresight, and diligence. Unavoidable delays within the meaning of this subparagraph shall be those caused by acts of God, war, insurrection, civil disorder, fire, floods, epidemic, or strikes.
  - c. Unseasonable Weather. An extension of contract time may be granted due to weather which is unsuitable for the Work currently in progress, upon the determination of the Owner that the weather conditions in fact caused the delay in completion of the Project and that such weather conditions were not, and could not in the exercise of reasonable diligence, have been foreseen by the Contractor. Seasonable weather that, in the exercise of reasonable foresight and diligence, should be expected in the area at the time of year in question is not cause for an extension of time.
  - d. Time Extensions Due to Contract Change Orders or Work Authorizations. A time extension may be granted due to additional work that results in a delay in the Project caused by the approval by the Owner of a Contract Change Order or Work Authorization. The Contractor shall be entitled to a contract time extension Change Order only when the extra Work is demonstrated by the Contractor to have caused a delay in the Project.
  - e. Owner Caused Delays. In the event that the Project is delayed by acts of the Owner not authorized by the Contract Documents which the Contractor demonstrates will or have caused an unavoidable delay, the Contractor shall be entitled to a contract

time Change Order to offset the extra time incurred by the Contractor. The Contractor will not be entitled to adjustments in the Contract Sum. Extra time shall be limited to that which is directly identified as critical by the delay.

4. The Contractor specifically agrees that a time extension as provided herein is its sole remedy for Owner-caused delays, and agrees to make no claim or demand for additional damages, nor claim an acceleration of the time for performance.
5. The Contractor shall not be entitled to any contract time extension nor Contract Sum adjustment for alleged Owner delays if the Owner has acted within the time limits specified by the Contract Documents.

D. NOTICE OF DELAYS

1. Contractor shall notify the Project Manager promptly whenever the Contractor foresees any event or circumstance that may delay the prosecution of the Work and in Contractor's opinion may provide grounds for an extension, and shall in any event notify the Project Manager immediately upon the occurrence of any such delay. The Contractor shall take immediate steps to prevent, if possible, the occurrence or continuance of the delay. If this cannot be done, the Project Manager shall determine how long the delay shall continue and to what extent the prosecution and completion of the Work are being delayed thereby. Such notification shall specify with detail the cause asserted by the Contractor to constitute grounds for an extension. Failure of the Contractor to submit such a notice within ten (10) days after the initial occurrence of the event-giving rise to the delay shall constitute a waiver by the Contractor of any request for a time extension, and no extension shall be granted as a consequence of such delay.
2. If the Contractor believes that the delay in prosecution in the Work will result in an unavoidable delay in completion of the entire Project, the Contractor shall submit evidence to support that belief, together with its request for a time extension. Such evidence shall include a demonstration that the delayed portion of the Work will affect the Critical Path Scheduling of the entire Project. The Contractor shall also submit a proposed revised Construction Schedule, which accounts for the delay in completion of the entire Project caused by the delay in prosecution of part of the Project, and includes a revised Critical Path demonstrating how the Project will be completed within the proposed revised contract time.

E. INVESTIGATION; PROCEDURE.

1. Upon receipt of a request for Time extension, the Project Manager shall conduct an investigation of the facts asserted by the Contractor to constitute grounds for an extension. The results of this investigation shall be reported by the Project Manager to the Contractor and shall indicate whether he/she will recommend for or against such extension to the Owner. The performance of this investigation by the Project Manager shall not be construed as direction or recommendation to the

Contractor regarding scheduling of the work. Scheduling this work is the sole responsibility of the Contractor.

2. The Project Manager may, in his/her sole discretion, defer this recommendation to allow the accumulation of time extensions due to Work Authorizations into a periodic or final Contract Change Order request.
3. Upon receiving the Project Manager's recommendation to the Owner regarding the Contractor's request for a time extension, the Contractor may either withdraw its application for extension or request that it be scheduled for action by the Owner. If the Owner disallows the request, there shall be no allowance made for the time during which the request was pending, and the Contractor shall remain obligated to complete the Work in the time specified.
4. If the Owner approves the time extension Contract Change Order, the new Construction Schedule submitted by the Contractor and approved by the Owner shall be deemed to amend the original Construction Schedule approved by the Owner; thereafter, the amended Construction Schedule shall have the same force and effect as the originally approved Progress Schedule.
5. The revised Construction Schedule must be submitted within seven (7) calendar days of the date on which the Owner approves the change.
6. The Contractor agrees that the Owner's determination as to the existence of grounds for an extension and, the duration of any such extension, shall be final and binding upon both Owner and Contractor.

F. DISCRETIONARY TIME EXTENSION FOR BEST INTEREST OF OWNER

1. The Owner reserves the right to extend the contract time for completion of the Work if the Director of Public Works and Planning or designee determines that such extension is in the best interest of the Owner.
2. In the event that such discretionary extension is made at the request of the Contractor, the Owner shall have the right to charge to the Contractor all or any part, as the Board may deem proper, of the actual cost to the Owner for engineering, inspection, supervision, contract administration, incidental and other overhead expenses that accrue during the period of such extension, and to deduct all or any portion of such amounts from the final payment for the Work.
3. In the event such extension is ordered over the objection of the Contractor, the Contractor shall be entitled to a Contract Change Order adjusting the price paid to reflect the actual costs incurred by the Contractor as a direct and proximate result of the delay, upon his/her written application therefor, accompanied by such verification of costs as the Project Manager requires. Only additional direct costs incurred at the site will be reimbursable by Contract Change Order.

G. LIQUIDATED DAMAGES

1. If the Work is not completed by Contractor in the time specified in the Work Order or within any period of extension authorized pursuant to this Article, the Contractor acknowledges and admits that the Owner will suffer damage, and that it is impracticable and infeasible to fix the amount of actual damages. Therefore, it is agreed by and between the Contractor and the Owner that the Contractor shall pay to the Owner as fixed and liquidated damages, and not as a penalty, the sum specified in Section 005213, Agreement, Article III for each calendar day of delay until the Work is completed and accepted, and that both the Contractor and the Contractor's surety shall be liable for the total amount thereof, and that the Owner may deduct said sums from any monies due or that may become due to the Contractor.
2. This liquidated damages provision shall apply to all delays of any nature whatsoever, save and except only unavoidable delays approved by the Owner pursuant to the provisions of Article 2.38.C.2 hereinabove, or discretionary time extensions approved by the Board of Supervisors pursuant to the provisions of Article 2.38.F hereinabove.

H. EXTENSION OF TIME NOT A WAIVER.

1. Any extension of contract time granted pursuant to this Article shall not constitute a waiver by the Owner, nor a release of the Contractor, from his/her obligations to perform the Work within the allotted contract time.
2. Granting of a time extension due to one (1) circumstance on one (1) request therefore shall not constitute a granting by the Owner of an extension of time for any other circumstance or the same circumstance occurring at some other time, and shall not be interpreted as a precedent for any other request for extension.

2.39 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

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

B. SAFETY OF PERSONS AND PROPERTY

The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

1. All employees on the Work and all other persons who may be affected thereby;
2. All the work and all materials and equipment to be incorporated therein, whether in storage or off the site, and that is under the care, custody or control of the Contractor or any of the Contractor's Subcontractors or Sub-subcontractors;



3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and
  4. The work of the Owner or other separate contractors.
- C. The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.
  - D. The Contractor shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent facilities.
  - E. When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.
  - F. The Contractor shall promptly remedy all damage or loss to any property referred to above caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, anyone directly or indirectly employed by any of them, or any one for whose acts any of them may be liable, and for which the Contractor is responsible under the above noted clauses, except damage or loss attributable solely to the acts or omissions of the Owner, the Project Manager, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable in any degree to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under the Indemnification provisions provided herein.
  - G. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and the Project Manager.
  - H. The Contractor shall not load or permit any part of the Work to be loaded in a manner that could endanger its safety or pose a risk to anyone working at the Project site.
  - I. EMERGENCIES  
In any emergency affecting the safety of persons or property the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in the provisions herein for Changes in the Work.

## 2.40 INSURANCE

### A. CONTRACTOR'S INSURANCE

1. Bidders' attention is directed to the insurance requirements below. It is highly recommended that Bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of the insurance certificates and endorsements required below. A bidder who is awarded a contract and thereafter fails to comply strictly with the insurance requirements, will be deemed to be in default of its obligations.
2. Contractor shall procure and maintain for the duration of the Contract, and for 3 years thereafter, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees, or subcontractors. The cost of such insurance shall be included in the Contractor's bid.
3. No later than ten (10) calendar days following the Award of the Contract, and prior to execution of the Agreement for Construction by the Owner, the Contractor shall submit certificates of insurance, signed by an authorized agent of the insurer, attesting to insurance coverage of the Contractor as required by this Article.

### B. MINIMUM SCOPE AND LIMITS OF INSURANCE

Coverage shall be at least as broad as:

1. Commercial General Liability (CGL): Insurance Services Office (ISO) Form CG 00 01 covering CGL on an "occurrence" basis, including products and completed operations, property damage, bodily injury and personal & advertising injury with limits no less than five million dollars (\$5,000,000) per occurrence and an annual aggregate of ten million dollars (\$10,000,000). If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location (ISO CG 25 03 or 25 04) or the general aggregate limit shall be three times the required occurrence limit.
2. Automobile Liability: Insurance Services Office (ISO) Form CA 0001 covering Code 1 (any auto), with limits no less than five million dollars (\$5,000,000) per accident for bodily injury and property damage. Coverage should include owned and non-owned vehicles used in connection with this Agreement and all applicable endorsements.
3. Workers' Compensation insurance as required by the State of California, with Statutory Limits, and Employers' Liability insurance with a limit of no less than one million dollars (\$1,000,000) per accident for bodily injury or disease.
4. Professional Liability with limits no less than \$2,000,000 per occurrence or claim, and \$3,000,000 annual aggregate.

5. Builder's Risk (Course of Construction) insurance utilizing an "All Risk" (Special Perils) coverage form, with limits equal to the completed value of the project and no coinsurance penalty provisions.

If Contractor maintains broader coverage and/or higher limits than the minimums shown above, the Owner requires and shall be entitled to the broader coverage and/or the higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the Owner.

#### *Self-Insured Retentions*

Self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the Contractor shall obtain coverage to reduce or eliminate such self-insured retentions as respects the Owner, its officers, officials, employees, and volunteers; or the Contractor shall provide a financial guarantee satisfactory to the Owner guaranteeing payment of losses and related investigations, claim administration, and defense expenses. The policy language shall provide, or be endorsed to provide, that the self-insured retention may be satisfied by either the named insured or Owner.

#### C. OTHER INSURANCE PROVISIONS

Contractor's insurance policies are to contain, or be endorsed to contain, the following provisions:

1. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers.
2. The County of Fresno, its officers, officials, employees, and volunteers are to be named individually and collectively, as additional insureds on the CGL policy with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers.
3. The insurer shall agree to waive all rights of subrogation against the Owner, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the Owner
4. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as respects the Owner, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the Owner, its officers, officials, employees, or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.
5. Any failure to comply with reporting provisions of the policies shall not affect Coverage provided to the Owner, its officers, officials, employees, agents, Engineers, Consulting Engineers, or volunteers.

6. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
7. All Contractor's insurance policies for coverage required under this agreement shall not be cancelled or changed without a minimum of thirty (30) days advance written notice given to Owner.
8. The insurer shall agree to waive all rights of subrogation against the Owner, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the Owner.
9. The Builder's Risk (Course of Construction) policy shall be an "All Risk" (Special Perils) coverage form, with limits equal to the completed value of the project and no coinsurance penalty provisions. All subcontractors shall be insured to the extent of their portion of the work under the Contractor. The Contractor shall request, and is responsible to confirm with its insurer, that the County of Fresno and all subcontractors are named, both as additional insured and as additional loss payees, on the Builder's Risk insurance policy. The Contractor and all subcontractors waive all rights, each against the others, for damages arising from perils covered by the insurance required under the terms of this article, except such rights as they may have to the proceeds of the Builder's Risk insurance obtained and maintained by the Contractor.

#### D. ACCEPTABILITY OF INSURERS

Contractor shall obtain the policies and coverages specified herein from an admitted insurer in good standing with and authorized to transact business in this state by the California Department of Insurance, and having a Best's rating of no less than A FSC VIII.

#### E. SUBCONTRACTORS

Contractor shall include all Subcontractors as insured under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all of the requirements stated herein.

#### F. EVIDENCE OF COVERAGE

Within ten (10) days of bid award, Contractor shall furnish the Owner with original Certificates of Insurance including all required amendatory endorsements (or copies of the applicable policy language effecting coverage required by this Article 2.40) and a copy of the Declarations and Endorsement Page of the CGL policy listing all policy endorsements to Owner. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. The Owner

reserves the right to require complete, certified copies of all required insurance policies, including endorsements, required by these specifications, at any time.

Certificates of Insurance and Endorsements for all policies must be signed by a person authorized by the insurer to bind coverage on its behalf, indicate the name and address of the official who will administer this contract, state that such insurance coverages have been obtained and are in full force and effect, and clearly indicate that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice has been given to the Owner.

Commercial General Liability Endorsements must name the County of Fresno, its officers, agents and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned; that such coverage for additional insured shall apply as primary insurance and any other insurance, or self-insurance, maintained by Owner, its officers, agents and employees, shall be excess only and not contributing with insurance provided under Contractor's policies herein.

#### 2.41 UNCOVERING WORK

- A. This Section shall apply to any Work installed and covered up by the Contractor that is required by the Building Code or other statutory or regulatory requirement to undergo inspection or special inspection and/or testing approval by an appropriate official representing the Owner or other public authority having jurisdiction to conduct such inspection and/or testing. Work covered up by the Contractor, Contractor's Subcontractor's or Suppliers prior to inspection/special inspection and/or testing approval shall be uncovered and repaired or replaced after inspection approval at the sole expense of the Contractor. This shall apply to all labor and material needed to complete both physical and cosmetic repairs, and any additional inspection costs associated with restoring the Work.
- B. This Section also shall apply to any Work installed and covered up by the Contractor, Contractor's Subcontractor's or Suppliers that is determined by the Owner or its Project Manager, during construction or within the Warranty period, to be defective, broken or inoperative. Work covered up by the Contractor, Contractor's Subcontractor's or Suppliers that is found to be defective, broken or inoperative shall be uncovered and repaired or replaced at the sole expense of the Contractor. This shall apply to all labor and material needed to complete both physical and cosmetic repairs, and any additional inspection costs associated with restoring the Work.

#### 2.42 CORRECTION OF WORK

- A. The Contractor shall promptly correct all Work rejected by the Project Manager as defective or as failing to conform to the Contract Documents, whether or not fabricated, installed or completed. The Contractor shall submit a plan of action, within twenty-four (24) hours of notification of the rejected work by the Project Manager, for correcting the rejected work. The Contractor shall

bear all costs of correcting such rejected Work, including compensation for the additional architectural and/or engineering services made necessary thereby.

- B. If, within 365 Calendar Days after the date of acceptance of the Work as specified in the Notice of Completion, or designated portion thereof, or within 365 Calendar Days after acceptance by the Owner of designated equipment, or within such longer period of time as may be prescribed by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found by Owner to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive both final payment for the Work or designated portion thereof and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.
- C. The Contractor shall, at his/her sole expense, remove from the site all portions of the Work that are defective or nonconforming and which have not been corrected under Articles 2.32, 2.42.A, and 2.42.B, unless the Owner waives removal.
- D. If the Contractor fails to submit a plan of action, within twenty-four (24) hours of notification of the rejected work by the Project Manager, for correcting the rejected work, or fails to correct defective or nonconforming Work as provided herein in Articles 2.32, 2.42.A, and 2.42.B, the Owner may correct it in accordance with Article 2.08.C.
- E. If the Contractor does not take action under the plan to initiate such correction of such defective or nonconforming Work within ten (10) days of written notice from the Project Manager, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten (10) days thereafter, the Owner may, upon ten (10) additional days' written notice, sell such Work at auction or at private sale and shall account for the proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for the Project Manager, Architect, or other Professional's additional services made necessary thereby. If such proceeds of sale do not cover all costs that the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Supplemental Work Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.
- F. The Contractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction or removal.
- G. Nothing contained in this Section 2.42 shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including Section 2.32 hereof. The establishment of the time periods noted in this Section 2.42, or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents, relates only to the specific obligation of the Contractor to correct the defective or nonconforming Work, and has no relationship to the time within which the Contractor's obligation to comply with

the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the defective or nonconforming Work.

#### 2.43 ACCEPTANCE OF DEFECTIVE OR NONCONFORMING WORK

If the Owner prefers to accept defective or nonconforming Work, the Owner may do so instead of requiring its removal and correction, in which case a Contract Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be given effect whether or not final payment has been made. The Project Manager shall determine the amount of reduction in the Contract Sum.

#### 2.44 TERMINATION BY THE OWNER

- A. If the Contractor is adjudged bankrupt, or makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of the Contractor's insolvency, or stop notices are served upon the Owner, or if the Contractor persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards applicable laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contract Documents, and fails after written notice to commence and continue correction of such default, neglect or violation with diligence and promptness, the Owner upon certification by the Project Manager that sufficient cause exists to justify such action, may, after an additional written notice and without prejudice to any other remedy the Owner may have, terminate the Contract and take possession of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever methods the Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished.
- B. If the unpaid balance of the Contract Sum exceeds the costs of finishing the Work, including compensation for the Project Manager's and Architect's additional services made necessary thereby, Contractor will only be paid for his/her actual unpaid costs from such excess. If such costs exceed the unpaid balance, the contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Project Manager, upon application, in the manner provided in Section 2.24 and this obligation for payment shall survive the termination of the Contract.

#### 2.45 SUBSTITUTION OF MATERIALS

- A. When a specific manufacturer, trade name or material is specified, or indicated, it is to establish a standard of quality and shall not be construed as limiting competition. The intent of the Contract Documents is to specify high-grade

standard material and equipment, and it is not the intent of these Contract Documents to exclude or omit the products of any responsible manufacturer, if such products are equally acceptable in terms of quality, finish, performance, durability, and serviceability, in the judgment of the Owner and the Architect, to those specified herein. Wherever an article, or any class of materials, is specified by the trade name or by the name of any particular patentee, manufacturer or dealer, it shall be taken as intending to mean and specify the article of material described or any other equal thereto in quality, finish, performance, durability, and serviceability, in the judgment of the Owner and the Architect, for the purpose for which it is or they are intended.

- B. If the Contractor desires to use material or equipment other than that specified, he/she shall submit a request for approval of such substitution, in writing, to the Project Manager by no later than 10 days prior to bid opening. Substitution requests will not be considered if received after the time stipulated.
- C. The Owner does not guarantee that alternative articles, components, materials or equipment other than the item specified by trade name or other specific identification, will fit within the design parameters of the Project without alteration of the Project design by the Contractor.
- D. The Owner has the right to reject any proposed alternative material which requires alteration of the project design which impacts the safety of the public or the user of a completed facility. If the proposed alternative material requires alteration of the design of the Project or any aspect thereof and said alterations are acceptable to the Owner, the Contractor shall be responsible for performing said alterations at no additional cost to the Owner.
- E. Submittals for approval of substitute materials shall contain sufficient detailed information, descriptive brochures, drawings, samples or other data as is necessary to provide a detailed side-by-side comparison to the specified materials. It is the sole responsibility of the Contractor to submit complete descriptive and technical information so the Project Manager can make proper appraisal. Lack of either proper or sufficient information shall constitute cause for rejection. Reference to product data will not be acceptable.
- F. It is the Contractor's responsibility to confirm and correlate all quantities and dimensions and coordinate with all trades whose work may be affected by the requested substitution.

#### 2.46 REFERENCE TO STANDARDS

- A. Reference to known standards shall mean and intend the latest edition or amendment published prior to date of these Specifications, unless specifically indicated otherwise, and to such portions of it that relate and apply directly to the material or installation called for on the Project.
- B. Where material is specified solely by reference to standard specifications, the Contractor shall, if requested by the Project Manager, submit to the Project Manager for his/her approval, data on all such material proposed to be incorporated into the Work of the Contractor, listing the name and address of



the vendor, the manufacturer or producer, and the trade or brand names of such materials.

#### 2.47 SPECIFICATIONS

- A. The Specifications are organized into Divisions, Sections, and Trade headings based on the Construction Specifications Institute's Master format and the Master format numbering system. This organization 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. The Contractor shall be responsible for examining all Sections of the Specifications for inter-related items of the Work, and for furnishing each item identified or specified.
- B. No responsibility will be assumed by the Owner, Architect or the Project Manager for omissions or duplications by the Contractor in the completion of the Contract due to any alleged discrepancy in the arrangement of the material in these Specifications, nor shall any such segregation of work and materials operate to make the Project Manager an arbiter in defining the limits to the agreements between the Contractor and his/her Subcontractors or suppliers.
- C. The misplacement, addition or omission of any letter, word or punctuation mark shall in no way damage the true spirit, intent or meaning of these Specifications.
- D. The words "shown", "indicated", "noted", "scheduled" or words of that effect shall be understood to mean that reference is made to Drawings accompanying these Specifications.
- E. Where reference herein is made to colors or finishes "as selected", the reference is to the Architect with concurrence by the Owner.

#### 2.48 APPROVED APPLICATORS

- A. Where specific instructions in these Specifications require that a particular product and/or materials be installed and/or applied by an "approved applicator" of the manufacturer, it shall be the Contractor's responsibility to insure that any Subcontractors used for such work be approved applicators.
- B. Contractor accordingly shall bear any and all costs, and shall reimburse Owner for any such costs incurred by Owner, resulting from Contractor's failure to insure the use of an "approved applicator".

#### 2.49 DELIVERY AND STORAGE OF MATERIALS

- A. Deliver all manufactured materials in the original packages, containers or bundles (with the seals intact), bearing the name or identification mark of all manufacturers.
- B. Deliver fabrications in as large assemblies as practicable and where specified to be shop-primed or shop-finished; they shall be packaged or crated as required to preserve such priming or finish intact and free from abrasion.

- C. Store all materials in such manner as necessary to properly protect same from damage, as materials or equipment damaged by handling, weather, dirt or from any other cause will not be acceptable.
- D. Store materials so as to cause no obstructions (i.e. stored off all sidewalks and other walkways, roadways, and underground services). The Contractor shall be responsible for protecting from damage all material and equipment furnished under the Contract.

#### 2.50 QUALITY OF WORK

- A. Where not more specifically described in any of the various Sections of these Specifications, the quality of work shall conform to all of the methods and operations of best standards and accepted practices of the trade or trades involved, and shall include all items of fabrication, construction, or installation regularly furnished or required for completion of the work (including any finish), and for successful operation as intended of the Project and the component thereof corresponding to that work.
- B. All Work shall be executed by mechanics skilled in their respective lines of work.
- C. When completed, all parts shall have been durably and substantially built and shall present a neat, finished appearance.

#### 2.51 HOURS OF WORK

- A. Eight (8) hours of labor shall constitute a legal day's work upon all work done hereunder, and it is expressly stipulated that no worker employed at any time by the Contractor, or by a Subcontractor under this Contract, upon the Work, shall be required or permitted to work thereon more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week, except as provided in Sections 1810-1815 inclusive, of the Labor Code of the State of California, all the provisions of which are deemed to be incorporated herein as if set forth in full; and it is further expressly stipulated that for each and every violation of said last named stipulation, said Contractor shall forfeit, as a penalty to the Owner, fifty dollars (\$50.00) for each worker employed by the Contractor in the execution of this Contract, for each calendar day during which said worker is required or permitted to labor more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week in violation of any of said provisions of the Labor Code.
- B. Notwithstanding the above stipulations, pursuant to Section 1815 of the Labor Code, work performed by employees of contractors in excess of eight (8) hours per day and forty (40) hours during any one (1) week shall be permitted on the Project upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and a half (1 1/2) times the basic rate of pay.

2.52 WAGE RATES AND RELATED LABOR COMPLIANCE REQUIREMENTS

- A. This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR), including the obligation to submit certified payroll records directly to the DIR Compliance Monitoring Unit (CMU) at least monthly using the CMU's eCPR system. Detailed information may be obtained on the State of California's Department of Industrial Relations website, [www.dir.ca.gov/dlse/cmu/CMU](http://www.dir.ca.gov/dlse/cmu/CMU).

The Contractor shall also submit certified payroll records of the Contractor, Subcontractors and all Sub-subcontractors of any tier to the Inspector of Record at least monthly.

- B. Contractor shall, and shall cause each of its Subcontractors (as defined in Labor Code section 1722.1) to provide written proof that they are currently registered with the California Department of Industrial Relations at the time of bid submittal, and have paid the applicable annual fee and are thereby qualified to submit a bid and to perform public work pursuant to Labor Code section 1725.5, prior to award of this Contract or any subcontract hereunder. No bid shall be accepted, nor shall this Contract or any subcontract hereunder, be entered into without such proof.
- C. Pursuant to Section 1770-1780 of the Labor Code of the State of California, the Director of the Department of Industrial Relations has determined the general prevailing rates of wages and rates for legal holidays and overtime in the locality in which this work is to be performed, which under Labor Code Section 1773.1 are deemed to include employer payments for health and welfare, pension, vacation, travel time and subsistence pay, and apprenticeship or other authorized training programs, for each craft or type of worker or mechanic needed to perform this contract. Said wage rates are available only at the Fresno County Department of Public Works and Planning, Design Division, and will be made available to any interested person upon request. Minimum wage rates for this Project, as predetermined by the Secretary of Labor, are set forth in the Special Provisions. If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the Prevailing Wage Rates predetermined by the Director of the Department of Industrial Relations of the State of California for similar classifications of labor, the contractor and his subcontractors shall pay not less than the higher wage rate.
- D. It shall be mandatory upon the Contractor to whom the Contract is awarded, and upon any Subcontractor under him/her to pay not less than the said specified rates to all laborers, workers, and mechanics employed by them in the execution of the Contract, and to pay all laborers, workers and mechanics not less often than once weekly. The Contractor to whom the Contract is awarded shall post a copy of the determination of prevailing wages at the job site. The Contractor shall require all Subcontractors to comply with Sections 1770-1780 of the Labor Code of the State of California and shall insert into every subcontract the requirements contained therein.
- E. The Contractor shall comply with Labor Code Section 1775. In accordance with said Section 1775, it is hereby further agreed that the Contractor shall forfeit to the Owner, as a penalty, fifty dollars (\$50.00) for each laborer, worker, or mechanic employed for each calendar day or portion thereof, who

is paid less than the said stipulated rates for any work done under the Contract, by him/her or by any Subcontractor under him/her. The difference between said stipulated rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than said stipulated rate shall be paid to each worker by the Contractor. The Contractor, and each Subcontractor, shall keep or cause to be kept an accurate record showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker or other employee employed by him/her or her in connection with the public work. The records shall be open at all reasonable hours to the inspection of the Owner, to its officers and agents, and to the Division of Labor Law Enforcement of the State Department of Industrial Relations, its deputies and agents, or as otherwise provided by applicable law (including but not limited to Labor Code 1776).

- F. In case it becomes necessary for the Contractor or any Subcontractor to employ on the Work under this Contract any person in a trade or occupation (except executive, supervisory, administrative, clerical or other non-manual workers as such) for which no minimum wage rate is specified, the Contractor shall immediately notify the Owner who shall promptly thereafter determine the prevailing rate for such additional trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

## 2.53 APPLICATION OF HIGHEST STANDARDS AND REQUIREMENTS

Whenever two (2) or more standards or requirements appear in these General Conditions or in any other part of the Contract Documents that form the Contract, the highest standard or requirement shall be applied and followed in the performance under this Contract.

## 2.54 NONDISCRIMINATION IN EMPLOYMENT

Contractor shall comply with all Federal and State Laws prohibiting discrimination in employment, including the following:

- A. California Labor Code Section 1735, which prohibits discrimination in employment on any basis listed in subdivision (a) of Section 12940 of the Government Code, as those bases are defined in Sections 12926 and 12926.1 of the Government Code, except as otherwise provided in Section 12940 of the Government Code, and applies to all employers, employment agencies and labor organizations.
- B. Title VII of the Federal 1964 Civil Rights Act (42 U.S.C. Section 2000e - 2000e - 17) which prohibits employment discrimination on the basis of race, color, sex, religion, or national origin, and applies to all employers that employ at least fifteen (15) workers during each working day in each of twenty (20) or more calendar weeks in the current or preceding year.
- C. In addition to these two (2) laws of general application listed in the immediately preceding paragraphs A and B, there are other Federal and State laws that prohibit employment discrimination in particular cases.

- D. The Owner is an Affirmative Action Employer and expects all of its contractors and suppliers to familiarize themselves with, and comply with, all applicable laws relating to employment discrimination.
- E. To the extent required by law, the Contractor shall meet all requirements of law relating to the participation of minority, women, and disabled veteran business enterprise contracting goals, and shall comply with Public Contract Code 10115 et seq. and all applicable regulations. Contractor further agrees that, when required, Contractor shall ensure compliance by all Subcontractors and shall complete all forms required by all agencies exercising jurisdiction over the Project.

## 2.55 APPRENTICES

- A. Pursuant to Sections 1770-1780 of the Labor Code of the State of California, the Director of the Department of Industrial Relations has determined the general prevailing rate of wages in the locality for each craft or type of worker needed to execute the work. Said wage rates pursuant to Section 1773.2 of the Labor Code are on file with the Clerk of the Fresno County Board of Supervisors, and will be made available to any interested person on request. A copy of this wage scale may also be obtained at the following Web Site: [www.dir.ca.gov/dlsr](http://www.dir.ca.gov/dlsr).
- B. Pursuant to Section 1775 of the Labor Code of the State of California, nothing in this Article shall prevent the employment of properly registered apprentices upon public works. Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which he/she is registered.
- C. Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards and written apprentice agreements under Chapter 4 (commencing at Section 3070), Division 3, of the Labor Code, are eligible to be employed on public works. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.
- D. Fresno County is committed to increasing the availability of employment and training opportunities, with particular attention to the plight of those who are most economically disadvantaged. In an effort to advance that purpose, the County will require that the Contractor and each subcontractor employed on this Project shall use their best efforts to ensure that thirty-three percent (33%) of apprentice hours, as determined by California Labor Code Section 1777.5 for each contractor and subcontractor of any tier on this Project, are performed by qualified participants in state approved apprenticeship programs who also are current or former "Welfare-to-Work" participants in the CalWORKs program. Provided, that nothing contained in this Paragraph D shall be interpreted to relieve or in any way diminish the obligation of the Contractor and each subcontractor to comply fully with all applicable apprenticeship laws in accordance with the California Labor Code and the California Code of Regulations; and accordingly such requirements as are contractually imposed by this Paragraph D shall be in addition to such legally

mandated requirements, and applicable only to the extent fully consistent therewith.

- E. Incentives whereby the Contractor or Subcontractor receives partial reimbursement for the wages paid to apprentices who qualify may be available. The incentive program is administered by the County of Fresno, Department of Social Services. For questions regarding the incentive program, contact the Department of Social Services at (559) 230-4008.

#### 2.56 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted, and this contract shall be read and enforced as though it were included, and if through mistake or otherwise any provision is not inserted or is not correctly inserted, upon application of either party the contract shall be amended to make the insertion or correction.

#### 2.57 DRUG FREE WORKPLACE CERTIFICATION

- A. The Contractor shall comply with Government Code Section 8355 in matters relating to providing a drug-free workplace.
- B. The Contractor shall publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of controlled substance is prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).
- C. The Contractor shall establish a Drug-Free Awareness Program as required by Government Code 8355(a)(2), to inform employees about all of the following:
  - 1. The dangers of drug abuse in the workplace,
  - 2. The Contractor's policy for maintaining a drug-free workplace,
  - 3. Any available counseling, rehabilitation and employee assistance programs,
  - 4. Penalties that may be imposed upon employees for drug abuse violations.
- D. Provide as required by Government Code 8355(c), that everyone who provides work under the Agreement.
  - 1. Will receive a copy of the company's drug-free policy statement, and
  - 2. Will agree to abide by the terms of the Contractor's statement as a condition of employment on the contract.

2.58 BUILDING PERMIT AND OTHER PERMITS

The Building permit shall be obtained and paid for by the Owner. All other required permits are the responsibility of the Contractor to obtain. Fees for all other required permits shall be reimbursed to the Contractor at actual cost when the County is presented with a valid receipt.

2.59 CODES AND REGULATIONS

All work, materials and equipment shall be in full compliance with the California Building Code; California Plumbing Code; California Electrical Code; California Mechanical Code; California Fire Code; California Energy Code; as those codes may be amended from time to time; Cal/OSHA Safety Regulations; and all Federal, State and Local laws, ordinances, regulations and Fresno County Charter provisions in effect and applicable in the performance of the work.

END OF SECTION

This page is intentionally left blank.



## 1.1 GENERAL

### A. Summary

1. This Section includes requirements for temporary utilities and support facilities.

### B. Establishment

1. It shall be at the Contractor's responsibility and cost to coordinate and establish temporary power and water and any other temporary utility for Contractor's use, to the job site with the appropriate Utility Agencies.
2. It shall be the Contractor's responsibility to provide adequate chemical toilet facilities and handwashing stations based on work force.

### C. Use Charges

1. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the Owner's construction forces, the Owner, testing agencies, and authorities having jurisdiction.
2. Water Service: The Contractor shall be responsible for all costs related to labor, materials, and the establishment of temporary water service. Contractor shall provide connections and extensions of services as required for construction operations. Upon utility establishment, the Owner will reimburse the monthly temporary water service fees on a dollar for dollar basis with no mark up to the Owner. Contractor must provide monthly water service billing statements with reimbursement requests.
  - a. Temporary water provided by use of water trucks will not be reimbursed.
3. Electric Power Service: The Contractor shall be responsible for all costs related to labor, materials, and the establishment of temporary electric power service. Contractor shall provide connections and extensions of services as required for construction operations. Upon establishment of temporary electrical power service, the Owner will reimburse the monthly temporary electric power fees on a dollar for dollar basis with no mark up to the Owner. Contractor must provide monthly electric power billing statements with reimbursement requests.
  - a. Temporary electric power provided by means of a portable electrical generator or other devices will not be reimbursed.

### D. Temporary Heat

1. Temporary heat is not required by the Owner. The Contractor may provide temporary heat at his/her own costs. If the Contractor decides to provide temporary heat, the Contractor shall adhere to the following guidelines:
  - a. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control
    - i. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
    - ii. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### E. Submittals

1. Site Plan: The Contractor shall provide, for the Owner's review and comment, a proposed site plan showing temporary facilities, utility hookups, material storage and staging areas, and parking areas for construction personnel at the preconstruction meeting scheduled by the Owner after award of the contract.

F. Quality Assurance

1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
2. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

2.1 EXECUTION

A. Installation, General

1. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
2. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

B. Temporary Utility Installation

1. General: Install temporary service
  - a. Arrange with utility company and the Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - a. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
3. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
4. Sanitary Facilities: Provide temporary chemical toilets, separate hand wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
5. Heating or Heating and Cooling, at the Contractor's expense and discretion: Provide temporary heating or heating and cooling at Contractor's option for construction activities for curing or drying of completed installations or protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
6. Ventilation and Humidity Control: At the Contractor's expense and discretion, provide temporary ventilation required by construction activities for curing or

drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

7. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - a. Install electric power service overhead or underground, as directed by the Governing Authority.

### 3.1 TERMINATION AND REMOVAL

- A. Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Final Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of the Contractor.

END OF SECTION 015213

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected site elements.

- B. Related Requirements:

- 1. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
  - 2. Section 017300 "Execution" for cutting and patching procedures.

### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage to adjacent construction that will remain.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

### 1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure on-site operations are uninterrupted.
  2. Coordination for shutoff, capping, and continuation of utility services.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

#### 1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Project Manager of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  1. Maintain fire-protection facilities in service during selective demolition operations.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing San Joaquin Valley Air Pollution Control District and EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Before proceeding with work verify existing underground utilities, call USA North 811 before digging.

- B. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- C. Review Project Record Documents of existing construction.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services.

### 3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective site demolition areas.
- B. Remove temporary barricades and protections where hazards no longer exist.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Dispose of demolished items and materials promptly. Comply with requirements in California Green Building Standards Code, Section 5.408 for Construction Waste Management and Disposal.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, sidewalks, and other adjacent occupied and used facilities.
- C. Existing Items to Remain: Protect construction indicated to remain against damage during selective demolition.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to California Green Building Standards Code, Section 5.408 for Construction Waste Management and Disposal.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119



## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Formwork for cast-in-place concrete with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.
- E. Related Sections
  - 1. Section 03 20 00 Concrete Reinforcement.
  - 2. Section 03 30 00 Cast-In Place Concrete.
  - 3. Section 03 39 00, Concrete Curing.

### 1.2 REFERENCES

- A. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
- B. ACI 318-16 - Building Code Requirements for Structural Concrete.
- C. PS-1 - Construction and Industrial Plywood.
- D. California Code of Regulations, Title 8 Subchapter 4. Construction Safety Orders, Article 29, Erection and Construction, Section 1717.
- E. Chapter 19, 2016 California Building Code.
- F. APA - American Plywood Association Design and Construction Guide.
- G. Local AQMD - Air Quality Management District.

### 1.3 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to ACI 318 Section 26.11. Resultant concrete to conform to required shape, line and dimension. Design of formwork is Contractor's responsibility.
- B. The formwork shall be designed for the loads and lateral pressures outlined in Chapter 2 of ACI 347R, and lateral forces as specified by the CBC.
- C. Above grade forms for elevated slabs and for walls exceeding 4 ft. in height shall be designed by a professional Civil or Structural engineer registered in the State of California.

- D. Foundation concrete may be placed directly into neat excavations, provided foundation trench walls are sufficiently stable subject to approval of DSA. Otherwise, minimum formwork is mandatory to insure clean excavations and properly formed surfaces immediately prior to and during placing of concrete.

#### 1.4 COORDINATION

- A. Coordinate this Section with other Sections of work that require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, Contractor shall adjust reinforcement positioning to accomplish required cover or otherwise request instructions from Architect before proceeding.

#### 1.5 SUBMITTALS

- A. Submit specification for type of form material to use for each exposed surface to be formed.

### PART 2 - PRODUCTS

#### 2.1 FORM MATERIALS

- A. Plywood: APA - MDO (Medium Density Overlay) Plyform, Group 1, Exterior, PS-1, for exposed surfaces. APA - BB (No-overlay) Plyform, Class 1, Exterior, PS-1 for unexposed surfaces.
- B. Lumber: Douglas Fir species; construction grade with grade stamp clearly visible.

#### 2.2 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless non-staining liquid chemical agent, free of wax or oils which will not absorb water. Material shall comply with AQMD, Local Regulations.
- B. Corners: Chamfered type; maximum possible lengths.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

### 3.1 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements in accordance with requirements of ACI 318 Section 26.11.
  - 1. Where public areas such as sidewalks and streets are to be shored, drawings and calculations are to be submitted by Contractor to the city or governing agency for approval prior to beginning of any work.
  - 2. Contractor and/or his engineer assume and accept all responsibility for construction and safety of formwork and shoring.
  - 3. Upon completion of Work, formwork and shoring materials are to be removed from site at expense of Contractor. Certain steel and/or concrete materials may be left in place with written approval of Architect.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shoring. Conform to Title 8, Subchapter 4, Construction Safety Orders, CCR.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on Drawings.
- F. Provide chamfer strips on external corners.
- G. Surface irregularities, ACI 347R Class A, gradual or abrupt irregularities of 1/8 inch for exposed to view concrete. Class B, 1/4 inch for plaster cement finish.

### 3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### 3.4 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work. No openings or embedded items permitted in structural slabs within 18 inches of columns. Conform to ACI 318 Section 26.11.
- B. Locate and set in place items that will be cast directly into concrete.

- C. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors and other inserts, whether indicated on the structural drawings or not.
- D. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

### 3.5 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

### 3.5 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117.

### 3.7 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design and that supports, fastenings, wedges, ties and items are secure.

### 3.8 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Conform to ACI 318 Section 26.11.2.
  - 1. Minimum stripping time for edges of slabs and footings: 3 days.
- B. Loosen forms carefully. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view. Do not break-off corners.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms. Re-shoring permitted only after 10 days from stripping.

END OF SECTION 031000

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

Fabricating and setting reinforcing steel and accessories for cast-in-place concrete.

#### A. Related Sections:

1. Section 031000, Concrete Formwork
2. Section 033000, Concrete

### 1.2 REFERENCES

- A. ACI 315 - Details and Detailing of Concrete Reinforcing.
- B. ACI 318-14 - Building Code Requirements for Structural Concrete and Commentary.
- C. ASTM A1064 – Standard Specification for Carbon-steel Wire and Welded Wire Reinforcement, Plain and Deformed, for concrete.
- D. ASTM A615 - Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- E. ASTM A706 - Specification for Deformed and Plain Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- F. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- G. Chapter 19, 2016 California Building Code.

### 1.3 SUBMITTALS

- A. Shop Drawings, indicating bar sizes, spacings, locations and quantities of reinforcing steel bending and cutting schedules and supporting and spacing devices.

### 1.4 QUALITY ASSURANCE

- A. Provide Testing Laboratory with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- B. Comply with the requirements of Division 01 General Requirements.

### 1.5 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other Work.

## PART 2 - PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, deformed billet steel bars, in grades as follows, and conforming to ACI 318 Chapter 20 and Section 26.6.
  - 1. For No.4 and larger bars, use 60 ksi yield grade.
  - 2. For ties and stirrups, and No. 3 and smaller bars, use 40 or 60 ksi yield grade.
- B. Welded Wire Reinforcement: Plain type, ASTM A1064; in flat sheets; uncoated finish, 6 x 6 - W4.0 x W4.0 unless otherwise noted on drawings.

### 2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gauge black annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.
- D. Concrete Blocks: Approximately 3 inches dimension each side.

### 2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice and ACI 315 and ACI 318. Wherever possible, make bends to shape in fabricator's shop.
  - 1. Bars reduced in section will not be accepted.
  - 2. Bars with kinks are unacceptable.
  - 3. Bars shall not be heated to facilitate bending or for any other purpose.
  - 4. Bars with bends not indicated on drawings will not be accepted. Perform no forming in a manner which will damage bars.
  - 5. Re-bending of bars prohibited.
- B. Locate reinforcing splices not indicated on Drawings at point of minimum stress.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. General: Comply with CBC and CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position. Install concrete blocks to support reinforcement over grade. Rocks not permitted.
- C. Do not displace or damage vapor barrier where vapor barrier is specified or indicated on drawings. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- D. Accommodate placement of formed openings.
- E. Prior to placing, thoroughly clean reinforcement of all rust, dirt, dust, oil or any other material deleterious to bonding of concrete.
- F. Accurately place and securely tie reinforcement with black annealed wire and securely hold in position during placing of concrete by means of precast concrete block supports. Point wire tie ends away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall conform to the ACI 315.
  - 1. Tie reinforcement splices and intersections per CBC and CRSI, Chapter 10-General Principles for Placing, Splicing and Tying Reinforcing Bars.
- G. During placing of structural concrete slabs, provide a full-time reinforcing steel placer to repair and replace reinforcing to its proper location. Provide additional chairs of the proper size available to place under bars displaced during the concrete pouring operation.
- H. Dowels for Walls: Securely tie in place prior to placing of concrete. Do not place dowels in concrete after pour.
- I. Conform to ACI 318-14 Section 20.6.1.3.1, and Structural Drawings for concrete cover over reinforcement. Where conflicts occur between the referenced documents, the more stringent shall apply.
  - 1. Where fire protective cover is specified exceeding the ACI and structural drawing specification, the fire protective cover shall apply.

END OF SECTION 032000

This page is intentionally left blank.



PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete.
- B. Concrete slabs on grade, footings and curbs for walls.
- C. Control, expansion and contraction joint devices associated with concrete work including joint sealants.
- D. Related Sections
  - 1. Section 031000, Concrete Formwork
  - 2. Section 032000, Concrete Reinforcement
  - 3. Section 033900, Concrete Curing
  - 4. Section 321313, Sitework Concrete

1.2 REFERENCES

- A. CBC - 2016 California Building Code
  - 1. CBC-19 - CBC Chapter 19, Concrete
- B. ADA - Americans with Disabilities Act of 1990
- C. ADA/Standards - ADA Title II Regulations and the DOJ/Standards for Accessible Design
- D. ACI 301 - Structural Concrete for Buildings.
- E. ACI 318-2014 - Building Code Requirements for Structural Concrete and Commentary.
  - 1. ASTM C33 - Concrete Aggregate.
  - 2. ASTM C150 - Portland Cement.
- F. ASTM C171 - Sheet Materials for Curing Concrete.
- G. ASTM C1107 - Packaged Dry, Hydraulic - Cement Grout (Nonshrink).
- H. ASTM C1116 - Specification for Fiber-Reinforced Concrete.
- I. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Bituminous Type).
- J. ASTM E96 - Water Vapor Transmission of Materials.
- K. CSS - Caltrans Standard Specifications, Latest Edition.

1.3 SUBMITTALS

- A. Placement Schedule: Submit for approval details and/or sketches showing location of each proposed construction joint. Do not deviate from locations of horizontal joints indicated on drawings.
- B. Product data for each type of manufactured material and product included. C. Design mix for each concrete mix.
- C. Steel reinforcement shop drawings, including material, grade bar schedules, spacing, bent bar diagrams, arrangement and supports.
- D. Submit contraction (crack control) joint, expansion, isolation and construction joint layout to Architect for approval.

1.4 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of embedded utilities and components that are concealed from view.
- B. Maintain an accurate record showing date and time of concrete placement in each portion of structure. Correlate placing record for test cylinders made by testing laboratory. Maintain a separate record giving date of removal of forms, shoring, including first and second halves and reshoring, if used. Keep records available for inspection at site. Upon completion, deliver two copies of each to Architect in approved form.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Section 1905, California Building Code, and ACI 318.1 and 318.3.
- B. Maintain one copy of all records.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to ACI Chapter 26.5.5 and ACI 305R when concreting during hot weather. No concrete placement permitted above 90 degrees Fahrenheit. Limit concrete temperature to 95 degrees Fahrenheit.
- E. Conform to ACI Chapter 26.5.4 and ACI 306R when concreting during cold weather. No concrete placement permitted below 50 degrees Fahrenheit.

1.6 COORDINATION

- A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

## PART 2 - PRODUCTS

### 2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II. Portland Cement Type, conforming to Section 1903A, California Building Code.
- B. Aggregates:
  - 1. Aggregate for Stone Concrete: ASTM C33.
  - 2. Aggregate for Lightweight Concrete: ASTM C330.
- C. Conform to requirements on structural drawings for maximum size of aggregate permitted in individual applications.
- D. Water: Clear, from potable source, and not detrimental to concrete.

### 2.2 ACCESSORIES

- A. Bonding Agent: ASTM C631, Polyvinyl Acetate Latex emulsion; HIBOND, manufactured by Lambert Corporation, Orlando FL, LOCK BOND NO. 906, manufactured by Macklanburg-Duncan Co., City of Industry, CA, or equal as approved in accordance with Division 01, General Requirements for Substitutions.
- B. Curing Film: ASTM C171; 10 mil thick, clear polyethylene film, single sheet, manufactured from virgin resin with no scrap or additives, free of visible defects, uniform in appearance, conforming to the following:
  - 1. Moisture Loss: 0.055 g per sq. cm.
  - 2. Tensile Strength: 1700 psi longitudinal, 1200 psi transverse.
  - 3. Elongation: 225 percent longitudinal, 350 percent transverse.
- C. Non-Shrink Grout: ASTM C1107, Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency suitable for application and a 30 minute working time.
- D. Vapor Barrier at interior slabs: ASTM E 1745, Class A, 15 mils thick, Permeance as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and subparagraphs 7.1.1 - 7.1.5): less than 0.01grains/(ft<sup>2</sup> · hr · inHg). WVTR less than or equal to 0.012 perms as tested by ASTM E: 96
  - 1. Acceptable Products
    - a. 15 mil Stegowrap Vapor Barrier, Stego Industries LLC
    - b. Reef Industries, VaporGuard
    - c. W.R. Meadows Premoulded membrane with plasmatic core.
    - d. Or equal, as approved in accordance with Division 01 requirements for substitutions.
- E. Reinforcement: In accordance with Section 03 20 00.

- F. Concrete Formwork: In accordance with Section 03 10 00.

## 2.3 JOINT DEVICES AND FILLER MATERIALS

- A. Expansion Joint Filler - ASTM D1751: Close cell bituminous saturated fiberboard, 1/2 inch thick; Fiber Expansion Joint manufactured by American Highway Technology, Kankakee, IL, W. R. Meadows, or approved equal.
- B. Expansion Joint Top: Integral extruded polystyrene plastic; 1/2 inch thick, with removable top strip exposing sealant trough, JOINT CAPS manufactured by The Burke Company, or equal as approved in accordance with Division 01, General Requirements for substitutions.
- C. Joint Backing: ASTM C1330, Cylindrical, Type C, closed cell, polyethylene backer rod; oversized 30 to 50 percent larger than joint width. Green Rod by Nomaco Inc. or equal.
- D. Sealant: Polyurethane multi-component type, non-sagging or self leveling at flatwork, as specified in Section 07 92 00.
- E. Primer: As recommended by sealant manufacturer.
- F. Saw-Cut Joint Filler: Two-component epoxy resin, gray color, non-hardening, self-leveling, SIKADUR 51 (SL), by Sikacorp., Lyndhurst, NJ, or equal as approved in accordance with Division 01 General Requirements for Substitutions.

## 2.4 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 1905, California Building Code.
- B. Deliver concrete in transit mixers only. Discharge loads in less than 1-1/2 hours after water is first added.
  - 1. Design Mix: ACI 318 Chapter 26. Ingredients and proportions for design mix shall be selected by a DSA-approved Testing Laboratory certified by a registered civil engineer licensed in California.
  - 2. Required Strength: As noted on the structural drawings.
  - 3. Select proportions by volume for concrete in accordance with the approved design mix.
  - 4. All mix designs for this project shall include a 15% flyash substitute for cement by volume. Class "C" flyash is not permitted.
  - 5. Do not exceed water-cement ratios by weight for concrete items as specified on the structural drawings.
  - 6. Comply with structural drawings for other limitations to each mix design specified.
  - 7. Miscellaneous Sitework Concrete: Specified in Section 32 13 13, Sitework Concrete.

## 2.5 GROUT MIX

- A. 1:3:2 parts Portland Cement, to sand, to pea gravel, at minimum 2000 psi at 28 days.

2.6 DRYPACK

- A. Cement/sand mix of consistency to pack dry below base plates and other components as specified. Minimum 5,000 psi.
- B. Alternate flowable cementitious fill material may be used if properly dammed and consolidated below components. Minimum 5,000 psi.

2.7 GRANULAR FILL

- A. Crushed Aggregate Base (capillary break): 3/4 inch maximum grading, crushed rock and rock dust conforming to requirements of Section 200-2.2, SSPWC, with 3/8 inch sieve requirement waived, or Class 2 Aggregate Base as defined in Section 26, CSS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify compaction has been completed per specifications.
- C. Verify requirements for concrete cover over reinforcement.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with sandblasting to remove laitance and expose clean aggregate.
- B. In locations where new concrete is doweled to existing work, drill and clean holes in existing concrete in accordance with the ICC ESR report specified on the structural drawings for the type of epoxy indicated. All non-structural epoxy dowel applications require IOR inspection during installation. All structural epoxy dowel applications will be subject to "special inspection and testing" at Structural Engineer's direction.
- C. When approved by the Architect, clean previously placed concrete with steel brush and apply bonding agent in accordance with manufacturer's instructions.
- D. Under Interior Slabs on Grade: Install 4 inches thick crushed aggregate base per Section 200-2.2, SSPWC or Class 2 CCS as capillary break. Over aggregate base place 15-mil vapor barrier in largest practical sections. Seal all 6-inch lapped seams, penetrations and foundation perimeters using manufacturer-approved tape only and install per manufacturer instructions. Install pipe boots at pipe penetrations. Install reinforcement and concrete as scheduled. Install 1 1/2" of coarse, washed sand over Vapor Barrier.
  - 1. Installation of vapor barrier shall be in accordance with ASTM E 1643 and manufacturer's instructions.

2. Tapes, mastics, sealants, and other products used with vapor barrier shall be from same manufacturer as, and certified compatible with, vapor barrier.

E. Install steel reinforcing per Section 03 20 00.

### 3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 318 Section 26.5.2. Remove loose dirt from excavations.

B. Notify Architect minimum 24 hours prior to commencement of operations. All excavations, forms and reinforcing shall be inspected and approved by the "special inspector" and Architect prior to placement.

C. Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and accessories are not disturbed during concrete placement.

D. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.

E. When detailed on the drawings, separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.

F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface using two-component polyurethane sealant as specified in Section 07 92 00.

G. Install joint devices in accordance with manufacturer's instructions as detailed.

H. Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

I. Maintain joint device in correct position to allow joint cover flush with finish. J. Install joint covers in longest practical length.

J. Place concrete continuously between predetermined expansion, control and construction joints.

1. Install expansion joints at vertical concrete walls at 24 feet on center unless noted otherwise on drawings.

2. Retaining Walls at Buildings: install waterstops in expansion joints to form a continuous waterproofed wall surface condition. Support and protect exposed waterstops during progress of the Work.

K. Do not interrupt successive placement; do not permit cold joints to occur.

L. Avoid segregation of materials. Perform vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.

M. Provide special mix prepared by the Testing Laboratory and approved by the Architect utilizing smaller aggregates in areas of reinforcing congestion to prevent the formation of rock pockets.

- N. The unconfined vertical drop of concrete shall not be greater than 5 feet. Do not allow concrete to fall free from any height that will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet. Utilize trunks or additional chutes where doubt occurs. Conform to requirements of ACI 318 Section 5.10.
- O. Horizontal Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to ACI 318 Section 5.7.
- P. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft. Slope floors for drains.
- Q. Exterior Slab Contraction Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch, place joints at column lines and at 12 ft. o.c. each way, maximum. Remove groover tool marks on exposed concrete surfaces. Contractor's option: Saw cut joints, early-entry dry-cut, per ACI 302.1R.
- R. Isolation Joints: preformed joint filler depth of slab, fill top 1/2 inch with elastomeric sealant per Section 07 92 00. Locations: at columns, footings, and as noted on drawings.
- S. Surface irregularities, ACI 347R Class A, gradual or abrupt irregularities of 1/8 inch for exposed to view concrete. Class B, 1/4 inch for plaster cement finish.

#### 3.4 CURING AND PROTECTION

- A. In accordance with Section 03 39 00 Concrete Curing.

#### 3.5 FIELD QUALITY CONTROL

- A. Provide free access to Work and cooperate with Architect, DSA and Testing Laboratory
- B. Measure floor and slab flatness and levelness according to ASTM E1155 (ASTM E 1155M) within 72 hours of finishing.
  - 1. Proposed mix design of each class of concrete shall conform to Section 1905A, California Building Code and shall be approved by the Architect prior to commencement of work.

#### 3.6 PATCHING

- A. Architect will inspect concrete surfaces and determine imperfections, if any.
- B. Patch imperfections as approved and in accordance with ACI 301.
  - 1. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.
  - 2. Fill cone form tie recesses with Portland cement mortar flush to finish surface.

3.7 DEFECTIVE CONCRETE

- A. Defective Concrete: Remove concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect.
- C. Do not patch, fill, touch-up, repair or replace exposed concrete except upon express approval of Architect for each individual area.
- D. Repairs of Concrete shall comply with the ACI and written directive from the Architect.

3.8 MOISTURE TEST FOR CONCRETE FLOORS

- A. Test and, if required, remediate all interior concrete slabs-on-grade scheduled to receive new moisture sensitive floor finishes.

END OF SECTION 033000



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. See Civil, Structural, and Architectural drawings for all necessary Miscellaneous Site Concrete work.
- A. This Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes but is not limited to the following applications:
  - 1. Trash Enclosure pad and apron.
  - 2. Flagpole footings.
  - 3. Block Wall Footings.
  - 4. Mow Strips.
  - 5. Rolling Gate concrete equipment bases/pads for gate operators and control, post footings and continuous concrete grade beam.
  - 6. Mechanical Equipment housekeeping pads as noted on the drawings.
  - 7. Other site concrete work noted on the drawings.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
  - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.
  - 3. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.

### 1.3 SUBMITTALS

- A. Product Data: For each manufactured material and product indicated.
- B. Design Mixes: For each concrete mix indicated.
- C. Material certificates.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

- C. County of Fresno, Public Works Standards.

#### 1.4 TESTING FOR COMPACTION:

- A. The Owner will test for compaction as described below.
- B. Determine the density of soil in place by the sand cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922 or D 3017.
- C. Determine laboratory moisture-density relations of soils by ASTM D 1557.
- D. Determine the relative density of cohesionless soils by ASTM D 1557.
- E. Sample backfill materials by ASTM D 75.
- F. "Relative compaction" is the ratio, expressed as a percentage, of the in-place dry density to the laboratory maximum dry density.
- G. Compaction shall be deemed to comply with the specifications when no more than one test of any three consecutive tests falls below the specified relative compaction. The one test shall be no more than three percentage points below the specified re-testing of work not conforming to the specifications.

### PART 2 - PRODUCTS

#### 2.1 FORM WORK

- A. Forms shall conform to the requirements of Section 033000 Cast-In-Place Concrete. Provide stakes and bracing materials to hold forms securely in place.
- B. Materials for sidewalk forms shall be 2-inch dressed lumber straight and free from defects, or standard metal forms. Where short-radius forms are required, 1-inch dressed lumber or plywood may be used. Provide stakes and bracing materials to hold forms securely in place.

#### 2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Plain Steel Wire: ASTM A 82, as drawn.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening steel reinforcement. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

#### 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.
  - 1. Fly Ash: ASTM C 618, Class F or C.
  - 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Aggregate: ASTM C 33, uniformly graded, from a single source.
- C. Water: ASTM C 94.
- D. Admixtures:
  - 1. No additives are to be used for retarding the concrete curing process.
  - 2. Submit list of admixtures proposed to be used to the Architect for his review before the placement of any concrete.
  - 3. Admixtures used are to be certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- E. Curing Materials:
  - 1. Moisture-Retaining Cover: ASTM C 171, white polyethylene film.
  - 2. Water: Potable.
  - 3. Approved curing compound.
- F. Related Materials:
  - 1. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## 2.4 CONCRETE MIXES

- A. Concrete Mixes: Prepare design mixes, proportioned according to ACI 211.1 and ACI 301. Refer to Section 033000, Cast-In-Place Concrete.
  - 1. Compressive Strength (28 Days): 3,000 P.S.I. unless noted otherwise.
- B. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

## PART 3 - EXECUTION

### 3.1 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
    - a. Concrete mixture design.

- b. Quality control of concrete materials and concrete paving construction practices.
2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
    - a. Contractor's superintendent.
    - b. Concrete paving Subcontractor.

### 3.2 PREPARATION OF SUBGRADE

- A. Excavate and shape subgrade to line, grade, and cross section as shown on the plans. Compact subgrade as specified in Section 312000, Earth Moving. The finished subgrade shall be within a tolerance of +/-0.08 of a foot of the grade and cross section shown and shall be smooth and free from irregularities at the specified relative compaction.

### 3.3 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

### 3.4 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.5 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

### 3.7 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment according to ACI 301.

### 3.8 EQUIPMENT BASES AND FOUNDATIONS

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
- C. Minimum Compressive Strength: 2,500 psi at 28 days.
- D. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- E. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

### 3.9 FLAGPOLE FOOTING

- A. Construct footings as shown on the drawings.
- B. Footing poured per Section 033000 – Cast-In-Place Concrete.

3.10 TRASH BIN ENCLOSURE PAD, CURB, AND APRON

- A. Construct reinforced pads, curbs, and footings as shown on the Structural and Architectural drawings. Comply with Section 03300, Cast-In-Place Concrete.
- B. Reinforcement: Structural, and Architectural drawings for reinforcing requirements. Accurately position and support reinforcement, and secure against displacement. Set wire ties with ends directed into concrete.
- C. Finish pads are to be sloped to drain and finished with a float finish with light broom finish.

3.11 POLE LIGHT BASES

- A. Construct bases as shown on the drawings.
- B. Finish: Slope top surface to drain. Provide smooth float finish with smooth troweled radiused edges. Where bases are raised above grade, remove forms, fill voids in base side walls and provide a smooth Sacked Finish.

3.12 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding 1/2 inch.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch .
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed-finished as-cast concrete where indicated:
  - 1. Smooth-rubbed finish.
  - 2. Grout-cleaned finish.
  - 3. Cork-floated finish.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.13 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
  - 1. Do not further disturb surfaces before starting finishing operations.
- C. Scratch Finish: Apply scratch finish to surfaces indicated and surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes unless otherwise indicated.
- D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- E. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
- F. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- G. Slip-Resistive Broom Finish: Apply a slip-resistive finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

### 3.14 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

### 3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301 .
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  2. Testing Frequency: Obtain at least one composite sample for each 100-cu. yd. or fraction thereof of each concrete mixture placed each day.

### 3.16 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Protect concrete from damage. Exclude traffic from pavement, walks, slabs, and pads for at least 14 days after placement.
- C. Maintain concrete free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321320



## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces, excluding site work concrete.

### 1.2 REFERENCES

- A. ACI 318-14 - Building Code Requirements for Structural Concrete.
- B. ACI 301 - Structural Concrete for Buildings.
- C. ASTM C171 - Sheet Materials for Curing Concrete.

### 1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 318 Section 26.5.3 and ACI 308R. Proper curing of concrete shall be the Contractor's responsibility. Improperly cured concrete in the opinion of the Architect shall be removed and replaced at no extra cost to the Owner.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle sheet film materials to avoid puncturing or damage of any kind.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Polyethylene Film ASTM C171; 10 mil thick, clear, manufactured from virgin resin with no scrap or additives, manufactured by Burke By Edoco, Long Beach, CA, or equal as approved in accordance with Division 01, General Requirements for Substitutions.
- B. Water: Potable and not detrimental to concrete.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify substrate conditions.
- B. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION - HORIZONTAL SURFACES

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.
- B. Maintain concrete with minimal moisture loss at above 50 degrees F temperature for period necessary for hydration of cement and hardening of concrete. Maintain concrete temperature below 95 degrees F. Dusting with dry cement to absorb excess water is prohibited.
- C. Cure floor surfaces only as specified herein and in accordance with Section 1905A.11 CBC. Membrane curing compound method not permitted for interior cast-in-place concrete slabs.
- D. Moisture Retaining Coverings: spread polyethylene film over floor slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for minimum of seven (7) days unless noted otherwise on drawings. Do not permit traffic over floor slabs during the seven (7) day curing period.
- E. Vertical Surfaces: fog spray water over surfaces and maintain wet for 10 days.
- F. Quality Control: Proper curing of concrete surfaces shall be the responsibility of the Contractor under this section.
- G. Flooding, sprinkling or ponding not permitted.

3.3 EXECUTION - VERTICAL SURFACES

- A. Spraying: Spray water over surfaces and maintain wet for 10 days.

3.4 PROTECTION OF FINISHED WORK

- A. Protect finished Work from damage caused by the work of other sections.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION 033900

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes furnishing and installing the following for buildings and fences:

1. Concrete masonry precision units as indicated in drawings, with special shapes and score patterns as indicated or required.
2. Concrete masonry fence unit as indicated in drawings including precision with special size, shapes and score patterns as indicated or required.
3. All reinforcement, grout, mortar and accessories.
4. Clear sealer at exposed concrete masonry not indicated for opaque paint or other finishes.

B. Related Sections:

1. Division 3 Section, "Cast-in-Place Concrete"
2. Division 5 Section, "Metal Fabrications"
3. Division 9 Section, "Painting"

1.02 REFERENCES

A. ASTM International (ASTM)

1. ASTM C33 – Standard Specification for Concrete Aggregates.
2. ASTM C90-11b -- Standard Specification for Load-Bearing Concrete Masonry Units.
3. ASTM C129 – Standard Specification for Non-Load-Bearing Concrete Masonry Units.
4. ASTM C140-12 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
5. ASTM C270-12 – Standard Specification for Mortar for Unit Masonry.
6. ASTM C476-10 – Standard Specification for Grout for Masonry.
7. ASTM C1019 – Standard Test Method for Sampling and Testing Grout.

B. Building Code Requirements and Specification for Masonry Structures:

1. TMS 402-11/ACI 530-11/ASCE 5-11, TMS 602-11/ACI 530.1-11/ASCE 6-11.

C. 2016 California Building Code (CBC)

D. National Concrete Masonry Association (NCMA):

1. NCMA TEK Bulletin #8-2A – Removal of Stains from Concrete Masonry.
2. NCMA TEK Bulletin #8-3A – Control and Removal of Efflorescence.
3. NCMA TEK Bulletin #9-4A – Grouts for Concrete Masonry.
4. NCMA TEK Bulletin #19-4 – Flashing for Concrete Masonry.
5. NCMA TEK Bulletin #3-1B – All-Weather Concrete Masonry Construction.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each different masonry unit, accessory, and other manufactured product indicated.
- C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
- D. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.
  - 1. Each different cement product required for mortar and grout including name of manufacturer, brand, type, and weight slips at time of delivery.
  - 2. Each material and grade indicated for reinforcing bars.
  - 3. Each type and size of joint reinforcement.
- E. Color Selection: For initial selection submit:
  - 1. Unit masonry samples showing full extent of colors and textures available for each type of exposed unit masonry required.
  - 2. Colored mortar samples showing full extent of colors available.
- F. Samples: For verification purposes submit:
  - 1. Samples for each style & color specified of exposed masonry unit specified, including full range of color and texture to be expected in completed work.
  - 2. Colored masonry mortar samples for each color required. Show full range of color which can be expected in finished work; label samples to indicate type and amount of colorant used.
- G. Material test reports from a qualified independent testing laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
  - 1. Mortar complying with property requirements of ASTM C 270.
  - 2. Grout mixes. Include description of type and proportions of grout ingredients.
  - 3. Masonry units.
- H. Results from tests and inspections performed by Owner's representatives will be reported promptly and in writing to Architect and Contractor.
- I. Submit Warranties in accordance with Section 01 78 36.

1.04 QUALITY ASSURANCE

- A. All Unit Masonry shall conform to the 2016 edition of the California Building Code (CBC).
- B. Unit Masonry Standard: Comply with TMS 402-11 and TMS 602-11, ACI 530-11/ASCE 5-11, ACI 530.1-11/ASCE 6-11 "Specifications for Masonry Structures." Also comply with recommendations in referenced ASTM Standards and NCMA Bulletins where more stringent than ACI and CBC requirements.
- C. Inspecting Laboratory Qualifications: To qualify for employment in performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
- D. Preconstruction Testing: Owner will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:
  - 1. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
  - 2. Grout compressive strength will be tested per ASTM C 1019.
  - 3. Mortar compressive strength will be tested per ASTM C270.
  - 4. Drying shrinkage testing per ASTM C426-07. Shrinkage test results are not required prior to start of construction, but may be used to determine causes of excessive cracking and/or unacceptable masonry performance. Shrinkage testing may be waived by owner when fabricator has recent testing results for similar project material to the satisfaction of the owner.
- E. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
- F. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to

prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

#### 1.06 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
- C. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
  - 1. Do not lay masonry units that are wet or frozen.
  - 2. Remove masonry damaged by freezing conditions.
  - 3. Comply with CBC, Section 2104.3
- D. Hot-Weather Construction: Comply with referenced unit masonry standard for hot-weather construction and the following:
  - 1. Comply with CBC, Section 2104.4.

#### PART 2 – PRODUCTS

##### 2.01 MATERIALS, GENERAL

- A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

- B. Acceptable manufacturer: Basalite, 1201 Golden State Blvd., Selma, CA 93662, Tel: 559-896-1649, or approved equal.
- C. Substitutions will be considered only in accordance with Section 01 25 00, submitted a minimum of 14 days prior to bid submittal date and approved prior to bid.

## 2.02 CONCRETE MASONRY UNITS

- A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.
  - 1. Provide special shapes and colors where indicated and as follows:
    - a. For corners, control joints, bonding, and other special conditions.
    - b. Square-edged units for outside corners.
    - c. Textures, patterns and coursing shall be as indicated in drawings.
    - d. Color to be natural grey for paint finish per Section 09 91 00 unless otherwise indicated. Fence block units to be natural grey with no paint (clear sealer).
  - 2. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units.
    - a. Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.
    - b. Width x height x length: 8"x8"x16", 8"x8"x8", 8"x4"x16", 6"x8"x16" and other sizes indicated or required including pilaster units, sill blocks, caps and special scored units, as indicated in drawings.
  - 3. Absorption Requirements: Conform to ASTM C 90-03 Table 2.
- B. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N and as follows:
  - 1. Unit Compressive Strength: Provide units with minimum average net area compressive strength of 1900 psi.
  - 2. Maximum 0.065% linear shrinkage when tested in accordance with CMA standards.
  - 3. Weight Classification: Light weight or Normal weight.
  - 4. Comply with CBC Standards and ACI 530.

## 2.03 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II low alkali, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce required mortar color. Masonry cement will not be permitted. Maintain cement type throughout project.

- B. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Colored Mortar: Use pure mineral oxide mortar color; proportion by weight. Match color of concrete masonry units or as otherwise indicated.
- E. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.
- F. Aggregate for Grout: ASTM C 404.
- G. Water: Clean and potable, free from impurities detrimental to mortar and grout.
- H. Admixtures
  - 1. Only with Architect's approval and not adversely affecting bond or compressive strength.
  - 2. Grout Aid: All grout shall contain Sika "Grout Aid" (GA) as manufactured by Sika Chemical Corp. Mix GA as recommended by manufacturer.
- I. Comply with CBC, Section 2103.

#### 2.04 REINFORCING STEEL

- A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article, with size and spacing as indicated in drawings.
- B. Steel Reinforcing Bars: Material and grade as follows:
  - 1. Billet steel complying with ASTM A 615 – Grade 60 deformed bars.
- C. Wire Ties: No. 16 annealed wire for tying reinforcing steel.
  - D. Wire Ladder reinforcement in horizontal beds of stacked bond units.

#### 2.05 MISCELLANEOUS MASONRY ACCESSORIES

- A. Control Joints:
  - 1. At Walls and Fences: Use joint type as detailed. Caulking shall match mortar joint color.
  - 2. At soil retained walls: Where soil occurs use Preformed rubber in profiles required or shown, same as Dur-O-Wal Inc.'s "Rapid Control Joint," or approved substitute.
- B. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226,



Type I (No. 15 asphalt felt).

## 2.06 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned:.
1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
  2. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:
    - a. "Sure Klean No. 600 Detergent," ProSoCo, Inc.

## 2.07 MORTAR AND GROUT MIXES

- A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Type S, Proportion Specification, for types of mortar indicated below:
1. Limit cementitious materials in mortar to Portland cement-lime.
  2. Refer to structural drawings for mortar mix proportions. Comply with CBC, Section 2103.9 and TMS 602, Table SC-1.
  3. Refer to structural drawings for grout strength requirements. Comply with CBC, Section 2103.13 and TMS 602, Section 2.2.
- C. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
- D. Grout for Unit Masonry: Comply with ASTM C 476 and referenced unit masonry standard.
1. Grout shall be a coarse grout designed to attain a compressive strength of 2000 psi at 28 days.
  2. Grout shall be composed of 1 part Portland Cement, not more than 1/10 part hydrated lime fine aggregate at 2 ¾ to 3 times the sum of the volumes of the cementitious materials, and pea gravel at 1 to 2 times the sum of the volumes of the cementitious materials, grout aid and sufficient water to attain a slump between 8 and 10 inches without segregation.
  3. Materials for grout shall be measured in suitable calibrated devices. After the addition

of water, all materials shall be mixed for at least 3 minutes in a drum type batch mixer. Mixing equipment and procedures shall produce grout with the uniformity required for concrete by ASTM C94.

2.08 SEALER

- A. Sealer for masonry not otherwise indicated to be painted, unfinished or receive other finish shall be a clear non-yellowing silicone water repellent. Apply two coats of sealer to CMU wall surfaces. Prepare all surfaces as recommended by the manufacturer. Materials shall be installed per all manufacturer recommendations and requirements.

2.09 SOURCE QUALITY CONTROL

- A. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140, and linear drying shrinkage per ASTM C146.
- B. Grout Unit Tests: Grout shall be tested for compressive strength per ASTM C1019.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation and verify compliance with number and locations of conduits within unit cells.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this

and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. CONDUITS AND PIPES IN MASONRY WALLS:
  - 1. Conduits, up to  $\frac{3}{4}$ " diameter, shall be allowed in cells for vertical runs only, in accordance with the following parameters. No horizontal runs are allowed except that vertical offsets up to 24" in length will be allowed to avoid interference and congestion with reinforcing steel and other embedded items.
    - a. Water, gas and other pipes may penetrate through a wall in a sleeve, but shall not be embedded in walls.
  - 2. Reinforced cells: Limit conduit to 1 –  $\frac{3}{4}$ " dia. conduit per cell, provided the following conditions are maintained:
    - a. Reinf. Steel shall be properly placed and shall not be relocated to accommodate conduits.
    - b. Grout cover between conduit and reinf. steel shall be 2.5 x bar dia., 1/2" min. (1 1/2" @ #5, 1 7/8" @#6).
    - c. Maintain a minimum clear area within the cell of 3"x3" for consolidation by vibration.
  - 3. Unreinforced cells: Limit conduit to 2 –  $\frac{3}{4}$ " dia. or 1-1" dia. conduit per cell, provided the following conditions are maintained:
    - a. Conduit shall not be placed closer than 3 dia., center to center, to adjacent conduit.
    - b. Maintain a minimum clear area within the cell of 3"x3" for consolidation by vibration.
  - 4. No conduits are allowed in walls less than 8" nominal thickness.
- G. Retaining walls:
  - 1. Masonry retaining walls designed to be tied to floor or roof at top of wall shall be braced prior to the placement of backfill.
  - 2. Cantilever retaining walls shall not be braced.
  - 3. Backfill placement shall be performed in proper lifts under soil engineer supervision to avoid developing significant lateral earth pressures.

3.03 CONSTRUCTION TOLERANCES

- A. Comply with construction tolerances of referenced unit masonry standard ACI 530.1-05, Part 3, 3.3G.

3.04 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
  - 1. Stack Bond, unless otherwise indicated in drawings.
  - 2. Maximum spacing of reinforcing steel is 16".
- D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry. If work is stopped for one hour or more, stop grout at 1/2" min. and 2" max. below top of units.
- E. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
  - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
    - a. At exterior frames insert extruded polystyrene board insulation around perimeter of frame in thickness indicated but not less than 3/4 inch to act as a thermal break between frame and masonry.

3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  - 1. Typical Wall Units – All head and bed joints shall be with full mortar coverage on horizontal and vertical face shells for a distance in from the face of the unit not less than the thickness of the shell.
  - 2. Columns, Pilasters and Wall Piers not exceeding 32" in length – All head and bed joints shall be with full mortar coverage. Face-to-face units shall have full mortar

coverage over the contact surfaces. Bed webs in mortar in starting course on footings and in all courses of columns, pilasters and piers, and where adjacent to cells or cavities to be filled with grout.

3. Starting Course – At starting course on footings and slabs, spread out full mortar bed including areas under cells. Initial joint shall not be less than ¼" nor more than 1 inch in thickness. Comply with 2104A.1.2.1.
  4. For stack bond coursing, provide wire ladder reinforcement in horizontal beds to keep wall aligned.
- B. Set stone units in full bed of mortar with all vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone joint surface thoroughly before setting; for stone surfaces that are soiled, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
- C. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.

### 3.06 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated or based on industry standards. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
1. Install preformed control joint gaskets designed to fit standard sash block.

### 3.07 INSTALLATION OF REINFORCED UNIT MASONRY

- A. General: Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
1. Grout lifts shall not exceed 5'-4". Comply with TMS 602, 3.5D.1.c.
  2. Where grout pours exceed 5'-4" cleanouts are required.
- D. Cleanouts: Clean-out openings shall be provided for 'High-Lift grouting' by one of the

following methods.

1. Provide cleanouts in each cell at the bottom of each pour by removing the face shell.
  2. Construct the course at the bottom of the pour with inverted, open-end bond-beam units and provide cleanouts in each reinforced cell by removing the face shell.
  3. Where Cleanouts are located below concrete slabs or in locations where the wall surface is not visible, Cleanout openings may be tightly form plugged. Where Cleanouts are located in areas where the wall surface is visible, cleanouts shall be plugged with face shells to match the units.
  4. Cleanouts shall be scaled before grouting, after inspection.
- C. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

### 3.08 FIELD QUALITY CONTROL

- A. Testing Frequency: Tests and evaluations listed in this article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
2. Mortar composition and properties will be evaluated per ASTM C 780.
  3. Grout compressive strength will be sampled and tested per ASTM C 1019.
- B. Verification of Masonry Strength: Verify masonry strength,  $f_m$ , by one of the following methods as outlined in CBC, Section 2105A.2.2:
1. Prism Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM C 1314.
  2. Masonry Prism Test Record: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.
  3. Unit Strength Method: Verify in accordance with procedure in CBC Section 2105A.2.2.1.
- D. All structural masonry work shall be continuously inspected during laying, reinforcing placement and grouting by an inspector specially approved for that purpose by the architect and Owner.

### 3.09 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent

construction to provide a neat, uniform appearance, prepared for application of sealants.

- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
  5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:
    - a. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.
  6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.
- D. Finish Application: When concrete masonry is clean and dry, apply 2 coats of clear sealer in accordance with manufacturer's instruction and recommendations. Other finishes where indicated shall be applied in accordance with and by the applicable specification and trade.
- E. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer that ensures unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 042200

This page is intentionally left blank.



## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.02 SUMMARY

- A. Section Includes: Portland cement based manufactured stone veneer and trims.
- B. Related Sections: Includes all Division 00 Sections Requirements.
  - 1. Section 079200 – Joint Sealants.
  - 2. Section 092400 – Portland Cement Plastering.
  - 3. Section 092090 – Plaster Accessories.

### 1.03 REFERENCES

- A. American National Standards Institute (ANSI):
  - 1. ANSI A118.4 – Specifications for Latex-Portland Cement Mortar.
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 2. ASTM C 67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
  - 3. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
  - 4. ASTM C 177 – Standard Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
  - 5. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
  - 6. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
  - 7. ASTM C 482 – Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.
  - 8. ASTM C 567 – Standard Test Method for Determining Density of Structural Lightweight Concrete.
  - 9. ASTM C 847 – Standard Specification for Metal Lath.
  - 10. ASTM C 932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
  - 11. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.
  - 12. ASTM C 1032 – Standard Specification for Woven Wire Plaster Base.
  - 13. ASTM C 1059 – Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.

14. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
15. ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
16. ASTM C1329 – Standard specification for Portland cement.
17. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
18. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
19. ASTM E2556/E2556M – Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment.

C. Other Standards:

1. UBC Standard No. 14-1, Kraft Waterproof Building Paper.
2. ICC AC38 Acceptance Criteria for Water Resistive Barriers.
3. UU-B-790 Building Paper, Vegetable Based, Kraft, waterproofed, water repellent and fireproof.

D. International Code Council (ICC):

1. ESR Report.

#### 1.04 SUBMITTALS

A. Per the County General Conditions Section 007200; submit following items:

1. Product Data.
2. Samples:
  - a. Standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
  - b. Full range of mortar colors.
3. Verification Samples: Following initial sample selection submit "laid-up" sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 by 3 feet.
4. Quality Assurance/Control Submittals:
  - a. Qualifications:
    - 1) Proof of manufacturer qualifications.
    - 2) Proof of installer qualifications.
  - b. Regulatory Requirements: Evaluation reports.
  - c. Veneer manufacturer's installation instructions.
  - d. Installation instructions for other materials.

- B. Project Completion Submittals: Reference County General Conditions Section 007200; submit following items:
  - 1. Maintenance Instructions.
  - 2. Special Warranties.

#### 1.05 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer Qualifications: Eldorado Stone, LLC.
  - 2. Installer Qualifications: Experienced mason familiar with installation procedures and related local, state and federal codes for masonry.
- B. Certifications:
  - 1. ICC Evaluation Service - Evaluation Report ESR-1215
  - 2. ASTM C1670
  - 3. LARR – Research Report RR25589
  - 4. UL - Classification listing in Building Materials Directory: UL 546T (F8002)
- C. Field Sample:
  - 1. Prepare 3 by 4-foot sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors. Include installation of the joint plaster accessory vertical and horizontal reveals.
  - 2. Obtain Architect's approval.
  - 3. Protect and retain sample as a basis for approval of completed manufactured stonework. Approved sample may be incorporated into completed work.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Reference County General Conditions Section 007200 – for Product Storage and Handling Requirements.
- B. Follow manufacturer's instructions.

#### 1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: When air temperature is 40 degrees or below, consult local building code for Cold-Weather Construction requirements.

#### 1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard warranty coverage against defects in materials when installed in accordance with manufacturer's installation instructions.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURER

- A. Eldorado Stone, LLC Tel: (800) 925-1491  
1370 Grand Ave., Bldg. B Fax: (760) 736-3840  
San Marcos, CA 92069 E-Mail: [customerservice@eldoradostone.com](mailto:customerservice@eldoradostone.com)  
Website: [www.eldoradostone.com](http://www.eldoradostone.com)

### 2.02 MATERIALS

- A. Stone Veneer:
  - 1. Profile: Mountain Ledge Panels - Silverton. Include matching corner pieces.
- B. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.
  - 1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi.
  - 2. Shear Bond: ASTM C 482: 50 psi, minimum.
  - 3. Freeze-Thaw Test: ASTM C 67: Less than 3 percent weight loss and no disintegration.
  - 4. Thermal Resistance: ASTM C 177: 0.473 at 1.387 inches thick.
- C. Weather Barrier: Per Section 072500 – Weather Barrier.
- D. Reinforcing: See Section 092400 - Cement Plastering for required reinforcing.
- E. Mortar:
  - 1. Cement: Portland cement complying with ASTM C 1329.
  - 2. Lime: ASTM C 207.
  - 3. Sand: ASTM C 144, natural or manufactured sand.
  - 4. Color Pigment: ASTM C 979, mineral oxide pigments.
  - 5. Water: Potable.
  - 6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.
- F. Bonding Agent: Exterior integral bonding agent meeting ASTM C 1059 Type II.
- G. Water Repellent: Water based silane or siloxane masonry water repellent per section 071900 - Water Repellants.

### 2.03 MORTAR MIXES

- A. Jointless/Dry-Stacked Installation:
  - 1. Polymer modified mortar complying with ANSI A118.4
  - 2. Mortar prepared to comply with ASTM C270. Type S mortar.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates upon which work will be installed.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Commencement of work by installer is acceptance of substrate.

#### 3.02 PREPARATION

- A. Protection: Protect adjacent work from contact with mortar.
- B. Surface Preparation: Prepare substrate in accordance with manufacturer's installation instructions for the type of substrate being covered.

#### 3.03 INSTALLATION

- A. Install and clean stone in accordance with manufacturer's installation instructions for Standard Installation (Grouted Joint) or Jointless/Dry-Stacked installation as specified above.
- B. Apply repellent in accordance with repellent manufacturer's application instructions.

#### 3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Manufacturer's Field Service Representative shall make two periodic site visits review of on-going installation process but is not responsible for any errors or omissions that are not observed or are previously completed.

#### 3.05 CLEANING

- A. Reference Section 017400-Cleaning and Waste Management.
- B. Remove protective coverings from adjacent work.
- C. Cleaning Veneer Units:
  - 1. Wash with soft bristle brush and water/granulated detergent solution
  - 2. Rinse immediately with clean water
- D. Removing Efflorescence:
  - 1. Allow veneer to dry thoroughly
  - 2. Scrub with soft bristle brush and clean water
  - 3. Rinse immediately with clean water; allow to dry
  - 4. If efflorescence is still visible, contact ES Customer Service for assistance.

END OF SECTION 047300

CONTRACT # 19-S-04

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
  - 2. Division 5 Section "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.
  - 3. Refer to Division 3 for anchor bolt installation in concrete.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
  - 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
  - 2. Structural steel primer paint.
  - 3. Shrinkage-resistant grout.
- C. Shop Drawings, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
  - 1. Fabricator and detailer shall be responsible for coordination of all contract documents for required steel work. Comply with AISC – Code of Standard Practice for Steel buildings and Bridges, Section 4.
  - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

4. Where drawings are in conflict, detailing shall not be completed for affected items until the detailer has requested clarification/revision from the Architect and has received written directive for such change as may be required. Request for clarification/revision shall be by RFI or by clouded comment on the initial shop drawing submittal. Fabricator shall be responsible for changes to the shop drawings required where shop drawings have progressed prior to resolution of discrepancies.
  5. Detailing shall allow for minor coordination changes and revisions as a part of the contract services.
- D. Inspection reports conducted on shop and field High-Strength 'Slip Critical' bolted and welded connections: Include data on type(s) of tests conducted and test results.

#### 1.4 QUALITY ASSURANCE

- A. Shop Drawings: Fabricator shop drawings shall be submitted in compliance with Division 01, Section 01 30 00.
1. Comply with AISC Code of Standard Practice for Steel Buildings and Bridges, Section 4.
  2. Use of CAD files and/or copies of design drawings: Comply with AISC Code of Standard Practice, Section 4.3 with the following exception:
    - a. Replace section 4.3 (d) with the following: "The Contractor shall compensate the Engineer, not to exceed \$50.00 per drawing, for preparation of CAD files including the removal of information that is not required for the fabrication or erection of the structural steel from the CAD files for the preparation of CAD files to be used as part of the shop or erection drawings.
- B. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."
    - a. In conformance with paragraph 3.2, the structural drawings identify the steel required for support of architectural, mechanical and electrical equipment. Contractor shall refer to the architectural, mechanical and electrical drawings for detail configurations and other construction information.
    - b. Paragraph 4.3 (a) of the above code is hereby modified per Section 1.04 A.2.
  2. AISC "Specifications for Structural Steel Buildings," including "Commentary."
  3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
  4. American Welding Society (AWS) D1.1 and D1.8 "Structural Welding Code - Steel."



5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
  6. California Building Code (CBC), 2016 edition, Chapter 22.
- C. Installer Qualifications: Steel work installers shall meet one or more of the following:
1. A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector with more than 5 years experience with similar work.
  2. A steel work installer with a minimum of 5 years experience who has successfully completed three (3) projects of similar scope and size to that specified for this project.
- D. Fabricator Qualifications: Steel fabricator shall meet one or more of the following:
1. A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.
  2. A fabricator who has a minimum of 10 years experience who has successfully completed at least three (3) projects of similar scope and size to that specified for this project in the past 5 years.
- E. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within previous 12 months for the types of welding to be performed.
  2. If recertification of welders is required, retesting will be the Contractor's responsibility.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to Project site in such quantities and at such times to ensure uninterrupted progress of Work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay Work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
1. Clean and relubricate bolts and nuts that become dry or rusty before use.
  2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including the following:
  - 1. Pitting.
  - 2. Rust and scale.
  - 3. Seam marks.
  - 4. Roller marks.
  - 5. Rolled trade names.
  - 6. Roughness.
- B. Remove blemishes by grinding or by welding and grinding prior to cleaning, treating, and applying surface finishes.
- C. Structural Steel W, S and M shapes: ASTM A992.
- D. Structural Steel C and MC shapes, Angles, Plates and Bars: ASTM A36.
- E. Braced-Frame and Moment-Frame Gusset Plates, Base Plates and Cap Plates: ASTM A992
- F. Square Cold-Formed Structural Steel Tubing (HSS): ASTM A500, Grade B.
- G. Round Structural Steel Tubing: ASTM A53, Grade B.
- H. Unheaded Anchor Bolts and Nuts: ASTM A 307, Grade C or ASTM F 1554, Grade 36; unheaded, unless otherwise indicated. Use headed bolts where embedded in the sides of masonry units.
- I. Headed Anchor Bolts and Nuts: ASTM A 307, Grade A or ASTM F 1554, Grade 36 headed, unless otherwise indicated.
- J. Unfinished Threaded Fasteners and Nuts: ASTM A307 or ASTM A; regular low carbon-steel bolts; and carbon-steel nuts.
  - 1. Provide either hex or square heads and nuts.
  - 2. Use only hex units for exposed connections.
- K. High-Strength Threaded Fasteners: Heavy hex structural bolts, heavy hex nuts, and hardened washers, as follows:
  - 1. Quenched and tempered medium carbon-steel bolts, nuts and washers, complying with ASTM A325.
    - a. Where indicated as "SC" type connections – Provide "Slip-Critical" connections with faying surfaces per AISC.

- b. Where indicated as galvanized, provide units that are mechanically deposited zinc-coating, ASTM B 695, Class 50 or Hot-dip zinc-coating, ASTM A153.
- L. Welding Electrodes: Comply with AWS Code; ASTM 233, E-70 Series.
- M. Structural Steel Primer Paint: Series L69, Hi Build Epoxoline II, Red color Low VOC epoxy, air dried, by Tnemec or equal as approved in accordance with Div 01 for Substitutions. Manufacturer's standard primer for unpainted steel permanently enclosed in walls and above ceilings.
- N. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.
- O. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. SonogROUT; Sonneborn/Contect.
    - b. Euco N.S.; Euclid Chemical Co.
    - c. Sealtight 588 Grout; W. R. Meadows.

## 2.2 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications on final Shop Drawings.
  1. Properly mark and match-mark materials for field assembly.
  2. Fabricate for delivery a sequence that will expedite erection and minimize field handling for materials.
  3. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
  4. Identify those members specified as AISC-AESS (Architecturally Exposed Structural Steel). Comply with AISC Section 10 for the fabrication of AESS steel.
- B. Connections: Weld or bolt shop connections, as indicated.
- C. Bolt field connections, except where welded connections or other connections are indicated.
  1. Provide high-strength 'Slip Critical' threaded fasteners where indicated as "SC" type.

2. Provide unfinished threaded fasteners for other connections primary and of secondary framing members to primary members (including girders, beams, purlins, girts, bracings and other framing members used) and for temporary bracing to facilitate erection.
- D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A 490 Bolts" for "slip-critical" type connections (SC). High strength bolts specified as A325 "bearing" type do not require faying surface preparation and shall be "torque indicator" type bolts.
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
1. Comply with AISC 10.2.5 for AESS component welding.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final Shop Drawings.
1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
  2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.
  3. Provide unfinished threaded fasteners for other primary connections and for secondary framing members to primary members and for temporary bracings to facilitate erection.
- H. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical expansion joints as indicated on drawings.
- I. Camber: Where cambers in steel members are indicated, cambering shall be in accordance with Section 6 of the AISC Code of Standard Practice for Buildings and Bridges. Cambers shall be by "cold cambering" unless fabricator's shop facilities can produce specified results by "heat cambering" without detrimental effects on the steel materials. Fabricator shall have successful experience history of "heat cambering" and shall obtain architect's approval before proceeding. Where aesthetic cambering in steel is required as indicated on the drawings cambering shall be by roller bending or other approved means so as to produce a smooth radius curve the full length of the member or between any two points indicated. Where camber is specified for cantilever beams the back-span camber shall be a radius curve between the two supports and the cantilever camber shall be a radius curve from the cantilever support to the end of the cantilever, unless otherwise specified. Indicate cambering on the shop drawings.

### 2.3 SHOP PAINTING

- A. General: Shop-paint structural steel that is exposed, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
  - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type "SC" connections.
  - 2. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
  - 1. SP-1 "Solvent Cleaning."
  - 2. SP-2 "Hand-Tool Cleaning."
  - 3. SP-3 "Power-Tool Cleaning."
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Do not prime steel scheduled to receive spray-applied fireproofing.

### 2.4 SOURCE QUALITY CONTROL

- A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency.
  - 1. Inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
  - 2. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections: Steel supplier, fabricator or erector shall not design any portion of the steel structural components used. Details shown on the drawings are typical; similar details apply to similar conditions, unless otherwise indicated. Where information is not provided to complete the construction, contractor shall inform architect. Work shall not continue on affected components until written directive has been submitted.
  - 1. Verify dimensions at site whenever possible without causing delay in the work.
  - 2. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

### PART 3 - EXECUTION

#### 3.1 ERECTION

- A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
  - 1. Remove temporary members and connections when permanent members are in place and final connections are made.
  - 2. Provide temporary guide lines to achieve proper alignment of structures as erection proceeds.
- B. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work; see Section 01500.
- C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
  - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
  - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
  - 4. For proprietary grout materials, comply with manufacturer's instructions.
- D. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Comply with AISC Section 10 for the handling and erection of AESS steel.
- E. Level and plumb individual members of structure within specified AISC tolerances.
- F. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- G. Splice members only where indicated and accepted on Shop Drawings.
- H. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- I. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
  - J. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
- 3.2 QUALITY CONTROL
- A. Owner will engage an independent testing and inspecting agency to inspect high-strength bolted connections and welded connections and to prepare test reports.
    1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
  - B. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
  - C. Testing agency may inspect structural steel at plant before shipment.
  - D. Correct deficiencies in or remove and replace structural steel that does not comply with specified requirements.
  - E. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

END OF SECTION 051200

This page is intentionally left blank.



## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Fabrications and installations of types of cold-formed metal framing units include the following:
  - 1. C-shaped load-bearing and non-load-bearing, punched and un-punched channel studs and joists with stiffened flanges.
  - 2. C-shaped load-bearing and non-load-bearing steel stud track.
  - 3. C-shaped un-punched blockings, headers and miscellaneous components.
  - 4. Lt.-gauge straps, z-shaped and "hat" shaped furring.

### 1.2 REFERENCES

- A. CBC 2016 - California Building Code
- B. SSMA - Steel Stud Manufacturers Association

### 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
  - 1. Product data and installation instructions for each item of cold-formed metal framing and accessories.
  - 2. Shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.
    - a. Include placing drawings for framing members showing size and gage designations, number, type, location, and spacing. Indicate supplemental strapping, bracing, splices, bridging, accessories, and details required for proper installation.
  - 3. 2-foot long sample of each stud, joist and track component to be used. Mark each sample to indicate symbol of identification from structural drawings. Deliver samples directly to structural engineer's office.

### 1.4 QUALITY ASSURANCE

- A. Component Design: Calculate structural properties of studs and joists in accordance with American Iron and Steel Institute (AISI) "Specification for Design of Cold-Formed Steel Structural Members."
- B. All component section properties shall comply with the Steel Stud Manufacturer's Association (SSMA). Refer to structural drawings for minimum section properties for each component used.
- C. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations,

provide units that have been approved by governing authorities that have jurisdiction.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, Manufacturer shall be a member of the Steel Stud Manufacturer's Association (SSMA).

### 2.2 METAL FRAMING

- A. System Components: Manufacturer's components shall comply with the section properties of the SSMA. Manufacturers' standard load-bearing steel studs and joists of type, size, shape, and gauge as indicated. With each type of metal framing required, provide manufacturer's standard, steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories for applications indicated, as needed to provide a complete metal framing system. All framing components shall be of the gauge indicated on the structural drawings, minimum 20 gauge steel, except as otherwise indicated.

- B. Materials and Finishes:

1. Bearing and non-bearing studs may be punched sections, unless specified otherwise. Comply with structural drawings for limitations on punch-out locations from ends of studs.
2. All joists and rafters shall be un-punched sections. Holes required for access of conduit and piping shall be drilled to a size of minimum requirement for installation.
3. For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi; ASTM A 653, A 570, or A 611.
4. For 18-gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 653, A 570, or A 611.
5. Provide galvanized finish to metal framing components complying with ASTM A 525 for minimum G 60 coating.
6. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
7. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

### 2.3 FABRICATION

- A. General: Framing components may be prefabricated into assemblies before erection. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.
- B. Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent component placement.
- C. Fastenings: Attach similar components by screw fasteners. Attach dissimilar components by bolting, or screw fasteners, as standard with manufacturer.

- D. Wire tying of framing components is not permitted.
- E. Welding of framing components is not permitted.
- F. Fabrication Tolerances: Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Bent, distorted or otherwise damaged components shall not be used.

### 3.2 INSTALLATION

- A. General: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations.
- B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as specified on the structural drawings. Do not exceed 24 inches o.c. spacing for power-driven fasteners or 16 inches o.c. for other types of attachment. Provide fasteners at corners and ends of tracks.
- C. Installation of Wall Studs: Secure studs to top and bottom runner tracks by screw fastening at both inside and outside flanges.
- D. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- E. Where stud system abuts structural columns or walls, including masonry walls, anchor end studs to stiffeners in supporting structure.
- F. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- G. Frame wall openings per structural drawings. Where details for openings are not provided, frame non-bearing wall openings smaller than 4 feet span with double 4" stud section header, single jamb stud, single king stud and single sill track. Frame openings larger than 4 feet span, but not exceeding 8 feet span, with double 6" stud section header, double jamb studs, double king studs and single sill track. All structural bearing wall openings and non-bearing openings larger than 8 foot span require special details, see structural

drawings.

- H. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.
- I. Install horizontal strap and block stiffeners in stud system where finish material is not installed to both sides, and where strap and block stiffeners are needed to maintain straightness of long studs. Space at not more than 96 inches o.c. vertically. See structural drawings for requirements.
- J. Erection Tolerances: Bolt wall panels (at both horizontal and vertical junctures) to produce flush, even, true-to-line joints.
  - 1. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/16 inch.
- K. Installation of Joists: Install level, straight, and plumb, complete with bracing and reinforcing as indicated on drawings. Provide not less than 1-1/2-inch end bearing.
  - 1. Drilled holes in un-punched joists shall be limited to a diameter of 1/3 joist depth and located within 1/3 joist depth within the center 1/3 joist span, unless otherwise approved by the engineer.
- L. Reinforce ends with end clips, steel hangers, steel angle clips, steel stud section, or as otherwise recommended by joist manufacturer.
- M. Where required, reinforce joists at interior supports with single short length of joist section located directly over interior support.
- N. Secure joists to interior support systems to prevent lateral movement of bottom flange.
- O. Field Painting: Touch-up damaged shop-applied protective coatings. Use galvanizing repair system for galvanized surfaces.

### 3.3 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing. Paint framing surfaces with same type of shop paint used on adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME)
  - 1. ASME B18 Fasteners
- B. American Society for Testing and Materials (ASTM)
  - 1. ASTM A36/A36M Carbon Structural Steel
  - 2. ASTM F1554 or A307 - Anchor Bolts, Steel, 35-ksi Yield Strength
- C. American Welding Society (AWS)
  - 1. AWS A2.4 - Standard Symbols for Welding, Brazing and Non-Destructive Examination
  - 2. AWS A5.1 - Carbon Steel Covered Arc-Welding Electrodes
- D. California Code of Regulations (CCR)
  - 1. Title 8, Chapter 3.2
  - 2. Cal/OSHA, Subchapter 4 Construction Safety Orders
  - 3. Title 24, Part 2, 2016 California Building Code (CBC), Chapter 22.
  - 4. Title 12, California Fire Code Chapter 26 Welding and Other Hot Work.

1.3 SUBMITTALS

- A. Shop Drawings. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable. Indicate welded connections using standard AWS A2.4 Welding Symbols. Indicate net weld lengths.
- B. Welder Certifications:
- C. Manufacturer's Certificates certifying welders employed on the work have been AWS qualified within the previous 12 months, in accordance with AWS-WHB-1.

1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following
  - 1. AWS D1.1, Structural Welding Code--Steel.
  - 2. AWS Certified welders.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

2.3 FASTENERS

- A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563 and ANSI B18.2.1; and, where indicated, flat washers and ASTM A325 as indicated on drawings.
- B. Anchor Bolts ASTM F1554, Grade 36.
- C. Machine Screws ASME B18.6.3, or ASTM A-307.
- D. Lag Bolts ASME B18.2.1.
- E. Wood Screws Flat head, carbon steel, ASME B18.6.1.
- F. Plain Washers Round, carbon steel, ASME B18.22.1.
- G. Threaded rods, steel yokes and plates – ASTM A36.
- H. Self-drilling, self-tapping screws, ASTM C954, galvanized, minimum #8 unless noted otherwise on drawings. By Buildex/Tomarco or equal.
- I. Anchorage Devices: Drilled Expansion Anchors Minimum 5/8-inch diameter with embedment noted on drawings.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. Welding Materials: AWS A5.1, E70XX for Grade 40, E90XX for Grade 60, type and procedures required by electrode manufacturer for materials being welded.

- B. Grout ASTM C1107, Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 8,000 psi at 7 days; of consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Fit and shop assemble in largest practical sections for delivery to site.
- B. Ease exposed edges to small uniform radius.
- C. Fabricate items with joints tightly fitted and secured.
- D. Welded Joints. Seal joined members by continuous welds. Dress welded joints, leaving no burrs, or sharp or abrasive corners, edges or surfaces.
  - 1. Where exposed to view, dress welds in accordance with NOMMA Guidelines for Finish 1.
  - 2. Where concealed, dress welds in accordance with NOMMA Guidelines for Finish 3.
- E. Exposed Mechanically Fastened Joints. Make exposed, mechanically fastened joints hairline-tight, flush, butt joints. Secure with flush-mount, countersunk, screws or bolts; unobtrusively located; consistent with design of component, except where specifically indicated otherwise.
- F. Provide components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as related metal fabrication, unless expressly indicated otherwise.

## 2.6 FINISHES

- A. Steel and Iron
  - 1. Clean surfaces of rust, scale, grease and foreign matter prior to finishing. Prepare in accordance with SSPC SP-2.
  - 2. Do not prime surfaces in direct contact with concrete or where field welding is required.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS standards and procedures for metal alloy welded.
- D. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

3.4 EQUIPMENT ENCLOSURES GATES

- A. Provide steel framing or aluminum framing if indicated, and panels and supports as indicated in Drawings and as necessary to complete Work.
  - 1. Fabricate units from structural-steel shapes, plates, sheet metal and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 2. Hinges Heavy-duty weld-on I type. Minimum 3 per leaf rated at 1000 lbs. each hinge.
  - 3. Enclosures and Gates As indicated on Drawings.
    - a. Gate Infill Panels for Enclosures, Sheet metal, 1-1/2 inches deep 36-inch panels, 18 gauge, G90 galvanized coated [Zincalume] steel ASTM A653. Box Rib by BHP Steel Building Products or equal. Paint per Section 09 90 00.

END OF SECTION 055000



PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Aluminum cage ladders.

1.03 RELATED SECTIONS

- A. Section 055000 – Metal Fabrications: Fasteners and installation requirements used to attach ladders to structure.

1.04 REFERENCES

- A. AA – Aluminum Association.
- B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. OSHA 1910.27 – Fixed Ladders.

1.05 SUBMITTALS

- A. Submit under provisions of County General Conditions Section 007200.
- B. Product Data: Manufacturer's data sheets on each product.
- C. Shop Drawings:
  - 1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
  - 2. Provide templates for anchors and bolts specified for installation under other Sections.
  - 3. Provide reaction loads for each hanger and bracket.
- D. Qualification Data:
  - 1. Refer to Quality Assurance provisions for submittal requirements evidencing

experience, certifications and resources.

- E. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors.
- F. Verification Samples: For each finish specified, two samples, minimum size 6 inches square, represent actual product color.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
  - 1. Record of successful in-service performance.
  - 2. Sufficient production capacity to produce required units.
  - 3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.
- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
- C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

#### 1.08 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurement before fabrication.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

#### 1.09 WARRANTY

- A. A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years commencing on the shipment date of the product against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
  - 1. Defects in materials and workmanship.

2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
  3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.
- B. Manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor. Manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of the ladder; and shall not be liable for incidental or consequential damages, losses of or expenses, resulting from the use of ladder products.

#### 1.10 EXTRA MATERIALS

- A. Furnish touchup kit for each type and color of paint finish provided.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Acceptable Manufacturer: O'Keeffe's, Inc.; 100 N Hill Drive, Suite 12, Brisbane, CA 94005. Toll Free Tel: (888) 653-3333. Tel: (415) 824-4900. Fax: (415) 824-5900. Email: info@okeeffes.com. Web: <http://www.okeeffes.com>.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

#### 2.02 APPLICATIONS/SCOPE

- A. Cage Ladder Design:
1. Safety cages are required on ladders over 20 feet.
- B. Cage Ladder:
1. Cage Ladder with Roof Hatch Rail Extension.
    - a. Model 531 as manufactured by O'Keeffe's Inc.

#### 2.03 FINISHES

- A. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural

Class I, clear coating 0.018 mm or thicker.

#### 2.04 MATERIALS

- A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
- B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

#### 2.05 FABRICATION

- A. Rungs: Not less than 1-1/4 inches in section and 18-3/8 inches long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
  - 1. Rungs shall withstand a 1,500 pound load without deformation or failure.
- B. Channel Side Rails: Not less than 1/8 inch wall thickness by 3 inches wide.
- C. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch wall thickness by 3 inches wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
- D. Safety Cages:
  - 1. Fabricate ladder safety cages to comply with authority having jurisdiction. Assemble by welding. Spacing of primary hoops, secondary hoops and vertical bars shall not exceed that required by code.
  - 2. Safety cage hoops and vertical bars: 3/16 inch by 2 inches aluminum bar.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

#### 3.02 INSTALLATION

- A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

- B. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all items firmly into position for long life.

3.03 PROTECTION

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

END OF SECTION 055150

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Closures and trim.
- 2. Exterior formed-metal-shaped panels.
- 3. Metal shapes as part of roof construction.

- B. Related Requirements:

- 1. Section 076100 "Sheet Metal Roofing" for items made of formed metal for roofing.
- 2. Section 076200 "Sheet Metal Flashing and Trim" for items made of formed metal for flashings and trim.

### 1.3 COORDINATION

- A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.
- B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes of deterioration.

### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative formed metal.
  - 1. Include plans, elevations, component details, and attachment details.

2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same thickness and material indicated for the Work.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.
- B. Mill Certificates: Signed by stainless-steel manufacturers certifying that products furnished comply with requirements.
- C. Evaluation Reports: For post-installed anchors, from ICC-ES.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For Clear Anodized Aluminum finish to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated for this Project and with a record of successful in-service performance as well as sufficient production capacity to produce required units.
- B. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- C. Installer Qualifications: Fabricator of products.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
- B. Store products on elevated platforms in a dry location.



### 1.10 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in County General Conditions Section 007200 Quality Requirements, to design decorative formed metal, including attachment to building construction.
- B. Structural Performance: Decorative formed metal items, including anchors and connections, shall withstand the effects of gravity loads and the following loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components.

### 2.2 SHEET METAL

- A. General: Fabricate products from sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
- B. Aluminum Sheet: Flat sheet complying with ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, either commercial steel or forming steel.
- D. Steel Sheet: ASTM A 879 / A 879M, with steel sheet substrate complying with ASTM A 1008 / A 1008M.
- E. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.

### 2.3 MISCELLANEOUS MATERIALS

- A. Gaskets: As required to seal joints in decorative formed metal and remain weathertight.
  - 1. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain seal for application indicated.
  - 2. Closed-cell polyurethane foam, adhesive on two sides, release paper protected.

- B. Sealants, Exterior: Elastomeric sealant complying with Section 079200 "Joint Sealants" and as recommended in writing by decorative formed metal manufacturer.
- C. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items.
  - 1. Use filler metals that will match the color of metal being joined and will not cause discoloration.
- D. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
  - 1. Provide concealed fasteners for interconnecting decorative formed metal items and for attaching them to other work unless otherwise indicated.
  - 2. Provide Phillips flat-head machine screws or square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- E. Structural Anchors: For applications indicated to comply with certain design loads, provide fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
- F. Nonstructural Anchors: For applications not indicated to comply with design loads, provide fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
- G. Anchor Materials:
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- H. Sound-Deadening Materials:
  - 1. Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and passing ASTM E 136 test.
  - 2. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- I. Backing Materials: Provided or recommended by decorative formed metal manufacturer.
- J. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal, will prevent telegraphing and oil-canning, and is compatible with substrate and noncombustible after curing.
- K. Isolation Coating: Manufacturer's standard alkali-resistant coating, alkali-resistant coating.

## 2.4 PAINTS AND COATINGS

- A. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Shop Primers: Comply with Section 099113 "Exterior Painting."
- D. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. Shop Primer for Galvanized Steel: Water-based galvanized metal primer complying with MPI#134.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

## 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- C. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.
- D. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
  - 1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
- E. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.

- F. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.
- G. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
  - 1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

## 2.6 CLOSURES AND TRIM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Fry Reglet Corporation.  
P.O. Box 3518  
625 S. Palm Avenue  
Alhambra CA 91803  
(800) 237-9773  
fryreglet.com
- B. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction, with weathertight joints at exterior installations.
  - 1. Aluminum Sheet: 0.0253 inch.
    - a. Finish: Clear anodic.
  - 2. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.
- C. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.
- D. Drill and tap holes needed for securing closures and trim to other surfaces.
- E. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.
- F. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

## 2.7 GENERAL FINISH REQUIREMENTS

- A. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- D. Finish items indicated on Drawings after assembly.
- E. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.
  - 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- D. Install concealed gaskets, joint fillers, insulation, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.

- E. Install concealed gaskets, joint fillers, sealants, and insulation, as the Work progresses, to make interior decorative formed metal items soundproof or lightproof as applicable to type of fabrication indicated.
- F. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
- G. Install decorative-formed-metal-clad doors and frames to comply with requirements specified in Section 081113 "Hollow Metal Doors and Frames."

### 3.3 ADJUSTING AND CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with water and soap, rinsing with clean water, and drying with soft cloths.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting".
- D. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

### 3.4 PROTECTION

- A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 057500

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plywood backing panels.
  - 2. Miscellaneous cleats, blocking and backing.
- B. Related Sections include the following:
  - 1. See Structural Drawings for exterior wall sheathing installation.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Fire-retardant-treated wood.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

## 2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Plywood backing panels.

## 2.3 DIMENSION LUMBER FRAMING

- A. Other Framing: No. 2 grade or better of any of the following species:
  - 1. Hem-fir (north); NLGA.
  - 2. Douglas fir-larch; WCLIB or WWPA.
  - 3. Douglas fir-south; WWPA.
  - 4. Douglas fir-larch (north); NLGA.

## 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
- B. Dimension Lumber Items: Construction or No. 2 or better grade lumber of any species.
- C. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:
  - 1. Northern species, No. 2 ; NLGA.
  - 2. Western woods, Construction or better grade; WCLIB or WWPA.



2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C -retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Securely attach carpentry work to substrate by anchoring and fastening as indicated.

END OF SECTION 061053

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plastic-laminate-faced architectural cabinets.
  - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plastic-laminate-faced architectural cabinets.
  - 1. Include plans, elevations, sections, and attachment details.
- C. Samples: For each exposed product and for each color and texture specified.

### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.

## PART 2 - PRODUCTS

### 2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. Type of Construction: Frameless.

- D. Door and Drawer-Front Style: Flush overlay.
  - 1. Reveal Dimension: 1/2 inch.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Formica Corporation.
    - b. Panolam Surface Systems / Pionite
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Vertical Surfaces: Grade VGS.
  - 3. Edges: Grade HGS.
  - 4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. See Interior Finish Schedule on sheet A-5.1 for the laminate manufacturer and selections. As indicated by laminate manufacturer's designations.

## 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade MD – Exterior Glue.
  - 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

3. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal, 5 inches long, 1-1/2 inches deep, and 5/16 inch in diameter.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: BHMA A156.9, B04013; metal.
- H. Drawer Slides: BHMA A156.9.
  1. Grade 1 and Grade 2: Side mounted.
    - a. Type: Full extension.
    - b. Material: Zinc-plated steel with polymer rollers.
  2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
  3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
  4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
  5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
- I. Door Locks: BHMA A156.11, E07121.
- J. Drawer Locks: BHMA A156.11, E07041.
- K. Door and Drawer Silencers: BHMA A156.16, L03011.
- L. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
  1. Color: To match door pull color.

- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- C. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-

FRESNO COUNTY SHERIFF SUBSTATION  
FRESNO, CA.

PLASTIC-LAMINATE-FACED ARCHITECTURAL  
CABINETS SECTION 064116 - 5

inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish.

END OF SECTION 064116

This page is intentionally left blank.



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes plastic sheet paneling, mounting hardware, adhesives, accessories, trims and sealants.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories.

### 1.4 QUALITY ASSURANCE

- A. Testing Agency: Acceptable to authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Crane Composites, Inc.
    - b. Marlite.
    - c. Nudo Products, Inc.
  - 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.

3. Nominal Thickness: Not less than 0.09 inch.
4. Surface Finish: Molded pebble texture.
5. Color: White.

## 2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
  1. Color: Match color of panels.
- B. Sealant: Mildew-resistant, single-component, neutral-curing silicone or sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

### 3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with manufacturer approved adhesive and fasteners.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

CONTRACT # 19-S-04

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 - Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Products supplied under this section:
  - 1. Vapor barrier and installation accessories for installation under concrete slabs.
- B. Related sections:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Special Conditions of these Specifications.
  - 2. Section 002200: Geotechnical Investigation Report
  - 3. Section 033000: Cast-In-Place Concrete

### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
  - 2. ASTM E1643-11 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. Technical Reference - American Concrete Institute (ACI):
  - 1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
  - 2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

### 1.4 SUBMITTALS

- A. Quality control/assurance:
  - 1. Summary of test results per paragraph 9.3 of ASTM E1745.
  - 2. Manufacturer's samples and literature.
  - 3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Vapor barrier shall have a minimum of the following qualities:
1. Moisture Vapor Permeance .040 Perms per ASTM E-154 and ASTM E1745 Class A, B and C.
  2. Tensile Strength 45.0 lb. f/in (min.) per ASTM D-882
  3. Puncture Resistance ASTM E1745, (Class C with minimum puncture resistance of 475 grams)
  4. Thickness 10 mils minimum.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Raven Industries - "VaporBlock" VB10  
Raven Engineered Films  
P.O. Box 5107 Sioux Falls, SD 57117-5107  
Ph: +1 (605) 335-0174 • +1 (800) 635-3456  
[efdsales@ravenind.com](mailto:efdsales@ravenind.com) [www.ravenefd.com](http://www.ravenefd.com)
  2. Stego – "Stego Wrap" (10-mil)  
Stego Industries, LLC  
216 Avenida Fabricante, Suite 101 San Clemente, CA 92672  
Sales, Technical Assistance Ph: (877) 464-7834  
[contact@stegoindustries.com](mailto:contact@stegoindustries.com) [www.stegoindustries.com](http://www.stegoindustries.com)
  3. W.R. Meadows Sealtight 10 mil - "Perminator"  
W.R. Meadows Inc.  
P.O. Box 338, Hampshire, IL 60140-0338  
Ph: +1 800-342-5976 [www.wrmeadows.com](http://www.wrmeadows.com)
  4. Fortifiber, 10 Mil - "Moistop Ultra"  
Fortifiber Building Systems Group  
300 Industrial Dr, Fernley, NV 89408  
Ph: (800) 773-4777 [www.fortifiber.com](http://www.fortifiber.com)

### 2.2 ACCESSORIES

- A. Seams: Use manufacturer approved Tape system.
- B. Sealing Penetrations of Vapor barrier: Use manufacturer approved Mastic and Tape system.
- C. Perimeter/edge seal: Use manufacturer approved Perimeter Tape system.

Area of adhesion should be free from dust, dirt, and moisture to allow maximum adhesion.

### PART 3 – EXECUTION

#### 3.1 PREPARATION

- A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
  - 1. Level and compact base material.

#### 3.2 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
  - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
  - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise:
    - (a) at a point acceptable to the structural engineer or
    - (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
    - (c) Seal vapor barrier to the entire perimeter wall or footing/grade beam with manufacturer approved Tape System, per manufacturer's instructions. Area of adhesion should be free from dust, dirt, and moisture to allow maximum adhesion.
  - 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
  - 4. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
  - 5. Seal all penetrations (including pipes) per manufacturer's instructions.
  - 7. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
  - 8. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
  - 9. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
  - 10. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION 071500

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical surfaces:
  - 1. Section 047300 – Manufactured Masonry Veneer.
- B. Related Sections:
  - 1. Section 076200 – Sheet Metal Flashing and Trim.
  - 2. Section 079200 – Joint Sealants.

PREINSTALLATION MEETINGS

1.3 DELIVERY STORAGE AND HANDLING

- A. General; Comply with County General Conditions Section 007200 for Product Requirements.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.4 ACTION SUBMITTALS

- A. General: Submit Listed Submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Samples: For each type of water repellent and substrate indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Submit certificate that applicator complies with the requirements of this section.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with application temperature range 40 - 95 Deg. F.
- B. Substrate shall be rain free 24 hours prior to application and 24 hours after application.
- C. Concrete shall be cured 28 days prior to application.

1.8 WARRANTY

- A. Waterproofing Warranty: Product has a five (5) year material warranty. Manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with said warranties. Should the product fail to perform as specified the manufacturer shall reimburse the purchase price of the material used or supply new material for replacement.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Siloxane Silane -Blend, Penetrating Water Repellent: Clear, silane and siloxane blend, water base with 400 g/L or less of VOCs.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following or approved equal:
    - a. A-Tech Masonry & Brick Sealer, water-based emulsion of siloxane and alkylalkoxysilane (10%) solids by Applied Technologies, LLC Contact: P. O. Box 18476 Fairfield, OH 45018 1-877-277-5948 (513) 939-3767 Fax (513) 939-3787
    - b. Armor SX5000 WB – Penetrating Silane / Siloxane Concrete Sealer and Masonry Water Repellent by Foundation Armor.



## 2.2 TESTING

- A. Test a minimum 3' x 4' Test Panel area of Manufactured Masonry Veneer. Use the manufacturer's application instructions. Let test area cure before inspection. Keep test panels available for comparison throughout application procedure. Do not proceed with application until Owner and Architect approve test.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
  - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in representative locations by method recommended by manufacturer.
  - 2. Do not proceed with the application until unacceptable conditions are corrected.
    - a. Substrate must not have rain for 24 hours prior to application
    - b. Substrate must not have rain for 24 hours after application
    - c. Site temperatures must be above 400F during and after application.
  - 3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
  - 4. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

### 3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions
  - 1. Ensure that surfaces to be coated are structurally sound and free of moisture, dust, loose materials, loose mortar or any materials or obstructions that would be detrimental to the penetration of the sealer.
- C. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.

- D. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

### 3.3 APPLICATION

- A. Apply coating of water repellent on surfaces to be treated using low-pressure spray to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
- B. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

### 3.4 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Glass-fiber blanket.
2. Glass-fiber board.
3. Sound Control Glass-fiber blanket.
4. Where noted on the Construction Drawings.

- B. Related Requirements:

1. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

### 1.3 ACTION SUBMITTALS

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

### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
  1. Do not expose to sunlight except to necessary extent for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

## PART 2 - PRODUCTS

### 2.1 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.

### 2.2 GLASS-FIBER BOARD

- A. Glass-Fiber Board, Faced: ASTM C 612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning

### 2.3 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
  1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

## 2.4 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
  2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
  - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

### 3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
  - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    - a. Exterior Walls: Set units with facing placed toward interior of construction.
    - b. Interior Walls: Set units with facing placed [toward areas of high humidity.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
  - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

CONTRACT # 19-S-04

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Building wrap.
  - 2. Flexible flashing.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
- B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

## PART 2 - PRODUCTS

### 2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. DuPont Safety and Construction.  
4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805  
1-800-44-TYVEK (8-9835); <http://www.construction.tyvek.com>

2. Water-Vapor Permeance: Not less than 20 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).
  3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E 2178.
  4. Allowable UV Exposure Time: Not less than three months.
  5. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

## 2.2 FLEXIBLE FLASHING

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. DuPont Safety and Construction.  
974 Centre Road  
Chestnut Run Plaza, Bldg. 735  
Wilmington DE 19805
  2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.
- C. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F 1667.

## PART 3 - EXECUTION

### 3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.



2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.
- D. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.
  1. Seal seams, edges, fasteners, and penetrations with tape.
  2. Extend into jambs of openings and seal corners with tape.

### 3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
  1. Prime substrates as recommended by flashing manufacturer.
  2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
  3. Lap flashing over water-resistive barrier at bottom and sides of openings.
  4. Lap water-resistive barrier over flashing at heads of openings.
  5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 Summary:

- A. This Specification Section shall serve as a Performance Based Specification for the Manufacturer, Handling and Installation of Insulated Metal Roof and Wall Panels.

- 1. Unless noted otherwise the Terms "Drawing or Drawings" shall mean the Architect and/or Design Consultant Drawings.
- 2. This Section shall apply to any Manufacturer of Insulated Metal Roof and Wall Panels that comply with the Drawings and Performance Specifications as described within this Section.
- 3. Insulated Metal Panels are a Differed Submittal for this Project. The Successful Insulated Metal Panel Supplier and/or Installer shall provide the following:
  - a. Manufacturer Drawings, Manufacturer Engineering Calculations, Support Data, Installation Drawings and Cut Sheets prepared to submit for Fresno County Development Services Plan Check for approval of Permits.
  - b. Provide Revisions and Additional Information as requested by Fresno County Development Services to obtain Permit Approval.
  - c. Provide all Factory Manufactured components required to install complete Roof and Wall Panel Systems per Manufacturer's instructions.
  - d. The Contractor shall provide all labor and material to complete the installation of Roof and Wall Panel Systems not included with Metal Roof and Wall Panel Manufacturer components.

- B. Related Documents and Sections:

- 1. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- 2. Section 133149 – METAL BUILDING SYSTEMS.
- 3. Section 074117 – METAL BUILDING ACCESSORIES.

C. Roof and Wall Panel Performance Specifications:

1. Sheriff's Substation Insulated Roof Panels:

- a. Panel Thickness: 4 inches minimum.
- b. Interior and Exterior Panel Metal Gauge: 26 Gauge.
- c. Interior and Exterior Panel Finish: 30 year warranty factory applied coating. Color as selected by Architect.
- d. R Value: R 32 Minimum.
- e. Panel Width: 40 inches.
- f. Panel Length: 8 feet to 56 feet maximum.
- g. Roof Panel Attachment: Concealed Fasteners.

2. Sheriff's Substation Tower Insulated Roof Panels:

- a. Panel Thickness: 4 inches.
- b. Interior and Exterior Panel Metal Gauge: 26 Gauge.
- c. Interior and Exterior Panel Finish: 30 year warranty factory applied coating. Color as selected by Architect.
- d. R Value: R 32 Minimum.
- e. Panel Width: 40 inches.
- f. Panel Length: 8 feet to 56 feet maximum.
- g. Roof Panel Attachment: Concealed Fasteners. Fasteners shall attach directly to Tube Frame at sixteen (16) inch centers maximum starting 3 inches from bearing points.
- h. Fasteners visibly penetrating the Roof Deck Interior shall be Replaced at no cost to the Owner.

3. Vehicle Storage Building Insulated Roof Panels:

- a. Panel Thickness: 3 inches minimum.
- b. Interior and Exterior Panel Metal Gauge: 26 Gauge.
- c. Interior and Exterior Panel Finish: 30 year warranty factory applied coating. Color as selected by Architect.
- d. R Value: R 22 Minimum.
- e. Panel Width: 40 inches.
- f. Panel Length: 8 feet to 62 feet maximum.
- g. Roof Panel Attachment: Overlap Rib

4. Vehicle Storage Building Insulated Wall Panels:

- a. Panel Thickness: 2 inches minimum.
- b. Interior and Exterior Panel Metal Gauge: 26 Gauge.
- c. Interior and Exterior Panel Finish: 25 year warranty factory applied textured coating.
- d. R Value: R 16 Minimum.
- e. Panel Width: 40 inches.
- f. Panel Length: Full Length, 23'-2" maximum (Verify with Drawings).
- g. Roof Panel Attachment: Concealed Fasteners.

5. Test and Approvals:
  - a. Factory Mutual Approvals: FM4880, FM 4881, FM 4471
  - b. Structural: ASTM E 72
  - c. Thermal Transmission: ASTM C 518
  - d. Air, Water Infiltration: ASTM E 283, E 331
  - e. Flammability Testing: ASTM D 1929
  - f. Roof Testing (Wind Uplift): ASTM E 10

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Provide construction details, material descriptions, dimensions of individual components and profiles and finish for each type of Roof and Wall Panel used on this Project.
- B. Shop Drawings:
  1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches equals 12 inches.
- C. Samples for Selection:
  1. Provide Two (2) samples of each type of Metal Roof and Wall panel with factory-applied color textures and finishes for approval by the Architect.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.

### 1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Warranty.
- B. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package Metal Panels for protection during transportation and handling.
- B. Unload, store, and erect Metal Panels in a manner to prevent bending, warping, twisting, and surface damage.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. The Contractor shall be responsible for Coordination of all Components and Trades to provide a completed Building Envelope in compliance with the Drawings. Coordinate sizes and locations of roof curbs, equipment supports, roof jacks and Roof and Wall penetrations with actual equipment provided.
- B. Coordinate metal panel installation with Accessory Installation, rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period as stipulated in Section

PART 2 - PRODUCTS

2.1 FABRICATION

- A. General: Fabricate and finish metal panels and Factory supplied accessories by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

- D. Factory Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.2 FINISH PROTECTION

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Minor variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Panels displaying flaws either Factory or Field Damaged shall be replaced at no cost to the Owner.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work. Any Condition preventing the proper installation of Roof, Wall Panels or Accessories shall be reported to the Contractor for immediate repair or modification prior to starting work.
  - 1. Examine primary and secondary roof framing to verify that rafters, purlins, girts, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by Metal Roof and Wall Panel Manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### 3.3 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.
- B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

### 3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- D. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- E. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

END OF SECTION 074116



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 Summary:

- A. This Specification Section shall serve as a Performance Based Specification for the Manufacturer, Handling and Installation of Metal Building Accessories.

- 1. Unless noted otherwise the Terms "Drawing or Drawings" shall mean the Architect and/or Design Consultant Drawings.
- 2. This Section shall apply to any Manufacturer of Insulated Metal Roof and Wall Panels that comply with the Drawings and Performance Specifications as prescribed within this Section and shall apply to Shop Fabricated Components supplied and/or installed by the Contractor.
- 3. Metal Building Accessories are part of the Deferred Submittal related to the Metal Building Systems, Metal Building Roof and Wall Panels and, Shop Fabricated Components supplied and/or installed by the Contractor.

- B. Related Documents and Sections:

- 1. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
  - a. Section 133149 – METAL BUILDING SYSTEMS
  - b. Section 174116 – INSULATED METAL ROOF AND WALL PANELS

- C. General

- 1. The Contractor shall provide all Labor and Materials to properly install Accessory Items at locations shown on the Drawings. It is the intent of the Drawings and Specifications to include complete working Systems that are Structurally Sound, Properly Fitted and Weather Resistant.

1.3 ACTION SUBMITTALS

- A. Shop Drawings/ Cut Sheets:

1. Accessory Shop Drawings and Cut Sheets shall be submitted to the Architect for Approval prior to ordering or manufacturing.
2. Provide Shop Drawings for each Accessory Component required to be Shop or Field Manufactured or Assembled.
3. Provide Cut Sheets to include Dimensions and Assembly Instructions for each Accessory Component Factory Manufactured. Accessories:

#### 1.4 Accessories

##### A. Accessories Shall Include but not be Limited to:

1. Pedestrian Doors, Frames and Hardware. Vehicle Storage Building Only.
  - a. In General, Pedestrian Doors and Frames shall be provided as part of the Metal Building Systems and shall be coordinated with installation of Exterior Metal Wall Panels and shall include all Materials required to provide proper support, fit and Weather protection. Doors may be adjusted in location upon approval of the Architect to avoid being installed at Wall Panel butt joints.
  - b. Pedestrian Doors and Frames shall be constructed of 18-gauge sheet metal and shall be primed and painted to match the Building Exterior both in color and quality. Provide all Mounting Hardware required to attach to the Metal Building System and Wall Panels.
  - c. Pedestrian Door Hinges shall be (3) Pairs of heavy duty, stainless steel, ball bearing Hinges with non-removable pins.
  - d. Pedestrian Doors shall be Equipped with heavy Lever Handle Schlage Model: S51PDSAT626 Saturn Heavy Duty Commercial Entrance Door Lever Set or Equal.
  - e. Pedestrian Doors shall be equipped with heavy duty, hydraulic operated, interior mounted, aluminum finish Norton 1601-Series Door Closer with hold-open capability or Equal.
  - f. Pedestrian Doors shall be equipped with low-profile ADA Compliant aluminum Threshold to match the depth of the door jamb with a minimum of (4) concrete sleeve anchors attached to the concrete slab. Pemko or Equal.
  - g. Pedestrian Door Jambs shall be equipped with Factory Supplied or 24-gauge Shop Fabricated Rainwater Diverter painted to match Exterior Wall panel Color. Provide all Materials required to weatherproof the Door Jamb.
  - h. Pedestrian Doors shall be equipped with Aluminum/Neoprene Door Sweep. Pemko or Equal.
  - i. Pedestrian Door Jambs shall be equipped with full perimeter, screw fastened, neoprene weather seals between the door and the jamb.
2. Overhead Door Frames:
  - a. In General, Overhead Door Frames shall be Designed or Factory Built to provide proper support, fit and Weather protection.

- b. Overhead Door Frames at the Vehicle Storage Building shall be constructed of 18-gauge sheet metal to be primed and painted to match the Exterior of the Wall Panels. Shop Fabricated or Metal Building System Overhead Door Frames are Acceptable.
  - c. Overhead Door Frames at the Vehicle Storage Building shall be Coordinated with the Metal Wall Panel Construction to provide proper support, fit and Weather protection
  - d. Overhead Rolling Door Frames at the Sheriff Substation Building shall be constructed of Anodized Clear Aluminum and shall be provided as part of a complete Overhead Door Assembly.
3. Ridge Ventilators.
- a. In General, Ridge Ventilators shall be Factory Built and installed at the Vehicle Storage Building only in locations shown on the Drawings and, shall include all mounting hardware, supports, weather sealant or any other components required to properly mount the Ridge Ventilator to the Metal Roof Panels to provide proper support, fit and Weather protection.
  - b. Ridge Ventilators shall be a minimum of 10 feet long and have a chain operated adjusted open throat clearance of 10 inches minimum or larger.
  - c. Ridge Ventilators shall be equipped with screens to keep out large insects and birds.
  - d. Ridge Ventilators shall be coated with a protective paint or may be aluminum.
4. Wall Vents and Louvers.
- a. In General, Wall Vents and Louvers may be Shop or Factory Built and installed at the Vehicle Storage Building only in locations shown on the Drawings and, shall include all mounting hardware, supports, weather sealant or any other components required to properly mount the Wall Vents or Louvers to the Metal Wall Panels to provide proper support, fit and Weather protection.
  - b. Wall Vents and Louvers shall be Adjustable from the Interior of the Building and shall be able to close tight enough to provide weather protection.
  - c. Wall Vents and Louvers shall be equipped with screens to keep out large insects and birds.
  - d. Wall Vents and Louvers shall be primed and painted to match the Exterior Wall Panels.
5. Roof Hatches and Ladders:
- a. In General, Roof Hatches and Ladders shall be Factory Built and installed at the in locations shown on the Drawings and, shall include all mounting hardware, supports, weather sealant or any other components required to properly mount the Roof Hatches and Ladders to the Metal Roof Panels to provide proper support, fit and Weather protection.
  - b. The Contractor shall Coordinate installation of Roof Hatches and Ladders with the Details and Dimensions shown on the Drawings. Verify all

Dimensional requirements and clearances prior to installation of Roof Hatches.

6. Roof Jacks:
  - a. In General, Roof Jacks shall be supplied by the Metal Building Systems or Insulated Metal Panel Company and shall include all Labor and Materials to provide proper support, fit and Weather protection.
  
7. Sheet Metal Flashing and Trim:
  - a. In General, Sheet Metal Flashing and Trim shall be Shop, Field or Factory Fabricated of not less than 24-gauge sheet metal or thicker. The Term "Flashing" shall include Exterior and Hidden fabricated sheet metal used for Trim, Closure and Weather Sealant.
  - b. The Contractor shall be responsible to select which Flashing components shall be Shop, Field or Factory Fabricated.
  - c. The Contractor shall be responsible to verify all shapes and dimensions prior to installing Flashing. Flashing and Trim:
  - d. Provide flashing and trim formed from same material as exterior facings of metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
  - e. Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - f. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Flashing edges shall be hemmed a minimum of 1/2 inches. Raw edges on flashing shall be rejected.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Accessory Components to protect them from damage.
- B. Unload, store, and erect Accessory Components in a manner to prevent bending, warping, twisting, and surface damage.

#### 1.6 FIELD CONDITIONS

- A. Weather Limitations:

1. Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.7 CLEANING AND PROTECTION

- A. Prior to Building Delivery, all Exposed Flashing, Trim and Architectural Metal shall be thoroughly Cleaned and/or Touch-up Painted as required.

END OF SECTION 074117

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Mechanically fastened TPO membrane roofing system.
2. Vapor retarder.
3. Sloped Roof and Cricket insulation.
4. Substrate Board.

- B. Related Sections:

- C. Retain Sections in subparagraphs below that contain requirements Contractor might expect to find in this Section but are specified in other Sections.

1. Division 07 Section "Thermal Insulation" for insulation beneath the roof deck.
2. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
3. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

### 1.3 DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7. Wind speed 110 mph exposure C.

- D. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low slope roof products.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
  - 2. Tapered insulation, including slopes.
  - 3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
  - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products:
  - 1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
  - 2. Roof insulation.
  - 3. Metal termination bars.
  - 4. Battens.
  - 5. Six insulation fasteners of each type, length, and finish.
  - 6. Six roof cover fasteners of each type, length, and finish.
- D. Qualification Data: For qualified Installer and manufacturer.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of compliance with performance requirements.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- G. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.
- H. Field quality-control reports.
- I. Maintenance Data: For roofing system to include in maintenance manuals.
- J. Warranties: Sample of special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.



- C. Source Limitations: Obtain components including roof insulation, fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
- D. Exterior Fire-Test Exposure: ASTM E 108, Class A for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

#### 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

#### 1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of membrane roofing system.
  - 2. Warranty Period: 25 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible fabric backed TPO sheet.
  1. Manufacturer: Provide products by the following:
    - a. Firestone Building Products Company.
    - b. Ultra-Ply TPO Membrane, 25 Year - Red Shield Medallion Warranty.
  2. Thickness: 0.080-inch nominal.
  3. Exposed Face Color: White.

### 2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
  1. Adhesives and sealants shall comply with VOC limits of local authorities having jurisdiction and 2016 California Green Building Code, Title 24.
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 0.060 inch nominal thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard, water based.
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8-inch thick; with anchors.
- F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

### 2.3 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

1. Products: Subject to compliance with requirements, provide one of the following, but are not limited to, the following:

- a. Georgia-Pacific Corporation; Dens Deck.

- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

## 2.4 VAPOR RETARDER

- A. Polyethylene Film: ASTM D 4397, 6 mils thick, minimum, with maximum permeance rating of 0.13 perm.

1. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
  2. Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.

- B. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn with maximum permeance rating of 0.50 perm and with manufacturer's standard adhesive.

## 2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

1. Firestone ISO 95 GL or RESISTA Insulation.

- B. Tapered Insulation: Provide approved factory-tapered insulation boards fabricated to slope of 3/8-inch per 12 inches unless otherwise indicated.

1. Firestone ISO 95 GL or RESISTA Insulation.

- C. Provide preformed saddles, crickets, tapered edge strips, sloped sheets and other insulation shapes where indicated for sloping to drain. Fabricate Sheets to slopes indicated.

## 2.6 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

- C. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2-inch-thick, factory primed.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Georgia-Pacific Corporation; Dens Deck Prime.
- D. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
  2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
  3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
  4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
  5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

### 3.3 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
  - 1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
  - 2. Fasten substrate board to wood deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

### 3.4 VAPOR-RETARDER INSTALLATION

- A. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches and 6 inches, respectively.
  - 1. Continuously seal side and end laps with tape.
- B. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches and 6 inches, respectively. Bond vapor retarder to substrate as follows:
  - 1. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
- C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

### 3.5 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install standard insulation board and tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
  - 1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
  - 1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
- I. Install slip sheet over cover board and immediately beneath membrane roofing.

### 3.6 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

- A. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
  - 1. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.
- B. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten TPO sheet to roof deck.
- G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
  2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
  3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
- I. Adequate temporary protection must be provided over the installed membrane during the works program, particularly at temporary walkways, access points to the roof, roofing material stockpiles etc. in order to prevent damage.
- J. Safety scaffolding, rubbish skips, access ladders etc. should be agreed with the client and in accordance with the current Health and Safety regulations.
- K. The General contractor shall ensure that all areas of the finished roofing system shall be protected from roofing related work traffic and other trades until completion of all works.

### 3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

### 3.8 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application.

- C. At the end of the working day: Temporarily seal the membrane to the deck to prevent any water infiltration. Temporary closures that ensure that moisture does not damage any completed section of the new roofing system are the responsibility of the roofing contractor.
- D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- E. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

### 3.10 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean up all debris, overspray and spillage from adjacent construction using cleaning techniques and procedures recommended by manufacturer of affected construction.

END OF SECTION 075420



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Manufactured through-wall flashing with counterflashing.
2. Manufactured reglets with counterflashing.
3. Formed roof-drainage sheet metal fabrications.
4. Formed low-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.
6. Formed equipment support flashing.
7. Formed overhead-piping safety pans.

- B. Related Requirements:

1. Section 074116 "Insulated Metal Roof and Wall Panels" for materials and installation of sheet metal flashing and trim integral with metal roofing and metal wall panels.
2. Section 074117 "Metal Building Accessories" for materials and installation of sheet metal flashing and trim integral with metal roofing and metal wall panels.
3. Section 079513.13 "Interior Expansion Joint Cover Assemblies" for manufactured expansion-joint cover assemblies for walls, and ceilings.
4. Section 079513.16 "Exterior Expansion Joint Cover Assemblies" for manufactured expansion-joint cover assemblies for exterior building walls, soffits, and parapets.

### 1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

### 1.4 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 6. Include details of termination points and assemblies.
  - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
  - 8. Include details of roof-penetration flashing.
  - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
  - 10. Include details of special conditions.
  - 11. Include details of connections to adjoining work.
  - 12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
  - 1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
  - 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
  - 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
  - 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

### 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

### 1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of

components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 4 (polished directional satin).

- C. Metallic-Coated Steel Sheet: Provide [zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:

- a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- c. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- d. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- e. FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- f. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

2. Color: As selected by Architect from manufacturer's full range.

3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

### 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.
- C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
  1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
  2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.
- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

### 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

## 2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Fry Reglet Corporation.
    - b. Heckmann Building Products, Inc.
    - c. National Sheet Metal Systems, Inc.
  - 2. Material: Galvanized steel, gauge thick.
  - 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
  - 5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
  - 6. Accessories:
    - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of

standard metal counterflashing or where Drawings show reglet without metal counterflashing.

- b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

7. Finish: With manufacturer's standard color coating.

## 2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  2. Obtain field measurements for accurate fit before shop fabrication.
  3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- K. Do not use graphite pencils to mark metal surfaces.

## 2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Built-in Gutters: Fabricate to cross section required, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch-long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
  - 1. Fabricate gutters with built-in expansion joints.
    - a. Galvanized Steel: 24 gauge thick.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
  - 1. Fabricate from the following materials:
    - a. Galvanized Steel: 24 gauge thick.

## 2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
  - 1. Fabricate from the Following Materials:
  - 2. Retain material and thickness of copings that suit wind performance requirements if any. The NRCA has a testing program and authorized fabricators for particular NRCA zinc-coated (galvanized) steel sheet and aluminum details. SMACNA and the CDA do not have testing programs or authorized fabricators for their details.
    - a. Galvanized Steel: 24 gauge thick.
- B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:



1. Galvanized Steel: 24 gauge thick.
- C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.
- D. Flashing Receivers: Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.

## 2.9 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.

## 2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.
- B. Overhead-Piping Safety Pans: Fabricate from the following materials:
  1. Galvanized Steel: 24 gauge thick.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
- D. Apply slip sheet, wrinkle free, over underlayment or directly on substrate before installing sheet metal flashing and trim per sheet metal manufacturer's written recommendations.

#### 3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners[, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  5. Torch cutting of sheet metal flashing and trim is not permitted.
  6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  2. Use lapped expansion joints only where indicated on Drawings.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
  2. Do not use torches for soldering.

3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

G. Rivets: Rivet joints in uncoated aluminum or zinc where necessary for strength.

### 3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Built-in Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.

1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system.

D. Splash Pans: Install where downspouts discharge on low-slope metal roof surface. Set in elastomeric sealant compatible with the substrate.

E. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
2. Loosely lock front edge of scupper with conductor head.

### 3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.

2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

### 3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry." and Section 047300 "Manufactured Masonry Veneer."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

### 3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

### 3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Work Included: Provide factory-fabricated roof hatches for ladder access.
- B. The following Sections contain requirements that relate to this Section:
  - 1. Division 7, Section 07542 – Thermoplastic Polyolefin (TPO) Roofing

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

### 1.6 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Type S-50T Roof Hatch by The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.

### 2.2 ROOF HATCH

- A. Furnish and install where indicated on plans metal roof hatch Type S-50T, size width: 36" x length: 30". Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
1. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
  2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  3. Operation of the cover shall not be affected by temperature.
  4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- C. Cover: Shall be 11 gauge aluminum with a 4" beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- D. Cover insulation: Shall be 2" thick polyisocyanurate with an R-value = 12, fully covered and protected by an 18 gauge aluminum liner.
- E. Curb: Shall be 12" in height and of 11 gauge aluminum. The curb shall be formed with a 4-1/2" (114mm) flange with 7/16" (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be 2" thick polyisocyanurate with an R-value = 12.
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
- H. Hardware
1. Heavy pintle hinges shall be provided



2. Cover shall be equipped with a spring latch with interior and exterior turn handles
  3. Roof hatch shall be equipped with interior and exterior padlock hasps.
  4. The latch strike shall be a stamped component bolted to the curb assembly.
  5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" diameter red vinyl grip handle to permit easy release for closing.
  6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
  7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be mill finish aluminum.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
1. Test units for proper function and adjust until proper operation is achieved.
  2. Repair finishes damaged during installation.
  3. Restore finishes so no evidence remains of corrective work.

#### 3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 077230

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Work Included: Provide factory-fabricated ladder safety posts.
- B. The following Sections contain requirements that relate to this Section:
  - 1. Division 5, Section 055150 – Metal Roof Access Ladder
  - 2. Division 7, Section 077230 – Roof Hatch

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

### 1.6 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Type LU Ladder Safety Post by The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com. Comply with the following:

### 2.2 LADDER SAFETY POST

- A. Furnish and install where indicated on plans ladder safety post Model LU-4. The ladder safety post shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
  - 1. Tubular post shall lock automatically when fully extended.
  - 2. Safety post shall have controlled upward and downward movement.
  - 3. Release lever shall disengage the post to allow it to be returned to its lowered position.
  - 4. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" on center and clamp brackets to accommodate ladder rungs up to 1-3/4" in diameter.
- C. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
- D. Material of construction: Shall be aluminum Model LU-4.
- E. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.
- F. Hardware: All mounting hardware shall be Type 316 stainless steel.
- G. Finishes: Factory finish shall be LU-4 mill finish aluminum.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
  - 1. Test units for proper function and adjust until proper operation is achieved.
  - 2. Repair finishes damaged during installation.
  - 3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 077240

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Work Included: Provide factory-fabricated fixed hatch railing system.
- B. The following Sections contain requirements that relate to this Section:
  - 1. Division 7, Section 077230 – Roof Hatch

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

### 1.6 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of twenty-five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Type Bil-Guard® Roof Hatch Railing System by The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.

### 2.2 HATCH RAIL SYSTEM

- A. Furnish and install where indicated on plans hatch rail system Model RL-S. The hatch rail system shall be field assembled and installed (by others) per the manufacturer's instructions.
- B. Performance characteristics:
  - 1. High visibility safety yellow color shall be molded in.
  - 2. Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
  - 3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
  - 4. UV and corrosion resistant construction with a twenty-five year warranty.
  - 5. Self-closing gate shall be provided with hatch rail system.
- C. Posts and Rails: Shall be round pultruded reinforced fire retardant yellow fiberglass treated with a UV inhibitor.
- D. Hardware: Mounting brackets shall be ¼" thick hot dip galvanized steel. Hinges and post guides shall be 6063T5 aluminum. Fasteners shall be Type 316 stainless steel.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
  - 1. Test units for proper function and adjust until proper operation is achieved.
  - 2. Repair finishes damaged during installation.
  - 3. Restore finishes so no evidence remains of corrective work.

### 3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish. END OF SECTION 077250



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Silyl-terminated polyether joint sealants.
4. Mildew-resistant joint sealants.
5. Butyl joint sealants.
6. Latex joint sealants.

- B. Related Requirements:

1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.
2. Section 079219 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.
3. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  1. Joint-sealant application, joint location, and designation.

2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
  1. Joint-sealant location and designation.
  2. Manufacturer and product name.
  3. Type of substrate material.
  4. Proposed test.
  5. Number of samples required.
- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
  1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion-Test Reports: For each sealant application tested.
- G. Sample Warranties: For special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
  3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone and masonry substrates.
  4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
  5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
  7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  2. Conduct field tests for each kind of sealant and joint substrate.
  3. Notify Architect seven days in advance of dates and times when test joints will be erected.
  4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
    - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
  6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

## 1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## 1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.
    - d. Sika Corporation; Joint Sealants.

## 2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Corporation.
    - b. Pecora Corporation.
    - c. Sika Corporation; Joint Sealants.

## 2.4 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

- A. STPE, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.

## 2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. GE Construction Sealants; Momentive Performance Materials Inc.
    - b. Pecora Corporation.
    - c. The Dow Chemical Company.
- C. STPE, Mildew Resistant, S, NS, 50, NT: Mildew-resistant, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

## 2.6 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Bostik, Inc.

## 2.7 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. May National Associates, Inc.; a subsidiary of Sika Corporation.
    - b. Pecora Corporation.
    - c. Sherwin-Williams Company (The).

## 2.8 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Adfast.
    - b. Alcot Plastics Ltd.
    - c. BASF Corporation.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C closed-cell material with a surface skin, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
    - d. Exterior insulation and finish systems.
  3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.



- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each 500 feet of joint length thereafter or one test per each floor per elevation.
  - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

- a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  3. Inspect tested joints and report on the following:
    - a. Whether sealants filled joint cavities and are free of voids.
    - b. Whether sealant dimensions and configurations comply with specified requirements.
    - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
  4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
  5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- 3.5 CLEANING
- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- 3.6 PROTECTION
- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
- 3.7 JOINT-SEALANT SCHEDULE
- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.

1. Joint Locations: Joint sealants in paved roads, parking lots, walkways, and curbing are specified in Section 321373 "Concrete Paving Joint Sealants."
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Tile control and expansion joints.
    - c. Joints between different materials listed above.
    - d. Other joints as indicated on Drawings.
  2. Joint Sealant: Urethane, M, P, 50, T, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.
1. Joint Locations:
    - a. Control and expansion joints in unit masonry.
    - b. Joints in dimension stone cladding.
    - c. Joints between metal panels.
    - d. Joints between different materials listed above.
    - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    - f. Control and expansion joints in ceilings and other overhead surfaces.
    - g. Other joints as indicated on Drawings.
  1. Joint-Sealant Application: Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
  2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Interior joints in horizontal traffic surfaces JS -3.
1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Urethane, S, P, 25, T, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS -4.
1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Tile control and expansion joints.
    - c. Vertical joints on exposed surfaces of unit masonry walls and partitions.
    - d. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-5.
1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Acrylic latex.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.
1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Concealed mastics JS-7.
1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Butyl-rubber based.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Samples: For each kind and color of acoustical joint sealant required.
- C. Acoustical-Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

### 2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. GE Construction Sealants; Momentive Performance Materials Inc.
    - b. Pecora Corporation.
    - c. Tremco Incorporated.
  - 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- D. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

END OF SECTION 079219

This page is intentionally left blank.



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
  - 1. Interior standard steel door frames.
  - 2. Exterior door opening frame.
- B. The following Sections contain requirements that relate to this Section:
  - 1. Division 8, Section 08700 – Finish Hardware
  - 2. Division 9, Section 099113 – Exterior Painting
  - 3. Division 9, Section 099123 – Interior Painting

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Ceco Door; ASSA ABLOY.
2. Republic Doors and Frames.
3. Steelcraft; an Allegion brand.

### 2.1 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A60 coating.
- d. Edge Construction: Model 1, Full Flush.
- e. Edge Bevel: Provide manufacturer's standard square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Manufacturer's standard Polystyrene and Vertical steel stiffener.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
- b. Construction: Full profile welded.

### 2.2 FRAME ANCHORS

- A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
  3. Post installed Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

## 2.3 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.4 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide

alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
  - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
  1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
  1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
  2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
  3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
  4. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

## 2.5 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

#### 3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with SDI A250.11.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  - 2. Floor Anchors: Secure with post installed expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
  - 3. Solidly pack mineral-fiber insulation inside frames.
  - 4. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    - a. Squareness: Plus, or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus, or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus, or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus, or minus 1/16 inch, measured at jambs at floor.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
- C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 00 Specification sections, apply to work of this section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Interior aluminum frames for doors installed in gypsum board partitions.
- 2. Interior aluminum frames for glazing installed in gypsum board partitions.
- 3. See Door and Window Schedules for scope of work and frame configurations.

- B. Related work:

- 1. Finish hardware is specified elsewhere in Division 8.
- 2. Flush Wood Doors are specified elsewhere in Division 8

### 1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For aluminum frames:

- 1. Include elevations, sections, and installation details for each wall-opening condition.

- C. Samples: For each exposed product and for each color and texture specified.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Western Integrated Materials, Inc.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Frames: Frames for fire-rated door assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Frames for Smoke- and Draft-Control Assemblies: Tested according to UL 1784 and installed in compliance with NFPA 105.
    - a. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg.

## 2.3 COMPONENTS

- A. Aluminum Framing: ASTM B 221, with alloy and temper required to suit structural and finish requirements, and not less than 0.062 inch thick.
- B. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.
- C. Glazing Frames: Extruded aluminum, for indicated Insert dimension glass thickness.
- D. Door Tracks: Extruded aluminum where exposed, sized to enclose sliding-door hardware, and in finish matching frame and trim finish.
- E. Trim: Extruded aluminum, not less than 0.062 inch thick; removable, snap-in casing trim glazing stops and door stops, without exposed fasteners.
  - 1. Trim Style: "Type 300 Door Frame system with 304-2 Trim"
- F. Doors: As specified in Section 081416 "Flush Wood Doors."
- G. Frame and Trim Finish: Clear-anodized aluminum.

## 2.4 ACCESSORIES

- A. Fasteners: Aluminum, nonmagnetic, stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.
- B. Door Silencers: Manufacturer's standard continuous mohair, wool pile, or vinyl seals in black color.
- C. Smoke Seals: Intumescent strip or fire-rated gaskets in black.
- D. Glazing Gaskets: Manufacturer's standard extruded or molded rubber or plastic, to accommodate glazing thickness indicated; in black.
- E. Glass: As specified in Section 088000 "Glazing."
- F. Door Hardware: As specified in Section 087100 "Door Hardware."



## 2.5 FABRICATION

- A. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted and mitered connections.
- B. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.
  - 1. Locate removable stops on the inside of spaces accessed by keyed doors.
- C. Fabricate components to allow secure installation without exposed fasteners.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install aluminum frames plumb, rigid, properly aligned, and securely fastened in place; according to manufacturer's written instructions.
  - 1. At fire-protection-rated openings, install fire-rated frames according to NFPA 80 and NFPA 105.
- B. Install frame components in the longest possible lengths with no piece less than 48 inches; components 96 inches or shorter shall be one piece.
- C. Glass: Install glass according to Section 088000 "Glazing" and aluminum-frame manufacturer's written instructions.
- D. Doors: Install doors aligned with frames and fitted with required hardware.
- E. Door Hardware: Install according to Section 087100 "Door Hardware" and aluminum-frame manufacturer's written instructions.

### 3.2 ADJUSTING

- A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended in writing by frame manufacturer and according to AAMA 609 and 610.
- B. Touch Up: Repair marred frame surfaces to blend inconspicuously with adjacent unrepaired surface so touchup is not visible from a distance of 48 inches as viewed by Architect. Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

END OF SECTION 081216

CONTRACT # 19-S-04

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Solid-core doors with hardboard or MDF and plastic-laminate faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

- B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.
2. See Finish Schedule for door laminate selection.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts and undercuts.
4. Doors to be factory finished and finish requirements.
5. Fire-protection ratings for fire-rated doors.

- C. Samples: For plastic-laminate door faces.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ampco Products, LLC.
  2. Graham Wood Doors; ASSA ABLOY Group company.
  3. Haley Brothers, Inc.
  4. Oregon Door.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. WDMA I.S.1-A Performance Grade:
1. Heavy Duty unless otherwise indicated.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
  2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
  3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Structural-Composite-Lumber-Core Doors:
1. Structural Composite Lumber: WDMA I.S.10.
    - a. Screw Withdrawal, Face: 700 lbf.
    - b. Screw Withdrawal, Edge: 400 lbf.

## 2.3 PLASTIC-LAMINATE-FACED DOORS

### A. Interior Solid-Core Doors:

1. Grade: Premium.
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS. See Interior Finish and Door Schedule for Laminate Selection.
3. Pattern and Finish: As indicated on the Door and Interior Finish Schedules.
4. Exposed Vertical Edges: Hardwood edges for staining to match faces.
5. Core: Either glued wood stave or structural composite lumber.
6. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.

## 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- C. Openings: Factory cut and trim openings through doors.
  1. Light Openings: Trim openings with moldings of material and profile indicated.
  2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
  3. Louvers: Factory install louvers in prepared openings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  1. Install fire-rated doors according to NFPA 80.
  2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
  - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of access door and frame and for each finish specified.
- C. Product Schedule: For access doors and frames.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

### 2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Babcock-Davis.
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Maxam Metal Products Limited.
  - 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
  - 3. Locations: Wall.
  - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed ready for paint finish.

5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage, factory primed ready for paint finish.
6. Stainless-Steel Sheet for Door: Nominal 0.062 inch, 16 gage, No. 4 finish.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Cam latch, key operated.

B. Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Babcock-Davis.
  - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - c. Maxam Metal Products Limited.
2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Wall.
4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed ready for paint finish.
5. Frame Material: Same material and thickness as door.
6. Latch and Lock: Cam latch, key operated.

C. Lightweight Flush Access Doors:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - b. Larsens Manufacturing Company.
  - c. Maxam Metal Products Limited.
2. Description: Face of door flush with exposed flange, with exposed piano hinge; frameless for surface installation.
3. Locations: Wall.
4. Metallic-Coated Steel Sheet for Door: Nominal 0.022 inch, 26 gage, factory primed paint finish.
5. Frame Material: Nominal 0.022 inch, 26 gage, factory primed for paint finish.
6. Latch and Lock: Cam latch, key operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:



- a. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - b. Larsens Manufacturing Company.
  - c. Maxam Metal Products Limited.
2. Description: Door face flush with frame, uninsulated; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
  3. Locations: Wall.
  4. Fire-Resistance Rating: Not less than that indicated that of adjacent construction 2 hours.
  5. Temperature-Rise Rating: 450 deg F 250 deg F at the end of 30 minutes.
  6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory primed ready for a finish.
  7. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage, factory primed ready for a paint finish.
  8. Frame Material: Same material, thickness, and finish as door.

#### 2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

#### 2.5 FABRICATION

- A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- C. Latch and Lock Hardware:
  1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2. Keys: Furnish two keys per lock and key all locks alike.

## 2.6 FINISHES

- A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
  2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.
    - a. Color: As indicated by manufacturer's designations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Insulated service doors.

#### B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.
2. Section 081113 "Hollow Metal Doors and Frames" for frame at door opening.

### 1.2 ACTION SUBMITTALS

#### A. Product Data: For each type and size of overhead coiling door and accessory.

#### B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices detectors or replaceable fusible links, and other accessories.
3. Include diagrams for power, signal, and control wiring.

#### C. Samples: For each exposed product and for each color and texture specified.

### 1.3 INFORMATIONAL SUBMITTALS

#### A. Sample warranty.

### 1.4 CLOSEOUT SUBMITTALS

#### A. Maintenance data.

### 1.5 QUALITY ASSURANCE

#### A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

#### B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and the State of California Building Code.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
  - 1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft., acting inward and outward.
  - 2. Testing: According to ASTM E 330/E 330M and complying with acceptance criteria of DASMA 108.
- B. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Thermiser Max ESD 30 Insulated Rolling Door.  
CornellCookson, Inc. 800.233.8366 ext. 4551  
[architecturaldesignsupport@cornellcookson.com](mailto:architecturaldesignsupport@cornellcookson.com)
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000.
- C. Curtain R-Value: 8 deg F x h x sq. ft./Btu.
- D. STC Rating: 32.
- E. Door Curtain Material: Aluminum.
- F. Door Curtain Slats: Flat profile slats of 3 - inch center-to-center height x 1" thick, minimum aluminum thickness of 0.050 - inch, 18 gauge.
  - 1. Insulated-Slat Interior Facing: Aluminum.

- G. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 - inch thick; fabricated from aluminum extrusions and finished to match door.
- H. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats.
- I. Hood: Match curtain material and finish - Aluminum.
  - 1. Mounting: As indicated on Drawings.
- J. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: inside and outside with cylinders.
- K. Manual Door Operator: Push-up operation.
- L. Electric Door Operator:
  - 1. Usage Classification: Medium duty, up to 12 cycles per hour and up to 50 cycles per day.
  - 2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
  - 3. Motor Exposure: Interior.
  - 4. Motor Electrical Characteristics:
    - a. Horsepower: 1/2 hp.
    - b. Voltage: 115-V ac, single phase, 60 Hz.
  - 5. Emergency Manual Operation: Push-up type.
  - 6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
  - 7. Control Station(s): Interior mounted.
- M. Curtain Accessories: Equip door with weatherseals, push/pull handles and pull-down strap.
- N. Door Finish:
  - 1. Aluminum Finish: Clear anodized.
  - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

## 2.3 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.4 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical

properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
  2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum aluminum thickness of 0.032 inch.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

## 2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

## 2.6 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: As specified in Section 087100 "Door Hardware" and keyed to building keying system.
  2. Keys: As specified in Door Hardware Specifications.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.7 CURTAIN ACCESSORIES

- A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- C. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.

## 2.8 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.9 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf.

## 2.10 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
  - 1. Comply with NFPA 70.
  - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
  - 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
  - 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- D. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Electric Sensor Edge: Automatic safety sensor edge, located within weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
  - a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- E. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
  1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
  2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- G. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Power-Operated Doors: Install automatic doors openers according to UL 325.

#### 3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323



## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SECTION INCLUDES

- A. Insulated Steel Sectional Doors
- B. Track and Framing
- C. Motor Operator
- D. Hardware

### 1.3 RELATED SECTIONS

- A. Section 055000 – Metal Fabrications: - Steel framed door openings.
- B. Section 079200 - Joint Sealers: Perimeter sealant and backup materials.
- C. Section 087100 - Door Hardware: Cylinder locks.
- D. Section 099123 – Painting: Painting of doors to match building exterior color.
- E. Division 16 Sections: Electrical service and connections for powered operators.

### 1.4 REFERENCES

- A. ASTM A 653/A 653M – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM B 209/209M – Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM B 221/221M – Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- D. ANSI/DASMA 102-1996.

### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
  4. Operation and maintenance data.
  5. Nameplate data and ratings for motors.
- C. Shop Drawings: Include opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 - inches square, representing actual product, color, and patterns.

#### 1.6 WIND PERFORMANCE REQUIREMENTS

- A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable governing building codes.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of doors specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Installation to be by qualified installer in accordance with the manufacturer's installation instructions.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

#### 1.9 PROJECT CONDITIONS

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

#### 1.10 WARRANTY

- A. Paint finish: 10-year warranty against rust through from cracking, checking or peeling of the paint finish.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: ASSA ABLOY Entrance Systems; 165 Carriage Court, Winston-Salem, NC 27105. ASD. Tel: (844) 232-4676. Email: [us.garagedoors@assaabloy.com](mailto:us.garagedoors@assaabloy.com) Website: [www.assaabloyentrance.us](http://www.assaabloyentrance.us)

1. ASSA ABLOY AE2432 - Commercial 2 inches heavy duty insulated door
- B. Requests for substitutions will be considered in accordance with provisions of Section 016000.

## 2.2 OVERHEAD DOORS - GENERAL

- A. Provide each door with door sections, brackets, tracks, counterbalance mechanisms and hardware to suit the opening and headroom available.
- B. Hardware:
  1. Minimum of 14 - gauge galvanized steel hinges and 13 - gauge galvanized steel track brackets.
  2. Rollers have 10 ball bearings with casehardened inner and outer races.
  3. Sliding end stile locking device provided with spring-loaded bolt for inside operation only.
  4. Doors 16 feet 4 inches and wider provided with double end hinges and stiles and long stem rollers.
- C. Tracks: 3 inches as required.
  1. Vertical Track
    - a. 3-inch vertical track 12-gauge minimum galvanized steel inclined using adjustable tapered reverse angle to assure a weather tight closure at the jambs.
  2. Horizontal Track
    - a. 3 inch 12 - gauge minimum galvanized steel, reinforced with 11 - gauge galvanized steel angles.
  3. Provide vertical lift tracks as indicated.
  4. Provide follow roof slope tracks as indicated.
- D. Spring Counterbalance: Torsion springs for door counter-balance mounted on a continuous cross header shaft. Springs to be oil tempered, helical wound and custom computed for each door. Cable drums to be die cast aluminum. Galvanized lift cable to provide minimum safety factor of five to one. Springs to comply with ANSI/DASMA 102-2011 as follows:
  1. High Cycle Spring: 50,000 cycles.
- E. Handle: Galvanized steel step plate/lift handle provided on inside and outside of bottom section.
- F. Lock: 5 pin cylinder lock interior lock bar and outside key.

- G. Weather stripping: 3-1/2 inches U-shaped vinyl bottom seal in a full-length 0.050 inch aluminum retainer attached to the bottom section.
- H. Mounting: Continuous reverse angle mounting for steel jambs.
- I. Mounting: Bracket mounting for wood jambs.
- J. Exhaust port: Installed in bottom sections. Connecting tube from vehicles by others.

### 2.3 INSULATED STEEL DOORS

- A. ASSA ABLOY AE2432 commercial 2 inches heavy duty insulated door.
  - 1. Door Size: As indicated on the Drawings.
  - 2. Door Sections: 2 inches thick, sandwich construction consisting of 24 - gauge exterior and 27 - gauge interior steel skins laminated to a CFC-free expanded polystyrene (EPS) foam core with a special urethane adhesive.
    - a. Calculated door section R-value of 9.4. U-Value is 0.106.
    - b. Exterior skin to have 0.41inch minor ribs on 4 or 5 inches centers.
    - c. End stiles to be 20 - gauge galvanized steel.
    - d. Provide 20 gauge galvanized primed steel support plates 2-5/8 by 4-3/8 inches located under each hinge location, pre-punched for hinge attachment.
    - e. Section joint to form weather tight tongue and groove joint. Attach Polypropylene Wear-Seal between each tongue and groove joint to reduce noise, reduce normal wear and tear on sections and form a second thermal break.
  - 3. Finish: Both skins to have stucco embossed texture. Door exterior and interior pre-painted steel consisting of a hot dipped galvanized coating applied to the base metal, a 0.2 mil baked on prime coat and an 0.8 mil baked on polyester top coat. The interior coat to be 0.2 mil primer with a 0.3 mil white top coat. The inside of the exterior and interior skins to be finished with a 0.2 to 0.3 mil primer.
    - a. Color to be selected by Architect from available manufacturer colors.
  - 4. Operation
    - a. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer. Operator shall meet UL325-2010 requirements for continuous monitoring of safety devices.
      - 1) Primary Monitored Entrapment Protection Entrapment Protection:
        - (a) Electric sensing edge monitored to meet UL 325-2010.
        - (b) Photoelectric sensors monitored to meet UL 325-2010.
      - 2) Operator Control Mounting:

- (a) Surface Mount
- 3) Operator Control Operation
  - (a) Keyed Push-button operated control stations with open, close, and stop buttons.
- 4) Operator Control Location
  - (a) interior location

## 2.4 FABRICATION

### A. Insulated Steel Doors.

1. Door is scheduled on the Door Schedule.
2. Galvanized struts (truss bars): Provide on all doors 14 feet 2 inches and wider to prevent deflection of no more than 1/120 of the spanned width when in the open position.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Doors to be interior face mounted on a prepared surface.
- B. Anchor assembly to wall construction and building framing without distortion.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members, Unistrut Supports/Bracing or solid backing only.
- D. Securely brace suspended from structure. Secure tracks to structural members, Unistrut Supports/Bracing or solid backing only.

- E. Fit and align door assembly, tracks and operating hardware.
- F. Install perimeter weatherstripping.
- G. Adjust door assembly to smooth operation and in full contact with weatherstripping.

#### 3.4 CLEANING

- A. Clean doors, frames and glass.
- H. Remove labels and visible markings.

#### 3.5 PROTECTION

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

END OF SECTION 083600

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Exterior storefront framing.
- 2. Storefront framing for punched openings.
- 3. Exterior manual-swing entrance doors and door-frame units.

B. Related Requirements:

- 1. Section 088000 "Glazing " for exterior glazing systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

- 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
- 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
  - a. Joinery, including concealed welds.
  - b. Anchorage.
  - c. Expansion provisions.
  - d. Glazing.
  - e. Flashing and drainage.
- 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
  - 1. Joinery, including concealed welds.
  - 2. Anchorage.
  - 3. Expansion provisions.
  - 4. Glazing.
  - 5. Flashing and drainage.
  
- F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
  
- G. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction Laboratory Mockup Testing Submittals:
  - 1. Testing Program: Developed specifically for Project.
  - 2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
  - 3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.
  
- B. Qualification Data: For Installer.
  
- C. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
  
- D. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.



## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
    - a. Water Penetration under Static Pressure: ASTM E 331.

## 1.7 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
    - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- E. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

- b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- H. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Arcadia, Inc.
  - 2. Kawneer North America, an Arconic company.
  - 3. U.S. Aluminum; a brand of C.R. Laurence.
  - 4. Vistawall Architectural Products.
- B. Basis of Design:
  - 1. Entry Tower: Kawneer 1602 Wall Framing System – Front Loaded 2" x 6 1/16".
  - 2. Building Windows: Kawneer Trifab VG 451T Framing System – Front Loaded 2" x 4 1/2".
- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Construction: Thermally broken.
  - 2. Glazing System: Retained mechanically with gaskets on four sides.
  - 3. Glazing Plane: Front.
  - 4. Finish: Clear anodic finish.
  - 5. Fabrication Method: Field-fabricated stick system.

- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
    - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

#### 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  - 2. Door Design: Medium stile; 3-1/2-inch nominal width.
  - 3. Glazing Stops and Gaskets: Square , snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

#### 2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products or products equivalent in function and comparable in quality to named products.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
  3. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
    - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
  2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- C. Pivot Hinges: BHMA A156.4, Grade 1.
1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
  2. Exterior Hinges: Stainless steel, with stainless-steel pins.
  3. Quantities:
    - a. For doors more than 87 and up to 120 inches high, provide four hinges per leaf.
- E. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- G. Manual Flush Bolts: BHMA A156.16, Grade 1.
- H. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- I. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

- J. Cylinders: As specified in Section 087100 "Door Hardware."
    - 1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".
  - K. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
  - L. Operating Trim: BHMA A156.6.
  - M. Removable Mullions: BHMA A156.3, extruded aluminum.
    - 1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
  - N. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
  - O. Concealed Overhead Holders: BHMA A156.8, Grade 1.
  - P. Surface-Mounted Holders: BHMA A156.16, Grade 1.
  - Q. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
  - R. Weather Stripping: Manufacturer's standard replaceable components.
    - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
    - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
  - S. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
  - T. Silencers: BHMA A156.16, Grade 1.
  - U. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- 2.6 GLAZING
- A. Glazing: Comply with Section 088000 "Glazing."
  - B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

## 2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials or Dead-soft, 0.018-inch-thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from exterior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## 2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. General:
1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.



3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
  - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.

- b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
  - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.5 MAINTENANCE SERVICE

#### A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.02 SECTION INCLUDES

- A. Custom fabricated Exterior Sun Control devices integral with Curtain Wall system, based on approved shop drawings.

### 1.03 RELATED REQUIREMENTS

- A. Division 01 - LEED Documentation.
- B. Section 05 40 00 [05400] - Cold-Formed Metal Framing: Backing Supports, attachment, clips, and blocking to receive sun control devices.
- C. Section 08 44 00 [08900] Curtain Wall and Glazed Assemblies - exterior mounting surface to receive sun control devices.

### 1.04 REFERENCE STANDARDS

- A. AAMA 2605 - High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
- C. AAMA 611 - Voluntary Specifications for anodized architectural aluminum.
- D. American Welding Society- AWS D1.2, Structural Welding Code-Aluminum.
- E. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
- F. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- G. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- H. National Association of Architectural Metal Manufacturers (NAAMM).
- I. USGBC - Leadership in Energy and Environmental Design (LEED) Green Building Rating Systems.

## 1.05 SUBMITTALS

- A. Product Data:
  - 1. Standard components, sizes, shapes, and hardware description.
  - 2. Sun Control manufacturer's data sheets on each product to be used, including:
    - a. Finish manufacturer's data sheet showing physical and performance characteristics.
    - b. Storage and handling requirements and recommendations.
    - c. Installation instructions and recommendations.
    - d. Specimen warranty for finish, as specified herein.
    - e. Maintenance instructions.
- B. Shop Drawings representing Designer's intent: Plans, elevations, sections, details with profiles, styles, part numbers, dimensions, materials, finishes, connections, method of anchorage, type of anchors and backing supports.
  - 1. Differentiate between shop fabrication and field installation.
  - 2. Indicate substrates and adjacent work specified in related sections with which the exterior sun control devices must be coordinated.
  - 3. Indicate connections to Curtain Wall Framing, and weatherseals.
- C. Samples: Submit samples, as requested, of each component, and fasteners to be utilized in Sun Control assembly with appropriate finish.
- D. Structural calculations. Provide engineering calculations for the Sun Control Devices and mounting brackets, prepared by an engineer registered in the state the project is located.
- E. Warranty: Provide copy of manufacturer's 5-year written warranty form.
- F. Certifications: Manufacturer's certification that Sun Control meets design criteria, Drawings and specification requirements.

## 1.06 QUALITY ASSURANCE

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Exterior Sun Control Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with continuous experience of 5 years.
- C. Installer Qualifications: Experienced in performing work of the type specified in this section.
  - 1. With minimum 3 years of documented experience in installation of exterior Sun Control devices similar to the Work of this Section.
  - 2. Approved by Sun Control Device manufacturer.

- D. Provide sun control devices from a single source. Sub-contracting of Sun Control assembly is not acceptable.
- E. Sun Control devices to be fabricated in an ISO 9001:2008 plant to ISO International Standards following strict Operating and Quality procedures as outlined in the ISO 9001:2008 Quality.
- F. Welding Qualifications: Any welding performed either in the fabrication of the sun control devices or brackets must follow AWS welding standards.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect finishes by applying heavy duty removable plastic film during production.
  - 2. Package for protection against transportation damage.
  - 3. Provide markings to identify components consistently with drawings.
  - 4. Exercise care in unloading, storing and installing sun control devices to prevent bending, warping, twisting and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

#### 1.08 WARRANTY

- A. Curtain wall/Sun Control Warranty: Warrant Curtain wall and Sun Control Devices on a single document for the term of 5 year from the date of invoice against defects in design, materials, and workmanship. Defects include, but are not limited to the following:
  - 1. Deterioration of metals and other materials beyond normal weathering.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. C.R. Laurence Co, Inc., 2503 E. Vernon Ave., Los Angeles, CA 90058-3488; Tel: (800) 421-6144 Ext. 7730 or (323) 588-1281 Ext. 7730; Fax: (866) 921-0532 or (323) 584-5258; Email: [railings@crlaurence.com](mailto:railings@crlaurence.com).

#### 2.02 EXTERIOR SUN SHADE SYSTEM

- A. Basis of Design: C.R. Laurence Custom Fabricated, pre-finished Aluminum Sun Control Devices; 12-inch projection.
- B. Components:

1. Outriggers: 1/4 - inch thick aluminum plate; ASTM B 209, 5052-H32 alloy; size: 1/4" x 3" x 12"
  - a. Square configuration
2. Mounting bracket options.
  - a. Curtainwall and Storefront brackets
    - 1) Standard Curtainwall bracket (AWSB2CW).
    - 2) Bracket to mount directly to United States Aluminum 3250 CW (AWSB3US).
    - 3) Bracket to mount directly to United States Aluminum Butt Glazed 3150 SSG (AWSB4US).
    - 4) Bracket to mount directly to United States Aluminum Center Glazed 451 Storefront (AWSB5US)
3. Fascia: 1/8-inch-thick aluminum extrusion; ASTM B 221, 6063-T5 alloy.
  - a. Square tube fascia; 3 x 3 inch.
4. Anchors and Inserts: Use Non-Ferrous metal or hot dip galvanized anchors and inserts for installation and elsewhere as required for corrosion resistance. Use stainless steel or lead expansion bolt devices for drill-in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
5. Fasteners: Fasteners shall be stainless steel bolts, studs, sheet metal screws, and other types of size and spacing as recommended by manufacturer for specific installation conditions and as detailed on approved shop drawings.

## 2.03 FABRICATION

- A. Provide fixed Sun Control Devices and accessories of design, material, sizes, depth, arrangement, and thickness as indicated on Drawings and as required for optimal performance with respect to strength; durability; and uniform appearance.
- B. Corners: Miter corners as indicated on shop drawings.
- C. Fabrication tolerances: Maximum allowable tolerances.
  1. Bow: + - 1/8 inch.
  2. Dimensional width or length: + - 1/8 inch.
  3. Squareness: + - 1/8 inch.

## 2.04 FINISHES

- A. Class 1 Anodized Finish- Clear film with a minimum of 0.7 mil. Thickness.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrate conditions in areas to receive the work. Verify dimensions, tolerances, and interface with adjacent work. Do not proceed until any unsatisfactory conditions have been corrected.
- B. Upon receipt of Sun Control Devices, thoroughly examine units for damage. Promptly report any observed damage to C.R. Laurence in writing. Include digital photographs of any observed damage as well as a copy of the Bill of Lading disclosing the damage.

#### 3.02 PREPARATION

- A. Prior to fabrication, field verify required dimensions.
- B. Coordinate Sun Control installation with Curtain Wall to ensure proper structural support is provided, attachment of sun control devices is compatible with Curtain Wall manufacturer's requirements, and weather tightness of exterior envelop is maintained.

#### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and recommendations for installation of the work.
- B. Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated and fitted to the structure.
- C. Anchor Sun Control Devices to Curtain Wall Framing as indicated on approved shop drawings, and as specified.
- D. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of galvanic action between metals.
- E. Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.
- F. Set units level, plumb and true to line, with uniform joints.
- G. Sun Control Device installation:
  - 1. Layout and verify centerline dimensions prior to setting outriggers window wall brackets.
  - 2. Install the two outer most outriggers window wall brackets plumb and level to the substrate.

3. Then, shoot a line from outrigger to outrigger to find the depth dimension of the outer line.
  4. Proceed with the installation by attaching the middle outrigger, shimming as required.
  5. Shims: Non-ferrous, as recommended by manufacturer. Verify centerline dimensions after shims are installed.
- H. Erection Tolerances:
1. Variation from level: +/- 1/8 inch maximum in 20 ft.- 0-inch runs, non-cumulative.
    - a. Maximum Offset From True Alignment Between Adjacent Members Butting or In-Line: +/- 1/32 inch.
- I. Do not field cut or trim units. Cut and trim component parts during erection only with the approval of the manufacturer, and in accordance with his recommendations. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly as directed.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### 3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
- C. Clean aluminum surfaces in accordance with recommendations found in AAMA 609 and 610. Do not use aggressive alkaline, TSP, acid cleaners, or abrasive cleaners on aluminum surfaces.

END OF SECTION 084413



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes:

- 1. Glass for windows, doors and interior borrowed lites.
- 2. Reception and Live Scan Window glazing.
- 3. Exterior windows and Door Lite.
- 4. Glazing sealants and accessories.

- B. Related Sections:

- 1. Section 081216 – Aluminum Frames for interior aluminum window frames for glazing installed in gypsum board partitions.
- 2. Section 084113 - Aluminum-Framed Entrances and Storefronts for Exterior storefront framing and exterior manual-swing entrance doors and door-frame units.
- 3. Section 087000 – Architectural Window Film

### 1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

### 1.4 REFERENCES

- A. ANSI Z 97.1 - Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
- B. ASTM C 1036 - Standard Specification for Flat Glass.
- C. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
- D. ASTM C 1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
- E. ASTM E 2188 – Standard Test Method for Insulating Glass Unit Performance.

- F. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- G. CPSC 16CFR-1201 - Safety Standard for Architectural Glazing Materials.
- H. Glass Association of North America (GANA) Glazing Manual.

#### 1.5 DEFINITIONS

- A. Sealed Insulating Glass Unit Surfaces:
  - 1. Surface No. 1: Exterior surface of outer lite.
  - 2. Surface No. 2: Interior surface of outer lite.
  - 3. Surface No. 3: Exterior surface of inner lite.
  - 4. Surface No. 4: Interior surface of inner lite.
- B. Airspace: Space between lites of an insulating glass unit that contains dehydrated air or other inert specified gas.

#### 1.6 SUBMITTALS

- A. Comply with Section 013300 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including performance characteristics and installation instructions.
- C. Shop Drawings: Submit manufacturer's or fabricator's shop drawings, including plans, elevations, sections, and details, indicating glass dimensions, tolerances, types, thicknesses, and coatings.
- D. Samples: Submit manufacturer's samples of each type, thickness, and coating other than clear monolithic vision glass; 12 inches square.
- E. Fabricator's Certification: Submit fabricator's certification by manufacturer.
- F. Cleaning Instructions: Submit manufacturer's cleaning instructions.
- G. Warranty: Submit manufacturer's standard warranty for sealed insulating glass units.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Minimum of 5 years experience manufacturing solar control coated glass.

- B. Fabricator's Qualifications:
  - 1. Minimum of 5 years experience manufacturing sealed insulating glass units meeting ASTM E 2190.
  - 2. Certified by coated glass manufacturer.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
  - 1. Deliver glass to site in accordance with manufacturer's instructions.
  - 2. Deliver glass in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
  - 1. Store glass in accordance with manufacturer's instructions.
  - 2. Store glass in clean, dry area indoors.
  - 3. Protect from exposure to direct sunlight and freezing temperatures.
  - 4. Apply temporary coverings loosely to allow adequate ventilation.
  - 5. Protect from contact with corrosive chemicals.
  - 6. Avoid placement of glass edge on concrete, metal, and other hard objects.
  - 7. Rest glass on clean, cushioned pads at 1/4-points.
- C. Handling:
  - 1. Handle glass in accordance with manufacturer's instructions.
  - 2. Protect glass from damage during handling and installation.
  - 3. Do not slide 1 lite of glass against another.
  - 4. Do not use sharp objects near unprotected glass.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Guardian Glass, LLC, 2300 Harmon Road, Auburn Hills, Michigan 48326. Toll Free (866) 482-7374. Phone (248) 340-1800. Web Site [www.guardianglass.com](http://www.guardianglass.com).

## 2.2 GLASS PRODUCTS, GENERAL

- A. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- B. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- C. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.3 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

## 2.4 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.
    - d. Sika Corporation.

2.5 SOLAR CONTROL INSULATING GLASS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- 1) Guardian Glass, LLC, 2300 Harmon Road, Auburn Hills, Michigan 48326. Toll Free (866) 482-7374. Phone (248) 340-1800. Web Site [www.guardianglass.com](http://www.guardianglass.com).
- B. Fabricators:
1. Sealed Insulating Glass Units, Heat-Strengthened Glass, Tempered Glass, and Spandrel Glass:
    - a. Acceptable Fabricators: Certified by Guardian Glass, LLC to fabricate SunGuard Solar Control Coated Glass products.
- C. Double-Glazed Sputter-Coated Insulating Glass Units: Conformance: ASTM E 2190.
1. Outboard Lite: Sputter-coated Guardian CrystalGray float glass.
    - a. Annealed CrystalGray Float Glass: ASTM C 1036, Type 1, Class 2, Quality q3.
    - b. Vacuum Deposition Sputtered Coating: ASTM C 1376.
    - c. Coating on Surface No. 2: SunGuard SNX 62/27.
    - d. Glass Thickness: 6 mm (1/4 inch).
    - f. Heat Treatment: Tempered; ASTM C 1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1.
  2. Air Space: 12 mm (1/2 inch) wide, hermetically sealed, dehydrated air space.
  3. Inboard Lite: Guardian Clear float glass.
    - a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
    - b. Glass Thickness: 6 mm (1/4 inch).
    - d. Heat-Treatment: Tempered; ASTM C 1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1.
  4. Glass Unit Performance Characteristics:
    - a. Visible Light Transmittance: 44 percent
    - b. Visible Light Reflectance Outdoors: 8 percent
    - c. Direct Solar Energy Transmittance: 16 percent
    - d. Direct Solar Energy Reflectance Outdoors: 19 percent
    - e. Winter U-Value Nighttime: 0.29
    - f. Summer U-Value Daytime: 0.27
    - g. Solar Heat Gain Coefficient: 0.22
    - h. Summer Relative Heat Gain: 54

5. Edge Seals: ASTM E 2188, with aluminum spacers, dual-sealed with a primary seal of polyisobutylene and a secondary seal of silicone sealant for glass-to-spacer seals.
6. Sealant: Approved by glass manufacturer.

## 2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.

## 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive glass. Notify Architect of conditions that would adversely affect installation. Do not proceed with installation until unsatisfactory conditions are corrected.

### 3.2 PREPARATION

- A. Verify glazing openings are correct size and within tolerance.
- B. Verify glazing channels, recesses, and weeps are clean and free of obstructions.

### 3.3 GLAZING

- A. Install glass in accordance with manufacturer's instructions, except where local codes or GANA Glazing Manual indicate more stringent requirements.

### 3.4 FIELD QUALITY CONTROL

- A. Coated glass, when viewed from minimum of 10 feet, exhibiting slightly different hue or color not apparent in hand samples, will not be cause of rejection of glass units, as determined by Architect.
- B. Verify glass is free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

### 3.5 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- D. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- E. Provide spacers for glass lites where length plus width is larger than 50 inches.
- F. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

### 3.6 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

### 3.7 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.8 CLEANING

- A. Clean glass promptly after installation in accordance with manufacturer's instructions.
- B. Remove labels from glass surface.
- C. Do not use harsh cleaning materials or methods that would damage glass.

### 3.9 PROTECTION

- A. Protect installed glass from damage during construction.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.



- C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

### 3.10 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Clear annealed float glass.
  - 1. Minimum Thickness: 1/2 inch.
- B. Glass Type GL-2: Clear fully tempered float glass.
  - 1. Minimum Thickness: 1/4 inch.

### 3.11 INSULATING GLASS SCHEDULE

- A. Glass Type GL-3: Low-E-coated, tinted insulating glass, exterior application.
  - 1. Basis-of-Design Product: SunGuard SNX 62/27 with Coating on Surface No. 2.
  - 2. Overall Unit Thickness: 1 inch.
  - 3. Minimum Thickness of Each Glass Lite: 1/4" thickness.
  - 4. Outdoor Lite: Tinted fully tempered float glass.
  - 5. Tint Color: CrystalGray
  - 6. Visible Light Transmittance: 44 percent
  - 7. Visible Light Reflectance Outdoors: 8 percent
  - 8. Direct Solar Energy Transmittance: 16 percent
  - 9. Direct Solar Energy Reflectance Outdoors: 19 percent
  - 10. Winter U-Value Nighttime: 0.29
  - 11. Summer U-Value Daytime: 0.27
  - 12. Solar Heat Gain Coefficient: 0.22
  - 13. Summer Relative Heat Gain: 54

END OF SECTION 088000

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
  - 1. Tempered glass mirrors qualifying as safety glazing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- C. Samples: For each type of the following:
  - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
  - 2. Mirror Trim: 12 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction test report.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Gardner Glass, Inc.
  - 2. Glasswerks LA, Inc.
  - 3. National Glass Industries.

### 2.2 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
  - 1. Nominal Thickness: ¼ inch.
- C. Safety Glazing Products: For tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

### 2.3 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating approved by mirror manufacturer.
- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.
- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

## 2.4 MIRROR HARDWARE

- A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
  - 1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Andscot Company, Inc.
      - 2) Laurence, C. R. Co., Inc.
  - 2. Finish: Clear bright anodized.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

## 2.5 FABRICATION

- A. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- B. Mirror Edge Treatment: Rounded polished. Seal edges of mirrors with edge sealer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

### 3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
  - 1. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
- C. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Work included: Furnishing and installing Plaster Channel Screed Reveal moldings, factory fabricated intersections and supplied accessories as specified here in and shown on the drawings.
- A. Related work specified elsewhere includes:
  - 1. Refer to "Manufactured Masonry Veneer" Section 047300 for additional information and coordination.
  - 2. Refer to "Cold-Formed Metal Framing" Section 054000 for additional information.
  - 3. Refer to "Sheathing" Section 061600 for additional information
  - 3. Refer to "Weather Barrier" Section 072500 for additional information.
  - 4. Refer to "Sheet Metal Flashing and Trim" Section 076200 for additional information.

1.3 SUBMITTALS

- A. Product data: Indicate product description, including compliance with specified requirements and installation requirements. Mark manufacturer's brochures to include only those products proposed for use.

1.4 QUALITY ASSURANCE

- A. Applicable standards; standards of the following, as referenced herein:
  - 1. Aluminum Association (AA).
  - 2. American Society for Testing and Materials (ASTM).
- B. Allowable tolerances in horizontal planes:
  - 1. Variation from level: +1/8" in 12'-0".
  - 2. Variation in plane of adjacent wallboard panels prior to joint treatment: 1/16".
- C. Allowable tolerances in framed vertical construction.
  - 1. Position: +1/4" maximum variation from design position.
  - 2. Alignment: 1/8" in 8'-0"; 1/4" maximum in any continuous wall, line or surface.

3. Surface smoothness: No joint or fastener location, roughness or blemish discernible after application of finish when viewed at any angle from a distance of 5'-0" under occupancy lighting conditions, with surface preparation as specified in Painting section. \*\*

#### 1.5 DELIVERY, STORAGE AND HANDLING

##### A. Storage:

1. Stack accessories off floor on pallets or similar platforms providing continuous support for accessories to prevent sagging. Stack accessories so that long lengths are not over short lengths.
2. Protect accessories from other work being done in the area.

- ##### B. Handle materials to prevent damage to surfaces, edges and ends of sheet metal items. Reject and remove damaged material from site.

#### PART 2 - PRODUCTS

##### 2.1 MANUFACTURER:

- ##### A. Acceptable manufacturer; subject to compliance with specified requirements:

Fry Reglet Corporation.  
12342 Hawkins Street  
Santa Fe Springs, CA 91803  
Phone 800-237-9773 Fax 800-200-4397

- ##### B. Accessory systems of similar design and construction, as manufactured by other manufacturers, may be submitted for Architect's consideration. Acceptance is subject to compliance with specified design criteria, as evidenced by submittal of specified product data. Submittals shall comply with requirements of Product Options and Substitutions section.

##### 2.2 MATERIALS AND FINISH:

##### A. Anodized finish:

1. Architectural 200R1 medium etch (AA-M32c10A21), clear color.

##### 2.3 REVEALS:

##### A. Plaster Channel Screed Reveal molding:

1. Acceptable product: Channel Screed – Size and depth as noted on the drawings.



2. Aluminum shall be extruded alloy 6063 T5, with chemical conversion coating, clear anodized or other specified finish. Refer to finish section.
3. Characteristics:
  - a. Description: Molding shall create a vertical or horizontal recessed reveal.
  - b. Material: Extruded aluminum.
  - c. Dimensions: As indicated on drawings.
4. Factory Fabricated Intersections for PCS Plaster Channel Screed Reveals for vertical intersections and horizontal corners as required for the project and indicated on the drawing details.

#### 2.4 FASTENERS:

- A. Fasteners: Exposed fasteners (provided by installer) shall be countersunk and shall match accessories in color.
  1. Aluminum to aluminum: Aluminum or Type 302 or 304 stainless steel.
  2. Aluminum to stainless steel or carbon steel: Type 302 or 304 Stainless steel.

#### 2.5 FABRICATION:

- A. Mounting holes: Provide mounting holes located at 8" o. c.
- B. Factory Fabricated Intersections for PCS Plaster Channel Reveals: Make custom miters and intersections with welded corners or with high-strength industrial tape on backs.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION:

- A. Install plaster Channel Screed Reveal molding in accord with manufacturer's product data, drawing details and as follows:
- B. Lathing – Vertical Installation:
  1. Place Weather Barrier behind all moldings and shiplap a minimum of 6".
  2. Secure moldings on 7" centers using fasteners as appropriate to substrate to meet ASTM C1063.
  3. Install wire lath over installation flange of moldings.
  4. Use vinyl or cloth tape specifically manufactured for masking anodized aluminum trim prior to plastering. For painted surfaces, use plastic tape.
- C. Lathing – Vertical Installation:

1. Place Weather Barrier behind all moldings and shiplap a minimum of 2".
  2. Secure moldings on 16" centers using fasteners as appropriate to substrate.
  3. Place building paper over upper flange of reveal, extending upward and under the above building paper overlap.
  4. Place wire lath over upper installation flange on horizontal installation.
  5. Install wire lath over bottom installation flange of moldings.
  6. Use vinyl or cloth tape specifically manufactured for masking aluminum trim prior to plastering. For painted surfaces, use plastic tape.
- D. Installation Of Moldings After Weather Barrier and Wire Lath Have Been Installed.
1. Make sure that the 7/8" installation flanges are covered with wire lath. This will prevent cracking.
  2. Uniform Building Code requires two layers of grade "D" paper when applied over wood base sheathing.
- E. Installing 2 - Piece Plaster Control Screed:
1. Place Weather Barrier behind all moldings and shiplap a minimum of 6".
  2. Prior to attachment, place sealant in the movement groove along the back of the molding. Note: If installation is horizontal, place movement flange on top and lap additional building paper over top flange.
  3. Leave alignment clips in place while fastening moldings to framing or studs.
  4. Secure moldings on 16" centers using fasteners as appropriate to substrate.
  5. Place building paper and wire lath over upper movement installation flange on horizontal installation, and shiplap a minimum of 2". (See Horizontal Installation)
  6. Install wire lath over bottom installation flange of moldings.
  7. Use vinyl or cloth tape specifically manufactured for masking anodized aluminum trim prior to plastering. For painted surfaces, use plastic tape.
- F. Sealant and Connector Clips
1. The use of sealant at all butt joints and Fry Reglet Connector Clips is required.
  2. Use Fry Reglet Connector Clips to align molding during installation.
  3. Apply sealant as indicated.
- G. Factory Fabricated Intersections for PCS Plaster Channel Reveals
1. Factory fabricated intersections are available from the manufacturer to speed installation and reduce labor cost. The joints are welded. Water resistant tape is factory applied to the backs of all PCS factory fabricated intersections.
  2. Intersections are furnished with 6" legs to join with straight sections of moldings.

3.2 PROTECTION

- A. Leave Protection Tape on Channel Screeds until all adjacent Manufactured Masonry Veneer installation and exterior finish work that could affect the Channel Screed finish are completed.
- B. Clean exposed Channel surfaces of any construction debris. Joint and fastener treatment shall be indistinguishable in finished work.
- C. Protect plaster Channel Screed Reveal molding from damage until date of Substantial Completion. Replace accessories which become damaged.

END OF SECTION 092090

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists, etc.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For firestop tracks, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645. Use steel studs and tracks.
  - 1. Steel Studs and Tracks:
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) MRI Steel Framing, LLC.
      - 4) SCAFCO Steel Stud Company.
    - b. Minimum Base-Metal Thickness: 20 gauge or as indicated on Drawings. See "Embossed Steel Studs and Tracks" Article in the Evaluations for information about embossed steel studs and tracks.
- C. Slip-Type Head Joints: Where indicated, provide the following:
  - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- 1) CEMCO; California Expanded Metal Products Co.
  - 2) ClarkDietrich.
  - 3) SCAFCO Steel Stud Company.
2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - 1) CEMCO; California Expanded Metal Products Co.
    - 2) ClarkDietrich.
    - 3) SCAFCO Steel Stud Company.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. MRI Steel Framing, LLC.
    - c. SCAFCO Steel Stud Company.
  2. Minimum Base-Metal Thickness: Minimum 20 gauge or as indicated on Drawings.
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. MRI Steel Framing, LLC.
    - c. SCAFCO Steel Stud Company.
  2. Depth: As indicated on Drawings.
  3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. ClarkDietrich.
  - b. MRI Steel Framing, LLC.
  - c. SCAFCO Steel Stud Company.
2. Minimum Base-Metal Thickness: 20 gauge or as indicated on Drawings.
  3. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. MRI Steel Framing, LLC.
    - c. SCAFCO Steel Stud Company.
  2. Configuration: Asymmetrical or hat shaped.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: As indicated on Drawings.
  2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. ClarkDietrich.
    - b. MRI Steel Framing, LLC.
    - c. SCAFCO Steel Stud Company.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:



1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES as appropriate for the substrate.
  - a. Uses: Securing hangers to structure.
  - b. Type: torque-controlled, adhesive anchor or adhesive anchor.
  - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
  - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
  1. Depth: As indicated on Drawings.
- F. Furring Channels (Furring Members):
  1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
  2. Steel Studs and Tracks: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 20 gauge or as indicated on Drawings.
    - b. Depth: As indicated on Drawings.
  3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base-Metal Thickness: 20 gauge or as indicated on Drawings.
  4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Armstrong World Industries, Inc.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
  - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
  - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
  - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
  - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 24 inches o.c. unless otherwise indicated.
  - 2. Multilayer Application: 24 inches o.c. unless otherwise indicated.
  - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  6. Curved Partitions:
    - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
1. Screw to wood framing.
  2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Shaped Furring Members:
1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
  2. Carrying Channels (Main Runners): 48 inches o.c.
  3. Furring Channels (Furring Members): 24 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

- a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within [erformance limits established by referenced installation standards.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Do not attach hangers to steel roof deck.
  6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Exterior base scratch and brown coats for applied brick veneer finish.
2. Exterior vertical plasterwork (stucco) prepared for finish Textured Acrylic Finish coat.
3. Exterior horizontal and nonvertical plasterwork (stucco).

- B. Related Sections:

1. Refer to "Manufactured Masonry Veneer" Section 047300 for additional information and installation over scratch and brown coat.
2. Refer to "Cold-Formed Metal Framing" Section 054000 for additional information.
3. Refer to "Weather Barrier" Section 072500 for additional information.
4. Refer to "Sheet Metal Flashing and Trim" Section 076200 for additional information.
5. Refer to "Plaster Accessories" Section 092710 for additional information and coordination.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of factory-prepared finish coat and for each color and texture specified.
- C. Samples for Verification: For each type of factory-prepared finish coat and for each color and texture specified, 24 by 24 inches, and prepared on rigid backing.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.5 FIELD CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
  - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
  - 2. Apply plaster when ambient temperature is greater than 40 deg F.
  - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

2.2 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CEMCO; California Expanded Metal Products Co.
    - b. ClarkDietrich Building Systems.
    - c. MarinoWARE.
  - 2. 3/8-Inch Rib Lath: 3.4 lb/sq. yd..
- B. Wire-Fabric Lath:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Tree Island Steel
    - b. Welded-Wire Lath: ASTM C 933; self-furring with paper backing.: K- Lath Stucco-Rite 16 GA and 195 HD zinc-coated, galvanized, welded wire fabric lath, 2"x2" mesh with slotted-perforated absorptive separator paper between face.
- C. Paper Backing: FS UU-B-790a, Type I, Grade B, Style 1a vapor-retardant paper.



1. Provide paper-backed lath in locations indicated on Drawings.
2. Provide additional layer of paper if plaster is installed over sheathing, as required by California Building Code. See Section 07250 – Weather Barrier for installation requirements.

## 2.3 ACCESSORIES

- A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CEMCO; California Expanded Metal Products Co.
    - b. ClarkDietrich Building Systems.
    - c. MarinoWARE.
  2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.
  3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
  4. External- (Outside-) Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
  5. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
    - a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
  6. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
  7. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
  8. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.

## 2.4 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.
- C. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

## 2.5 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I.
  - 1. Color for Finish Coats: White.
- B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- C. Sand Aggregate: ASTM C 897.
- D. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems formulated with colorfast mineral pigments and fine aggregates; for use over cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. California Stucco Products Corp.
    - b. El Rey Stucco Solutions; a Parex USA, Inc. brand.
    - c. Senergy; BASF Corp.
  - 2. Color: Match Architect's color sample.
  - 3. Texture: Smooth super fine or fine texture. Supply samples.

## 2.6 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
  - 1. Portland Cement Mixes:
    - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
    - b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
- C. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.2 INSTALLING METAL LATH

- A. Metal Lath: Install according to ASTM C 1063.

3.3 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External (Outside) Corners:
  - 1. Install lath-type, external-corner reinforcement and cornerbead at exterior locations.
  - 2. Install cornerbead at interior locations.
- C. Control Joints: Locate as indicated on Drawings.

3.4 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
- B. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:
  - 1. Portland cement mixes.
- C. Ceilings; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork and having 3/4-inch total thickness for metal lath as follows:
  - 1. Portland cement mixes.
- D. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions. Provide a smooth trowel finish to that matches approved sample board.

3.5 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

END OF SECTION 092400

CONTRACT # 19-S-04

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.
  - 2. Tile backing panels.
  - 3. Texture finishes.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each texture finish indicated on same backing indicated for Work, minimum 2' x 2' samples.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. CertainTeed Corporation.
  - b. Georgia-Pacific Building Products.
  - c. National Gypsum Company.
2. Thickness: 5/8 inch.
3. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

#### 2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation.
    - b. Georgia-Pacific Building Products.
    - c. National Gypsum Company.
  2. Core: 5/8 inch, Type X.
  3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

#### 2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or paper-faced galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - e. Expansion (control) joint.
- B. Exterior Trim: ASTM C 1047.
  1. Material: Hot-dip galvanized-steel sheet or rolled zinc.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.

- c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

## 2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  1. Interior Gypsum Board: Paper.
  2. Exterior Gypsum Soffit Board: Paper.
  3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use setting-type, drying-type, all-purpose compound, all-purpose compound.
  4. Finish Coat: For third coat, use drying-type, all-purpose compound.
  5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
  1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

## 2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
  1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90. Acoustical Sealant specified in Section 79219 – "Acoustical Joint Sealants"
- F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

## 2.8 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed Corporation.
    - b. National Gypsum Company.
  - 2. Texture: Fine Orange Peel Texture. Submit samples for Project Manager, Owner and Architects review and approval.

## PART 3 - EXECUTION

### 3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.



- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
  - 5. Level 5: Where indicated on Drawings.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

### 3.2 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved sample panel and free of starved spots or other evidence of thin application or of application patterns.

### 3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Porcelain tile.
- 2. Glazed wall tile.
- 3. Thresholds.
- 4. Tile backing panels.
- 5. Crack isolation membrane.
- 6. Shower Waterproof Membrane.
- 7. Metal edge strips.
- 8. Shower niche.

- B. Related Sections include the following:

- 1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- 2. Division 9 Section "Gypsum Board" for fiber cement backer board at restroom wet walls.

### 1.3 ACTION SUBMITTALS

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

- B. Samples:

- 1. Each type and composition of tile and for each color and finish required.
- 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer has a minimum five years of experience with commercial installations of similar size, member of the National Tile Contractors Association or a member of the Tile Contractors' Association of America.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

- A. Ceramic Tile Type PFT-1 & PFT-2: Glazed porcelain tile.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Daltile.
  - 2. Certification: Tile certified by the Porcelain Tile Certification Agency.
  - 3. Face Size: PFT-1 24" x 24".  
PFT-2 12" X 24".
  - 4. Thickness: 3/8 inch.
  - 5. Face: smooth with rectified, unpolished.
  - 6. Dynamic Coefficient of Friction: Not less than 0.42.
  - 7. Tile Color, Glaze, and Pattern: As indicated on the Finish Schedule and plans.
  - 8. Grout Color: As indicated on the Finish Schedule.
  - 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
    - a. Base: PTB-1 Surface Bullnose Base, module size 3" x 12".

B. Ceramic Tile Type CWT-1, 2 and 3: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Daltile, Color Wheel Linear.
2. Module Size: 4 1/4" x 12 7/8".
3. Thickness: 5/16 inch.
4. Face: Plain with modified square edges or cushion edges.
5. Finish: Mat, opaque.
6. Tile Color and Pattern: As noted on the Finish Schedule.
7. Grout Color: As noted on the Finish Schedule.
8. Mounting: Loose.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes.
  - a. Base: Flat Top Cove Base 4 1/4" x 12 7/8" inches.
  - b. Wainscot Cap: Surface bullnose, module size 4-1/4 by 12 7/8 inches.
  - c. External Corners: Surface bullnose, same size as adjoining flat tile.
  - d. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

C. Ceramic Tile Type PMT-3: Porcelain Mosaic Tile.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Daltile, Keystones.
2. Module Size: 1" x 1".
3. Thickness: 1/4 inch.
4. Face: Plain with modified square edges, unglazed.
5. Finish: Mat, opaque, Finish as noted on the Finish Schedule.
6. Tile Color and Pattern: As noted on the Finish Schedule.
7. Grout Color: As noted on the Finish Schedule.
8. Mounting: 12" x 24" sheets.
9. Base: Cove Base 1" x 1"
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes.
  - a. Base: Cove, 1" x 1".
  - b. Wainscot Cap: Surface bullnose, module size 1 by 1 inches.

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.
  1. Description: Provide the following:
    - a. Daltile. Double Bevel Threshold, 4" W x 36" L x 5/5" H. See Interior Finish Schedule sheet A5.1 for stone threshold selection.

#### 2.4 TILE BACKING PANELS

- A. Fiber-Cement Backer Board: ASTM C 1288.
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. CertainTeed Corporation.
    - b. Georgia-Pacific Building Products.
    - c. National Gypsum Company.
  2. Thickness: As indicated.

#### 2.5 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Noble Company (The); Nobleseal TS

#### 2.6 SETTING MATERIALS

- A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Bostik, Inc.

- b. Custom Building Products.
  - c. MAPEI Corporation.
2. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
  3. For wall applications, provide nonsagging mortar.

## 2.7 GROUT MATERIALS

- A. High-Performance sanded Tile Grout: ANSI A118.7.
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Custom Building Products.
  2. Fusion Pro, single component stain resistant grout.
  3. Aqua Mix Grout Release; Install and remove per manufacturer's written recommendations.
  4. Use large format tile mortar for floor tile: PFT-1 and PFT-2

## 2.8 SHOWER WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
  1. Schluter Systems, L.P. [www.schluter.com](http://www.schluter.com). Kerdi Membrane at Shower floor and walls. A sheet-applied polyethylene waterproofing membrane and vapor retarder. Installed and tiled per the manufacturers written instructions. Coordinate installation with water line and drain installations to maintain waterproof integrity.

## 2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Schluter Systems, L.P. [www.schluter.com](http://www.schluter.com). Refer to Finish Schedule and notes for additional information.
- C. Shower Niche: Prefabricated 12" x 12" x 3 1/2" deep, installed, waterproof membrane covered and tiled per the manufacturers written instructions.
  1. provide products by the following:
    - a. Schluter Systems, L.P. [www.schluter.com](http://www.schluter.com). Refer to drawings for additional information.
    - b. Provide solid backing and blocking.

## 2.10 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
  3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped less than 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors consisting of tiles 8 by 8 inches or larger.
    - b. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  - 1. Glazed Wall Tile: Minimum per manufacturer's recommendations.

2. Porcelain Tile: Minimum per manufacturer's recommendations.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
  - H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
    1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
  - I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
    1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set or improved modified dry-set mortar (thinset).
    2. Do not extend crack isolation membrane under thresholds set in standard dry-set, modified dry-set or improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.
  - J. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

### 3.4 TILE BACKING PANEL INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

### 3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

### 3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

### 3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

### 3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
  - 1. Tile Installation: Porcelain Tile Pavers TCNA F113 and ANSI A108.5 thinset mortar on crack isolation membrane.
    - a. Ceramic Tile Type: Porcelain Tile, refer to finish schedule.
    - b. Thinset Mortar: Modified dry-set mortar.
    - c. Grout: High-performance sanded grout.
- B. Interior Gypsum Board Walls:
  - 1. Ceramic Wall Tile Installation: TCNA W243 and ANSI A108.5; thinset mortar on gypsum board or Cement board.
    - a. Ceramic Tile Type: Ceramic Wall Tiles, refer to Finish Schedule.

- b. Thinset Mortar: Modified dry-set mortar.
  - c. Grout: High-performance sanded grout.
- C. Ceramic Tile Installation (Shower Stall Walls ): TCNA F144; thinset mortar on waterproof membrane over cementitious backer units or fiber-cement backer board.
- a. Ceramic Tile Type: PMT-3 Porcelain Mosaic Tile and CWT-1, 2 and 3 Ceramic Wall Tile.
  - b. Thinset Mortar: Modified dry-set mortar.
  - c. Grout: High-performance sanded grout.
- D. Ceramic Tile Installation ( Shower Stall Floor ): TCNA F122; thinset mortar on waterproof membrane.
- a. Ceramic Tile Type: PMT-3 Porcelain Mosaic Tile.
  - b. Thinset Mortar: Modified dry-set mortar.
  - c. Grout: High-performance sanded grout.

END OF SECTION 093013

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Refer to Interior Finish Schedule for additional information.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Delegated-Design Submittal: For seismic restraints for ceiling systems.
  - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, and coordinated with each other, using input from installers of the items involved.
- B. Product test reports.
- C. Research reports.
- D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E 1264.
  - 2. Smoke-Developed Index: 25 or less.

### 2.2 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Armstrong World Industries, Inc.
- B. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.
- C. Classification: Armstrong "Cirrus", Second-Look II, 24 x 24 scoring on 24 x 48 panels with ¼" beveled tegular edge.
- D. Color: White, as indicated on the Interior Finish schedule.
- E. Light Reflectance (LR): 85 % LR.
- F. Ceiling Attenuation Class (CAC): 35 CAC.
- G. Noise Reduction Coefficient (NRC): 0.65 NRC.
- H. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- I. Thickness: 3/4 inch.
- J. Modular Size: 24 by 48 inches.

### 2.3 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Armstrong World Industries, Inc.

- B. Metal Suspension-System Standard: Manufacturer's 15/16-inch Prelude XL Exposed Tee System, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M.
- C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.
  - 1. Structural Classification: Intermediate-duty system.
  - 2. End Condition of Cross Runners: butt-edge type.
  - 3. Face Design: Flat, flush.
  - 4. Cap Material: aluminum.
  - 5. Cap Finish: Painted white.

## 2.4 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Hold-Down Clips: Manufacturer's standard hold-down.
- C. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

## 2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Armstrong World Industries, Inc.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.

- B. Layout openings for penetrations centered on the penetrating items.

### 3.2 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
  - 3. Arrange directionally patterned acoustical panels as follows:
    - a. As indicated on reflected ceiling plans.
  - 4. Install hold-down impact and seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
- C. Where necessary Field cut panel edges to match width and depth of panel Beveled Tegral Edge and Scoring to align with ceiling track, edge moldings or trim. Paint edges with manufacturer provided repair paint. Unpainted, unaligned or poorly cut ceiling panel edges will not be acceptable.

END OF SECTION 095113



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Thermoplastic-rubber base.
  - 2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOPLASTIC-RUBBER BASE RB-1

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
- B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
  - 1. Group: I (solid, homogeneous).
  - 2. Style:
    - a. Cove.
- C. Thickness: .125 inch.
- D. Height: 4".
- E. Lengths: Coils in manufacturer's standard length. 48" pieces are not acceptable.

- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: As indicated on Finish Schedule.

### 2.3 THERMOPLASTIC-RUBBER BASE RB-2

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
- B. Product Standard: ASTM F 1861, Type TP (rubber, vulcanized), Group I (solid, homogeneous).
  - 1. Style:
    - a. Profiles Designer Wall Base, Elusive 3".
- C. Thickness: 0.313 inch at toe.
- D. Height: 3".
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Factory Pre-cut.
- G. Inside Corners: Factory Pre-cut.
- H. Colors: As indicated on Finish Schedule.

### 2.4 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
- B. Description: Rubber joiner for concrete and carpet.
- C. Profile and Dimensions: Architect to select from manufacturers standard profiles.
- D. Locations: Where carpet meets concrete, VCT and SDT floor tiles and porcelain tile.
- E. Colors and Patterns: Color to match RB-1 and RB-2, refer to Finish Schedule sheet A-5.1.

## 2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed Corners: Install preformed corners before installing straight pieces.
- G. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 12 inches in length.
    - a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 12 inches in length.
  - a. Miter corners to minimize open joints.

### 3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Solid vinyl floor tile.
  - 2. Composition floor tile.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

### 2.2 COMPOSITION FLOOR TILE VCT – Tile

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Armstrong World Industries, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through pattern.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: Refer to Finish Schedule for additional information.

### 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
  4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles square with room axis .
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- H. Floor Polish: Use only on BBT tiles. Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

FRESNO COUNTY SHERIFF SUBSTATION  
FRESNO, CA.

RESILIENT TILE FLOORING  
SECTION 096519- 4

1. Apply two coats.

END OF SECTION 096519



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Static-dissipative, vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of static-control resilient flooring.
  - 1. Samples: For each type of static-control resilient flooring.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store static-control resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer.

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive static-control resilient flooring.

1. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- B. Close spaces to traffic during static-control resilient flooring installation.
- C. Close spaces to traffic for 48 hours after static-control resilient flooring installation.
- D. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Static-Dissipative Properties: Provide static-control resilient flooring with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
  1. Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage and ESD-STM-7.1.
    - a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
    - b. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
  2. Static Generation: ANSI /ESD STM 92.7 at 40% RH with dissipative footwear: Less than 10 V; 12 % RH with dissipative footwear: Less than 10V.
  3. Static Dissipation: 1000 to 100 V in 0.2 seconds.

### 2.2 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Static-Dissipative, Vinyl Composition Floor Tile SDT: ASTM F 1700, Class II (Thru Pattern), Type A (smooth surface).
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Armstrong
  2. Thickness: In manufacturer's standard thickness, but not less than 0.08 inch.
  3. Size: 12 by 12 inches.
  4. Colors and Patterns: As indicated on the Finish Schedule sheet A-5.1.

### 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.
- C. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.
- D. Maintenance Floor Tiles: Special floor tiles inscribed "Conductive floor. Do not wax."
- E. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor-covering manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of static-control resilient flooring and electrical continuity of floor-covering systems.
- B. Concrete Substrates: Prepare according to ASTM F 710 and as recommended by manufacturer. Do not use solvents for cleaning substrates.
- C. Do not install static-control resilient flooring until it is same temperature as space where it is to be installed.
  - 1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

### 3.2 INSTALLATION, GENERAL

- A. Install static-control resilient flooring according to manufacturer's written instructions.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.
- C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.

- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Adhere static-control resilient flooring to substrates using a full spread of static-control adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
  - 1. Install metal corners at inside and outside corners.

### 3.3 FLOOR-TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
  - 1. Lay floor tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
  - 1. Lay static-dissipative, vinyl composition floor tiles with grain direction alternating in adjacent floor tiles (basket-weave pattern).

### 3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.
  - 1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.
  - 2. Arrange for testing of static-control resilient flooring before performing floor polish procedures.
- B. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of static-control resilient flooring.

- B. Protect static-control resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- C. Cover static-control resilient flooring until Substantial Completion.

END OF SECTION 096536

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes modular carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.
  - 5. Pattern of installation.
  - 6. Pattern type, location, and direction.
  - 7. Type, color, and location of edge, transition, and other accessory strips.
  - 8. Transition details to other flooring materials.
- C. Samples: For each exposed product and for each color and texture required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Required pre-installation moisture and alkalinity tests should be performed to ASTM Standards. Testing will be performed by the Owner's special inspection consultant.

1.8 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE MCT-1

- A. Manufacturer: Subject to compliance with requirements, provide products by the following:
  - 1. Mohawk Group
    - a. Product: Solve II / BT 416
- B. Color: # 359 Eco Active
- C. Installation Method: Monolithic
- D. Backing System: "Eco Flex ICT".
- E. Size: 24" X 24".

2.2 CARPET TILE MCT-2

- A. Manufacturer: Subject to compliance with requirements, provide products by the following:
  - 1. Mohawk Group
    - a. Product: Frist Step II GT315
- B. Color: To be selected.
- C. Installation Method: Monolithic
- D. Backing System: "Eco Flex ICT".



- E. Size: 24" 24".

## 2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Sealer: Use manufacturer approved and recommended sealer. Use is recommended when existing slab moisture exceeds 3 lbs./ sq. Yard per ASTM test method.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with the specified tile manufacturer's requirements.
- B. Concrete Floor Slabs: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Before installing carpet tiles over a new or existing concrete subfloor, you must test the moisture and alkalinity levels of the concrete. Testing will be performed by the Owner's testing and inspection consultant. Tests will be performed so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
  - 1. Moisture conditions of the concrete should be determined by use of the in Situ Probe RH test method (ASTM F 2170). If moisture readings exceed 90% RH contact Mohawk Technical Services at 800-833-6954.
  - 2. Perform additional moisture tests recommended in writing by the carpet tile manufacturer.
- D. Alkalinity Test: Perform as directed in manufacturer's written installation instructions. Using current version of ASTM F710. If PH exceeds 9, consult with Mohawk Technical Services at 800-833-6954.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8-inch-wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended by carpet tile manufacturer.
- C. All carpet tiles must be removed from cartons and allowed to adjust to job site temperature for 48 hours prior to installation.
- D. Maintain dye-lot integrity. Do not mix dye lots in same area.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

CONTRACT # 19-S-04

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.
- B. Refer to the Interior Design Drawings on sheet A5.1 for the Vinyl Wall Covering scope of work and Product Data.

1.2 SUMMARY

- A. Section Includes:
  - 1. Vinyl wall covering.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 10, Section 106520 - Folding Panel Partition, coordinate with partition manufacturer.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch-long in size.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 50 or less.
  - 2. Fire-Growth Contribution: No flashover and heat and smoke release according to NFPA 265.

### 2.2 VINYL WALL COVERING

- A. Manufacturer: Subject to compliance with requirements, provide products by the following:
  - 1. Koroseal, Interior Products, LLC.
  - 2. Type II, Vinyl.
- B. Test Responses:
  - 1. Colorfastness to Wet and Dry Crocking: Passes AATCC 8, Grade 3, minimum.
  - 2. Colorfastness to Light: Passes AATCC 16, Test Option 1 or 3, Grade 4, minimum, at 40 hours.
- C. Total Weight: 21 oz. PLY
- D. Width: 52 - 54 inches.
- E. Backing: Woven Osnaburg
- F. Colors, Textures, and Patterns: Refer to Finish Schedule on sheet A5.1.

### 2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

- B. Primer/Sealer: Mildew resistant, complying with requirements in Section 099123 "Interior Painting" and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
  - 1. Gypsum Board: Shall have a Level 5 finish. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
- D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

#### 3.2 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.
- F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
- H. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.

END OF SECTION 097200

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Concrete.
  - 2. Steel.
  - 3. Galvanized metal.
  - 4. Aluminum (not anodized or otherwise coated).
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this section.
  - 2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Label each coat of each Sample.
  - 3. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Indicate VOC content.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 2gal. of each material and color applied.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:
  - 1. Product name and type (description).
  - 2. Batch date.
  - 3. Color number.
  - 4. VOC content.
  - 5. Environmental handling requirements.
  - 6. Surface preparation requirements.
  - 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.



- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide [Sherwin-Williams Company \(The\)](#); products indicated or comparable product from one of the following:
  - 1. Benjamin Moore & Co.
  - 2. Dunn-Edwards Corporation.
  - 3. PPG Paints.
- B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:
  - 1. Products are approved by manufacturer in writing for application specified.
  - 2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.
- C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
  - 1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

### 2.2 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: For field applications, provide paints and coatings that complies with VOC content limits of authorities having jurisdiction.

- C. Colors: As indicated on the Exterior Finish schedule and as selected by the Architect.

### 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  2. Testing agency will perform tests for compliance with product requirements.
  3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
  1. Report, in writing, conditions that may affect application, appearance, or performance of paint.
- B. Substrate Conditions:
  1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
    - a. Concrete: 12 percent.
    - b. Masonry (CMU): 12 percent.
    - c. Portland Cement Plaster: 12 percent.
    - d. Gypsum Board: 12 percent.
  2. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
  - 1. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Aluminum Substrates: Remove loose surface oxidation.
- I. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  4. Paint entire exposed surface of window frames and sashes.
  5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Mechanical Galvanized Ducts.
    - i. Exterior Louvers and Grills.
    - j. Roof and Overflow Drain piping.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
  2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 EXTERIOR PAINTING SCHEDULE

#### A. Concrete, Nontraffic Surfaces:

##### 1. Latex System:

##### a. Prime Coat: Primer sealer, latex.

- 1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.

##### b. Prime Coat: Latex, exterior, matching topcoat.

##### c. Intermediate Coat: Latex, exterior, matching topcoat.

##### d. Topcoat: Latex, exterior, flat.

- 1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.

##### e. Topcoat: Latex, exterior, low sheen.

- 1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

#### B. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:

##### 1. Water-Based Light Industrial Coating System:

##### a. Prime Coat: Primer, water based.

- 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.

##### b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.

- c. Topcoat: Light industrial coating, exterior, water based, semi-gloss.
  - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
  
- d. Topcoat: Light industrial coating, exterior, water based, gloss.
  - 1) S-W Pro Industrial Acrylic Gloss Coating, B66-600 Series, at 2.5 to 4.0 mils dry, per coat.

END OF SECTION 099113

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel.
  - 2. Galvanized metal.
  - 3. Aluminum (not anodized or otherwise coated).
  - 4. Gypsum board.
  - 5. Cotton or canvas insulation covering.
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this section.
  - 2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Label each coat of each Sample.
  - 3. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Indicate VOC content.

1.4 CLOSEOUT SUBMITTALS

1. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Paint: 2gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
  1. Product name and type (description).
  2. Batch date.
  3. Color number.
  4. VOC content.
  5. Environmental handling requirements.
  6. Surface preparation requirements.
  7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.



PART 2 - FPRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide [Sherwin-Williams Company \(The\)](#); products indicated or comparable product from one of the following:
1. Benjamin Moore & Co.
  2. Dunn-Edwards Corporation.
  3. PPG Paints.
- B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:
1. Products are approved by manufacturer in writing for application specified.
  2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.
- C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

- A. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall provide materials that comply with VOC limits of authorities having jurisdiction and for interior paints and coatings applied at Project site, the following VOC limits exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Flat Paints and Coatings: 50 g/L.
  2. Nonflat Paints and Coatings: 150 g/L.
  3. Primers, Sealers, and Undercoaters: 200 g/L.
  4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
  5. Floor Coatings: 100 g/L.
  6. Shellacs, Clear: 730 g/L.
  7. Shellacs, Pigmented: 550 g/L.

- C. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small Scale Environmental Chambers."
- D. Colors: As indicated on the Interior Finish Schedule, Sheet A5.1.

### 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
  - 1. Report, in writing, conditions that may affect application, appearance, or performance of paint.
- B. Substrate Conditions:
  - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
    - a. Gypsum Board: 12 percent.
  - 2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
  - 1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
  - 1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.

- J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - 2. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.

- c. Uninsulated plastic piping.
  - d. Pipe hangers and supports.
  - e. Metal conduit.
  - f. Plastic conduit.
  - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - h. Other items as directed by Architect.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
  2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

- A. Metal Substrates (Aluminum, Steel, Galvanized Steel):
1. Latex System:
    - a. Prime Coat: Primer, rust-inhibitive, water based:
      - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.

- b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
  - c. Topcoat: Water-based acrylic, semi-gloss:
    - 1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
2. Water-Based Dry-Fall System:
- a. Top Coat: Dry-fall latex, semi-gloss:
    - 1) S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-83, at 5.8 mils wet, 2.3 mils dry.
3. Water-Based Light Industrial Coating System:
- a. Prime Coat: Primer, rust-inhibitive, water based:
    - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
  - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
  - c. Topcoat: Light industrial coating, interior, water based, semi-gloss:
    - 1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."
5. Waterbased/Alkyd Urethane System:
- a. Prime Coat:
    - 1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
  - b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
  - c. Topcoat: Water-based alkyd-urethane, gloss, interior:
    - 1) S-W Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils wet, 1.4 mils dry, per coat.
- B. Gypsum Board Substrates:
1. Latex System:
- a. Prime Coat: Primer, latex, interior:
    - 1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.

- b. Intermediate Coat: Latex, interior, matching topcoat.
  - c. Topcoat: Latex, interior, eggshell:
    - 1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
  - d. Topcoat: Latex, interior, semi-gloss:
    - 1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
2. Water-Based Light Industrial Coating System:
- a. Prime Coat: Primer sealer, latex, interior:
    - 1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.
  - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
  - c. Topcoat: Light industrial coating, interior, water based, eggshell:
    - 1) S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
  - d. Topcoat: Light industrial coating, interior, water based, semi-gloss:
    - 1) S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 099123

This page is intentionally left blank.



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes room-identification signs that are directly attached to the building.
- B. Related Requirements:
  - 1. Section 104450 "Accessibility Signage".

### 1.3 DEFINITIONS

- A. Accessible: In accordance with the ADA accessibility standards.

### 1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.
- B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
  - 1. Include representative Samples of available typestyles and graphic symbols.

- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
  - 1. Room-Identification Signs: Full-size Sample.
  - 2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
  - 3. Exposed Accessories: Full-size Sample of each accessory type.
  - 4. Full-size Samples, if approved, will be returned to Contractor for use in Project.
- E. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

#### 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Variable Component Materials: 24 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
  - 2. Tools: Two sets of specialty tools for assembling signs and replacing variable sign components.

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.10 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

### 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
    - c. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions of the ADA and the 2016 California Building Code (CBC).

### 2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign: Sign system with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. APCO Graphics, Inc.
    - b. ASI Sign Systems, Inc.
    - c. Mohawk Sign Systems.
  - 2. Laminated-Sheet Sign: Photopolymer or Sandblasted polymer face sheet with raised graphics laminated to acrylic or phenolic backing sheet to produce composite sheet.
    - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign - 0.125 inch minimum.
    - b. Surface-Applied Graphics: Applied vinyl film.
    - c. Color(s): As selected by Architect from manufacturer's full range.
  - 3. Sign-Panel Perimeter: Finish edges smooth.
    - a. Edge Condition: As indicated on Drawings.
    - b. Corner Condition in Elevation: As indicated on Drawings -Square.
  - 4. Frame: Entire perimeter.

- a. Material: Aluminum.
  - b. Material Thickness: 0.5 inches.
  - c. Frame Depth: As indicated on Drawings with removable face sheet and changeable subsurface graphics.
  - d. Profile: Square .
  - e. Corner Condition in Elevation: Square with Mitered corners.
  - f. Finish and Color: Clear anodized and as selected by Architect from manufacturer's full range.
5. Mounting: Manufacturer's standard method for substrates indicated or Surface mounted to wall with concealed anchors, countersunk flathead through fastener, two-face tape, hook-and-loop tape or magnetic tape.
  6. Text and Typeface: Accessible raised characters and Braille with typeface as selected by Architect from manufacturer's full range and variable content as scheduled. Finish raised characters to contrast with background color, and finish Braille to match background color.

### 2.3 SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- D. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings.

### 2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
  1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
  3. Sign Mounting Fasteners:
    - a. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides. 3M 4655 VHB Double-Sided Foam Tape.
- C. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.

## 2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

## 2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standards.
- C. Mounting Methods:
  - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
  - 2. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
  - 3. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
  - 4. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips 0.250 inch away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.
  - 5. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.

3.2 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423.13

This page is intentionally left blank.



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Section 092216 "Non-Structural Metal Framing and Gypsum Board" for blocking and backing and wall material.
- 2. Section 093000 "Ceramic Tile" for wall finish materials.
- 3. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
- 2. Show locations of cutouts for compartment-mounted toilet accessories.
- 3. Show locations of centerlines of toilet fixtures.
- 4. Show locations of floor drains.
- 5. Show overhead support or bracing locations.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

- 1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.

1. Door Hinges: Two hinges with associated fasteners.
2. Latch and Keeper: Two latches and keepers with associated fasteners.
3. Door Bumper: Two bumpers with associated fasteners.
4. Door Pull: Two door pulls with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.

#### 1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the 2016 California Building Code for requirements for toilet compartments designated as accessible and

U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities

## 2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Scranton Products.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screen Style: Floor mounted, overhead braced.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
  - 1. Stealth Integral Hinges: Configure doors and pilasters to receive integral hinges.
  - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
  - 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
  - 4. Height: 66 inches high.
- E. Pilaster Shoes and Sleeves Caps: Manufacturer's standard design; stainless steel.
- F. Urinal-Screen Post: Manufacturer's standard post design of 1-3/4-inch-square, aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster.
- G. Brackets (Fittings):
  - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

## 2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
  - 1. Material: Stainless steel.
  - 2. Hinges: Manufacturer's standard paired, continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door.
  - 3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
  5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
  6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish. No joints allowed, overhead braces are to be continuous.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

#### 2.4 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless-Steel Castings: ASTM A 743/A 743M.
- G. Zamac: ASTM B 86, commercial zinc-alloy die castings.

#### 2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.
    - b. Panels and Walls: 1 inch.
  - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
    - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
  - 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
    - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Corner guards.

- B. Related Requirements:

- 1. Section 087100 "Door Hardware" for metal protective trim units, according to BHMA A156.6, used for armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For each type of wall and door protection showing locations and extent.

- 1. Include plans, elevations, sections, and attachment details.

- C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

- 1. Include Samples of accent strips and accessories to verify color selection.

- D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

- 1. Corner Guards: 12 inches long. Include example top caps.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type of exposed plastic material.

### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than four, 48-inch-long units.
  - 2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
  - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
  - 2. Keep plastic materials out of direct sunlight.
  - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
    - a. Store corner-guard covers in a vertical position.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Provide products from manufacturer specified.



## 2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

## 2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards – "CG": Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90 - degree turn to match wall condition.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Korogard Wall Protection Systems; a division of RJF International Corporation.
  - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
    - a. Profile: Nominal 2-inch-long leg and 1/4-inch corner radius. G100 Series.
    - b. Height: 4 feet in one continuous piece mounted above the base.
    - c. Color and Texture: Pebble grain finish, color as noted on the Finish Sheet A5.1.
  - 3. Continuous Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum.
  - 4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
  - 5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

## 2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

## 2.5 FABRICATION

- A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled.

## 2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.
- B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

### 3.3 INSTALLATION

- A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

- B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings. Corner Guards are installed above wall base.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Adjust end and top caps as required to ensure tight seams.

#### 3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 00 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. Section Includes:

- 1. Public and Staff use washroom accessories.
- 2. Underlavatory guards.
- 3. Custodial accessories.
- 4. Staff Shower accessories.

- B. Related Sections include the following:

- 1. Division 8 Section 088300 "Mirrors" for frameless mirrors.
- 2. Division 9 Section 092216 – Non-Structural Framing for backing plates, accessory wall openings and framing.
- 3. Division 9 Section 092900 - Gypsum Board for fiber cement backer board at restroom wet walls.
- 4. Division 9 Section 093000 – Ceramic Tile at restroom walls and shower accessories.
- 5. Division 10 Section 102113.19 - Plastic Toilet Compartments for attachment and coordination of openings between compartment panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Full size, for each exposed product and for each finish specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
  - 1. Unless noted otherwise Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

- A. Owner-Furnished Materials:
  - 1. Shower Curtains and Curtain Clips.

2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Grab Bar - 1
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Bobrick Washroom Equipment, Inc.
    - b. Grab Bars B-6806.
  - 2. Mounting: Flanges with concealed fasteners.
  - 3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, No. 4 finish (satin).
  - 4. Outside Diameter: 1-1/2 inches.
  - 5. Configuration and Length: As indicated on Drawings.
- B. Toilet Tissue (Roll) Dispenser - 2
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Bobrick Washroom Equipment, Inc.
    - b. ConturaSeries Toilet Tissue Dispenser B-4288.

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Heavy duty spindels.
5. Capacity: Designed for 5 ¼" diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Seat-Cover Dispenser - 3

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. Contura Series Surface mounted Seat-Cover Dispenser B-4221.
2. Mounting: Surface mounted.
3. Minimum Capacity: 250 seat covers.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

D. Recessed Paper Towel Dispenser and Waste Receptacle - 4

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B – 43944 Contura Series Recessed Paper Towel Dispenser and Waste Receptacle.
2. Cabinet — 18-8, type-304, 22-gauge stainless steel. All-welded construction. Exposed surfaces have satin-finish. One-piece, seamless construction.
3. Flange — 18-8, type-304, 22-gauge stainless steel with satin-finish. Drawn, one-piece, seamless construction. Radius on corners and return edges complement corners and edges of door and waste receptacle.
4. Door — 18-8, type-304, 18-gauge stainless steel with satin-finish. Drawn, one-piece, seamless construction. Radius on corners and edges of door match side edges of waste receptacle. Secured to cabinet with a full-length stainless steel piano-hinge. Equipped with a stainless steel cable door-swing limiter and flush tumbler lock.
5. Paper Towel Dispenser — 18-8, type-304, 22-gauge stainless steel with satin-finish. Cabinet inside equipped with 90° return towel guide angle to prevent paper towels from falling forward out when door is opened for servicing. Rounded towel tray has hemmed opening to dispense paper towels without tearing. Waste receptacle shall have a formed, 18-gauge, one-piece, seamless, removable front panel with top edge hemmed. Capacity: 600 C-fold or 800 multifold paper towels.
6. Waste Receptacle — 18-gauge, one-piece, seamless, removable front panel with top edge hemmed. Unit equipped with LinerMate trash liner holder fabricated with molded plastic trash liner holder sleeve and a 20-gauge, U-shaped support

strap; riveted construction. Liner holder shall have an arc at front and same shape as inside of waste receptacle area. LinerMate facilitates installation and removal of disposable trash liners and retains liner inside waste receptacle. Capacity of waste receptacle shall be 15.0-gal.

E. Recessed Paper Towel Dispenser and Waste Receptacle - 5

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B – 4369 Contura Series, Recessed Paper Towel Dispenser and Waste Receptacle.
2. Cabinet — 18-8, type-304, 22-gauge stainless steel. All-welded construction. Exposed surfaces have satin-finish.
3. Flange — 18-8, type-304, 22-gauge stainless steel with satin-finish. Drawn, one-piece, seamless construction. Radius on corners and return edges complement corners and edges of door and waste receptacle.
4. Door — 18-8, type-304, 22-gauge stainless steel with satin-finish. Drawn, one-piece, seamless construction. Front of door has same degree of arc as front of waste receptacle. Secured to cabinet with a full-length stainless steel piano-hinge. Equipped with a flush tumbler lock keyed like other Bobrick washroom accessories
5. Paper Towel Dispenser — 18-8, type-304, 22-gauge stainless steel with satin finish. Cabinet inside equipped with 90° return towel guide angle to prevent paper towels from falling forward out when door is opened for servicing. Rounded towel tray has hemmed opening to dispense paper towels without tearing. Capacity: 350 C-fold or 475 multifold paper towels.
6. Waste Receptacle — Waste receptacle shall have a formed, one-piece, seamless, removable front panel with top edge hemmed. Unit equipped with LinerMate trash liner holder fabricated with molded plastic trash liner holder sleeve and a 20-gauge stainless steel, U-shaped support strap; riveted construction. Trash liner holder shall have an arc at front and same shape as inside of waste receptacle area. Capacity of waste receptacle shall be 3.0-gal.

F. Paper Towel (Folded) Dispenser - 6

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-4262 Paper Towel Dispenser, Contura Series.
2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at sides or front.



G. Bathroom Pivoting Mirror With Frame – 7

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Gatco Fine Bathware – Max Collection
  - b. Pivoting Framed Large Rectangle Mirror (Beveled) #4849FS.
  - c. Chrome Finish - 24.5" x 32.5".
2. Installation: Per Manufacturers written instructions.

H. Automatic Liquid-Soap Dispenser - 8

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Sloan Valve Company.
  - b. Model ESD-200.
2. Description: Automatic dispenser with infrared sensor to detect presence of hands; 120 VAC plug-in transformer.
3. Mounting: Deck mounted on vanity.
4. Capacity: 27 fl. oz.
5. Materials: liquid soap dispenser has a chrome plated cast brass spout assembly with sensor housing.
6. Refill Indicator: LED indicator.

I. Surface - Mounted Soap Dispenser – 9

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-4112 Contura Series, Surface – Mounted Soap Dispenser
2. Description: Body is 18-8, Type-304, 20-gauge stainless steel with satin-finish. Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps. Valve shall be operable with one hand and with less than 5 pounds of force to comply with accessible design guidelines. Radius on corners and edges of soap dispenser shall complement other Bobrick ConturaSeries washroom accessories. Container body and back plate shall be epoxy-sealed to prevent warping and leakage. Soap dispenser shall have concealed, vandal-resistant mounting. Locked, hinged stainless steel lid for top filling shall require special key to open. Capacity shall be 40-fl oz.

J. Baby Changing Station – 10

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Gamco Commercial Restroom Accessories
  - b. Baby Changing Station model BCS-1 or -2
2. Specification: Made of High-density polyethylene. Unit shall be surface-mounted. Equipped with a pneumatic cylinder for controlled opening and closing of bed. No hinge structure shall be exposed on interior or exterior surfaces. Bed shall be secured to back plate with a concealed, full-length steel-on-steel hinge. 11-gauge steel mounting plates with mounting hardware included. Unit shall have Microban antimicrobial embedded into plastic material. Unit shall conform to ANSI A117.1 Accessible and Usable Buildings and Facilities, ASTM F2285-04 (formerly ASTM PS125) Standard Safety Performance Specification for Diaper Changing Tables for Commercial Use, ANSI Z535.4 Product Safety Signs and Labels, ASTM G21 Antifungal and ASTM G22 Antibacterial Standards. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses. Unit shall have a universal instruction graphics and safety messages in 6 languages and braille.
- a. Size: 35-1/4" W x 20" H x 4" D (closed)
  - b. Color: To be selected by Architect.
  - c. Installation: Install per manufacturer's written instructions.
  - d. Warranty: Manufacturer's 5-year limited warranty on materials and workmanship.

K. Cap and Coat Hook - 11

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-682 Cap and Coat Hook
2. Description: Double-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.4 UNDERLAVATORY GUARDS

A. Underlavatory Shield - 12

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Truebro – Protective Lavatory Enclosure, White
2. Description: Lav Shield is designed to be used in combination with ADA conforming 20" x 18" wall-hung china lavatories with waste outlets a maximum of 8.5" from wall, covering the water supply and drain piping assemblies and preventing direct contact with and burns from piping. Field scribe to allow 10"

- clearance at finish floor. Mounting screws are to be stainless steel. Drill additional holes as needed. Install per Manufacturer's written requirements.
3. Material and Finish: Antimicrobial, molded plastic, white.

## 2.5 CUSTODIAL ACCESSORIES

### A. Shelf, Mop and Broom Holder – 13

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-224 x 36 Shelf, Mop and Broom Holder.
2. Description: Unit with holders.
3. Length: 36 inches.
4. Shelf: 36 inches x 8 inches.
5. Hooks: 3.
6. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
7. Material and Finish: Stainless steel, No. 4 finish (satin).

## 2.6 SHOWER ACCESSORIES

### A. Shower Curtain Rod - 14

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-6107 Heavy-Duty Shower Curtain Rod
2. Curtain Rod — 18-8, Type-304, 20-gauge stainless steel tubing with satin finish. 1" outside diameter. Lengths 60".
3. Flanges — 18-8, Type-304, 20-gauge stainless steel with satin finish. Drawn, one-piece, seamless construction.

### B. Folding Shower Seat - 15

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-517 or B-518 Folding Shower Seat
2. Seat — 2" thick overall with 1-1/2" thick, closed-cell polyurethane foam padding mounted on 1/2" thick plywood. Covered in white naugahyde (water-resistant, reinforced vinyl fabric).

3. Frame — 18-8, type-304 stainless steel with satin finish. 16-gauge, 1-1/4" square members and 18-gauge, 1" diameter tubing.
4. Mounting Flanges (2) — 18-8, type-304, 3/16" thick stainless steel with satin finish. 3" diameter with three mounting screw holes.
5. Baseplate — 18-8, type-304, heavy-gauge stainless steel. Spring — 17-7, type-301, 24-gauge stainless steel. Spot-welded to baseplate.
6. Guide Bracket — 18-8, type-304, 16-gauge stainless steel with satin finish.

C. Robe Hook - 16:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Bobrick Washroom Equipment, Inc.
  - b. B-672 Robe Hook
2. Description: Double-prong unit.
3. Flange & Support Arm — 18-8, type-304, 22-gauge stainless steel. Concealed, 18-gauge stainless steel mounting bracket. All-welded construction. Secured to wall plate with a stainless-steel setscrew.
4. Concealed Wall Plate — 18-8, type-304, 19-gauge stainless steel.
5. Cap — 18-8, type-304, 14-gauge stainless steel. Welded to the support arm.

D. Recessed Soap Dish will be called out in Section 093000 - Ceramic Tile specification.

E. Shower Curtains and Stainless-steel Rings supplied by Owner.

## 2.7 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units' level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION 102800

CONTRACT # 19-S-04

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

### 1.5 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated. Refer to Section 104416 - Fire Extinguishers for portable fire extinguisher information.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

### 1.6 SEQUENCING

- A. Apply decals or vinyl lettering on field-painted fire-protection cabinets after painting is complete.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Guardian Fire Equipment, Inc.
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Larsens Manufacturing Company.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Center glass panel with frame.
- H. Door Glazing: Clear annealed float glass.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
  - 1. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
  - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
    - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet door.
      - 2) Application Process: Decals or Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Red.
      - 4) Orientation: Vertical.
- K. Materials:
  - 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
    - a. Finish: Baked enamel or powder coat.

- b. Color: Clear Anodic or Satin Aluminum color.
- 2. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.

### 2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply decals or vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413

This page is intentionally left blank.



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers where noted on the plans.
- B. Refer to Section 104413 for semi-recessed Fire Protection Cabinets.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

### 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Amerex Corporation.
    - b. Guardian Fire Equipment, Inc.
    - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - d. Larsens Manufacturing Company.
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Regular Dry-Chemical Type Insert drawing designation: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with sodium bicarbonate-based dry chemical in manufacturer's standard enameled container.
- C. Clean-Agent Type in Steel Container: UL-rated 2-A:10-B:C, 14-lb nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.

### 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
  - 1. Mounting Brackets: 40 inches above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 WORK INCLUDED AS SHOWN ON THE CONSTRUCTION DOCUMENTS

- A. Decals at accessible entry.
- B. Unisex restroom door and Wall signage as detailed on the drawings.
- C. Interior exit path of travel signs as detailed on the drawings.

### 1.3 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.
- B. Section 101423.13 – Room-Identification Signage.

### 1.4 SUBMITTALS

- A. Submit the following in accordance with Section 01300.
- B. Product Data: Indicate type, style, color and method of attachment.
- C. Samples: Each type of sign finish.
- D. Shop Drawings: Submit shop drawings for fabrication and erection of specialty signs. Include plans, elevations and large-scale details of sign wording and lettering layout. Show anchorages and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.

### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Include installation template, adhesive and installation instructions.

## PART 2 – PRODUCTS

### 2.1 ENTRY DECALS

- A. Provide minimum 4" square decals with international handicapped symbol white on blue background with white border, applied to glass at accessible entry doors.

## 2.2 RESTROOM SIGNAGE

- A. Toilet Room Wall and Door Symbols and Signage: as noted and shown and detailed on the construction drawings.
  - 1. 1/4" thick x 12" w/ international unisex symbol and "UNISEX" in contrasting color to background. Black and White.
  - 2. Raised image sign of non-glare matte finish plastic injection molded plate with 1/32" raised image relief area. Symbols are 8"x8" with 5/16" radius corners. Background color is Black with White 5/8" Helvetica Medium upper-case letters followed by Grade 2 Braille. Mounting shall be International symbol for Unisex (Men / Women).

## 2.3 MISCELLANEOUS MATERIAL

- A. Fasteners: Unless otherwise indicated, use concealed fasteners fabricated from metals that are non-corrosive to either the sign material or the mounting surface.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install signs level, plumb, true to line, and with sign surfaces free from distortions and defects.
- B. Entry Signs: Install in locations as approved by Architect.
- C. Restroom Signage: Locate sign units and accessories where shown or scheduled, using mounting methods of type described and in compliance with the manufacturer's instructions.
  - 1. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in of appearance.
  - 2. Wall-Mounted Panel Signs: Attach panel signs to wall or door surfaces using the methods indicated below:
    - a. Silicone Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular or porous surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
    - b. Mechanical Mounting: Mechanical attached unit to subsurface as per sign manufacturer's recommendations.

3.2 CLEANING AND PROTECTION:

- A. At completion of the installation, clean soiled sign surface in accordance with the manufacturer's instructions. Protect units from damage until acceptance by Fleming.

END OF SECTION 104450

This page is intentionally left blank.



## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.02 SUMMARY

- A. Provide custom size paired panel partitions, vinyl wall covering, pocket doors and ceiling track for manual operation.
- B. Related Section:
  - 1. Section 033000 - Cast-in-Place Concrete: concrete footings and for concrete slab tolerances required.
  - 2. Section 051200 - Structural Steel: overhead track structural support including pre-punching of support members by structural steel supplier per operable partition supplier's template.
  - 3. Section 055000 - Metal Fabrication: miscellaneous angles and fabrications.
  - 4. Division 9 Sections for wall, soffit and ceiling framing at head and jambs.

### 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
- C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

### 1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
  - 1. STC: Partition which have been tested by the manufacturer and rated STC 52 in accordance with E90.
  - 2. Finish: Class III in accordance with ASTM E84.

### 1.05 SUBMITTALS

- A. Procedure: In accordance with Section 013300.
- B. Product Data: Material descriptions, construction details, finishes, installation

details, and operating instructions for each type of operable partition, component, and accessory specified.

- C. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- D. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
- E. Samples: Provide Color samples demonstrating full range of finishes available to architect. Verification samples will be available in same thickness and material indicated for the work.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in the manufacturer's standard protective packaging.
- B. Store products indoors in dry locations.
- C. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- D. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.
- E. Follow installation instructions of the manufacturer.

#### 1.07 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Warranty period: Two (2) years.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Panel Partitions: Modernfold 'Acousti-Seal Model 932" manually operated paired panel operable partition or equal.
  - 1. Provide with pocket door where shown on Drawings; Modernfold "Type II" or equal.

## 2.02 OPERATION

- A. Acousti-Seal #932: Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals.
- B. Final Closure:
  - 1. Horizontally expanding panel edge with removable crank.

## 2.03 MATERIALS AND FABRICATION

- A. Panels:
  - 1. Nominal 3-inch thick, custom size panel width. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin
  - 2. Panel Skin: Minimum 22 gage roll-formed steel wrapping around the panel edge. Panel skins shall be lockformed and welded directly to the frame for unitized construction.
  - 3. Panels Hinges: SOSS invisible laminated hinge with anti-friction segments mounted between each heat-treated link. Hinge to be attached directly to panel frame. Welded internal hinge bracket shall support the hinge and allow for adjustment of hinge plates. Concealed hinges or hinges mounted into panel edge or vertical astragal are not acceptable.
  - 4. Panels shall not require or permit trim on the vertical edges and shall create a minimal groove at panel-to-panel joints.
  - 5. Panel Weight: 11 lb./sq. ft.
  - 6. Finish: Panel finish shall be factory applied, Class "A" rated material.
    - a. Finish: Vinyl wall covering, see sheet A-5.1 Interior Finish Schedule for Pattern and Color.
- B. Sound Seals:
  - 1. Vertical interlocking sound seals between panels (astragals) of a reversible tongue and groove configuration shall be required in each panel edge, permitting universal panel operation. Astragals shall be roll formed steel for maximum durability, and fire resistance. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.
  - 2. Horizontal top seals shall be continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion and no mechanically operated parts.
  - 3. Horizontal Bottom Floor Seals: Automatic operable seals providing nominal 2-inch operating clearance with an operating range of plus 0.50-inch to minus 1 .50-inch and shall automatically drop as panels are positioned without the need for tools or cranks.
- C. Suspension System: Modernfold #17 Suspension System or equal.

1. Track shall be minimum 11 gage roll-formed steel. Track shall be capable of either direct mounting to a wood header or shall be supported by adjustable steel hanger brackets connected to structural support by pairs of 0.38-inch diameter threaded rods. Brackets must support the load bearing surface of the track.
  2. Exposed track soffit shall be all steel, integral to the track and prepainted off white. Wood or aluminum soffits are not permitted.
  3. Each panel (except hinged panels) shall have one all-steel trolley with steel-tired ball-bearing wheels. Non-steel tires are not acceptable.
- D. Available Accessories/Options:
1. Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc., with same construction, finish, and appearance as the adjacent panels.
  2. Finished end caps.
  3. Intersecting partition interface.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Floor in immediate area of panel partition installation shall be level to within 1/8 inch, plus or minus, in 10 feet, non-accumulative.
- B. Confirm track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to floor.
- C. Verify that surfaces to receive materials are satisfactory for their installation. If unsatisfactory conditions exist, do not commence installation until such conditions have been corrected.

#### 3.02 INSTALLATION

- A. Install panel partitions in accordance with ASTM E557, manufacturer's instructions, as shown on the Drawings and approved Shop Drawings.
- B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
- C. Partitions shall be installed by an authorized representative of the partition manufacturer.
- D. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- E. Upon completion of installation, panel partitions shall operate smoothly.
- F. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

3.03 CLEANING

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and Installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.04 ADJUSTING

- A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.05 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.06 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION 106250

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Division 00 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

### 1.2 SUMMARY

- A. Scope: Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for exterior sun control devices as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:
  - 1. Modular, shop-fabricated, metal sun shades to mount on exterior wall surfaces, including, but not limited to, Cement Plaster over steel framing and insulated metal wall panels.
- C. Related Sections: Related sections include, but shall not be limited to, the following:
  - 1. Section 051200 - Structural Steel Framing.
  - 2. Section 061000 - Rough Carpentry.
  - 3. Section 076000 - Flashing and Sheet Metal.
  - 4. Section 079000 - Joint Protection.
  - 5. Section 092400 - Cement Plastering.

### 1.3 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
- B. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 611, "Voluntary Specifications for Anodized Architectural Aluminum (Revised)."
  - 2. AAMA 2604, "Voluntary Specification, Performance Requirements, and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels."
- C. American Society of Civil Engineers (ASCE):

1. ASCE 7, "Minimum Design Loads for Buildings and Other Structures" (copyrighted by ASCE, ANSI approved).
- D. American Welding Society (AWS):
1. AWS D1.1, "Structural Welding Code - Steel" (copyrighted by AWS, ANSI approved).
  2. AWS D1.2, "Structural Welding Code - Aluminum" (copyrighted by AWS, ANSI approved).
  3. AWS D1.3, "Structural Welding Code - Sheet Steel" (copyrighted by AWS, ANSI approved).
- E. ASTM (ASTM):
1. ASTM A 36/A 36M, "Standard Specification for Structural Steel."
  2. ASTM A 500, "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
  3. ASTM A 653/A 653M, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process."
  4. ASTM A 792/A 792M, "Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process."
  5. ASTM B 26/B 26M, "Standard Specification for Aluminum-Alloy Sand Castings."
  6. ASTM B 209/B 209M, "Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate."
  7. ASTM B 221/B 221M, "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes."
- F. National Association of Architectural Metal Manufacturers (NAAMM):
1. NAAMM MFM, "Metal Finishes Manual."
- G. South Coast Air Quality Management District (SCAQMD):
1. SCAQMD Rule #1168, "Adhesive and Sealant Applications," including most recent amendments.
- H. SSPC: The Society for Protective Coatings (SSPC):
1. SSPC Paint 12, "Paint Specification No. 12 Cold-Applied Asphalt Mastic (Extra Thick Film)."
- 1.4 SYSTEM DESCRIPTION
- A. General: Work shall be designed to perform under conditions specified herein or required by site conditions with no permanent damage to or deforming of the louver blades or assembly, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.



B. Performance Requirements:

1. Exterior sun control devices shall be factory-engineered to withstand all applicable design loads, including, but not limited to, dead loads, live loads, and snow loads. Minimum design loads shall be calculated to comply with ASCE 7, or with requirements of authorities having jurisdiction.
2. Exterior sun control devices shall be factory-engineered to withstand wind loads, acting inwards and outwards. Minimum design loads shall be calculated to comply with ASCE 7, or with requirements of authorities having jurisdiction.
3. Exterior sun control devices shall be factory-engineered to withstand seismic loads. Minimum design loads shall be calculated to comply with ASCE 7, or with requirements of authorities having jurisdiction.

C. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures in engineering, fabricating, and installing exterior sun control devices to prevent buckling, opening of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 °F, ambient; 180 °F, material surfaces.

D. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.

1.5 SUBMITTALS

A. General: See Section 013300 - Submittal Procedures.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, device components and finishes.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data, including, but not limited to, layout, dimensions, spacing of components, and anchorage and installation details.

1. Submit shop drawings which have been signed and sealed by a professional engineer licensed to practice in the State in which the Project is located.

D. Samples:

1. Submit samples for initial color selection. Submit samples of each specified finish. Submit samples in form of manufacturer's color charts showing full range of colors and finishes available. Where finishes involve normal color variations, include samples showing the full, range of variations expected.

2. Upon color selection submit samples for verification purposes. Submit 10 inch by 10 inch minimum size sample of sun control panel illustrating design, fabrication workmanship, and selected color coating. Additional samples may be required to show fabrication techniques and workmanship.

E. Quality Control Submittals:

1. Design Data: For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the professional engineer who was responsible for their preparation.
2. Qualification Data: Submit documentation demonstrating capability and experience in performing installations of the same type and scope as specified by this Section. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
3. Certificates: Submit certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

F. Maintenance Data: Submit maintenance data for exterior sun control devices to include in operation and maintenance manuals specified in Division 01 - General Requirements.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of exterior sun control devices of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing exterior sun control devices similar in type and scope to that required for this Project, and shall be approved by the manufacturer.
3. Engineer Qualifications: The engineer shall be a professional engineer legally authorized to practice in the jurisdiction where the Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of products similar to this Project in material, design, and extent, and that have a record of successful in-service performance.
4. Welder Qualifications: Qualify welding processes and welding operators in accordance with AWS standard qualification procedures. Operators shall carry proof of qualification on their persons.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Welding Standards: Comply with applicable provisions of AWS D1.2.

- D. Single Source Responsibility: Obtain exterior sun control devices from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

#### 1.8 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to fabrication of the work and preparation of shop drawings, to ensure proper fitting of the work. Show recorded measurements on final shop drawings. Notify the Owner and the Architect, in writing, of any dimensions found which are not within specified dimensions and tolerances in the Contract Documents, prior to proceeding with the fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the work.

#### 1.9 WARRANTY

- A. General: See Section 017700 - Closeout Procedures.
- B. Special Warranty: Provide manufacturer's standard form outlining the terms and conditions of their standard limited warranty:
  - 1. Surface Finish Warranty: One year limited warranty.
  - 2. Material Integrity Warranty: One year.
- C. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis of Design: Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect will be the sole judge of the basis of what is equivalent.

#### 2.2 MATERIALS

A. Aluminum:

1. Extruded Shapes: ASTM B 221/B 221M, Alloy 6063, Temper T6.
2. Sheet: ASTM B 209/B 209M, Alloy 6063, Temper T6.
3. Castings: ASTM B 26/B 26M, Alloy 319.

B. Anchors and Inserts: Provide type, size, and material required for loading and installation indicated. Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors. Provide types of size and spacing as recommended by manufacturer for specific condition and as detailed on final shop drawings.

C. Bituminous Paint: Provide cold-applied asphalt mastic complying with SSPC Paint 12, except containing no asbestos fibers.

## 2.3 MANUFACTURED UNITS

A. Exterior Sun Control Device:

1. Type: Provide exterior sun control device consisting of modular framed panels with indicated infill and outriggers for mounting above windows and doors on exterior wall surfaces, as indicated on the Drawings.

- a. Material: Aluminum.
- b. Infill: Louver.
- c. Panel Sizes: As indicated on the Drawings.
- d. Panel Infill: Inclined, flanged louvers welded to support cross bars.

2. Support System: Provide means for support of exterior sun control devices. System shall be designed to resist applicable dead, live, wind, and seismic loads. Provide type as indicated on the Drawings. Provide welded fabrication as detailed and dimensioned on the Drawings and final shop drawings. Provide size as required to provide sufficient structural support.

B. Basis of Design: Hansen Architectural Systems, Inc.; 5500 SE Alexander Street, Hillsboro, OR 97123; Toll Free Tel: 800-599-2965, Fax: 503-356-8478; Web: [www.aluminumrailing.com](http://www.aluminumrailing.com).

## 2.4 FABRICATION

A. Assemble exterior sun control devices in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1. Exterior sun control devices shall be assembled entirely by welding.
2. Maintain equal blade spacing to produce uniform appearance.

3. Include supports, anchorages, and accessories required for complete assembly.
4. Join fixed blades, fascia, outriggers, mounting plates, etc., with fillet welds concealed from view, unless size of assembly makes concealed, bolted connections between frame members necessary.

## 2.5 FINISHES

- A. General: Comply with NAAMM MFM for recommendations for applying and designating finishes.
  1. Variations in appearance of abutting or adjacent units are acceptable if they are within one-half of the range of final samples. Noticeable variations in the same unit are not acceptable.
  2. Variations in appearance of other components are acceptable if they are within the range of final samples and are assembled or installed to minimize contrast.
- B. Aluminum Finish: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  1. Class I Clear Anodized Finish: AA-M12-C22-A41 (Mechanical Finish: as fabricated, non-specular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil complying with AAMA 611.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
  1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

### 3.2 PREPARATION

- A. Coordinate installation of exterior sun control devices with provision of exterior wall system, window framing system, curtain wall system, etc., to ensure proper structural support is provided, attachment of exterior sun control devices is compatible with substrate, and weathertightness of exterior envelope is maintained.
- B. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchors, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.

### 3.3 INSTALLATION

- A. Install exterior sun control devices in accordance with reviewed product data, final shop drawings, the Drawings, and manufacturer's written installation instructions.
  - 1. Insulate dissimilar metals to prevent electrolysis with bituminous paint or non-absorptive gasket to prevent contact.
  - 2. Allow for thermal expansion and contraction of metal components.
  - 3. Install exterior sun control devices plumb, level, free from distortion, and aligned with building elements and adjacent construction.
  - 4. Do not install bent, bowed, or otherwise damaged devices. Remove damaged components from site and replace.
  - 5. Attach devices with appropriate fasteners for secure, permanent installation.

### 3.4 ADJUSTING AND CLEANING

- A. Touch-Up: Immediately after installation, touch-up scratched, nicked, abraded, chipped, or otherwise damaged areas of the finish so as to be unnoticeable. Performance of touch-up shall be in all ways equal to that of the factory finish.
- B. Cleaning: Wash to remove any deleterious material from finished surfaces immediately. Cleaning and protective methods shall be carefully selected, applied, and maintained so that finishes shall not become uneven or otherwise impaired as a result of unequal exposure to light and weathering conditions.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to the Installer that shall ensure that the exterior sun control devices shall be without damage at time of Completion.

END OF SECTION 107113

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes 30' tall ground-set flagpole made from aluminum.

1.3 RELATED WORK

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division I of these Specifications.
  - 1. Section 321320 - Concrete Walks, Ramps and Site Work

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide Flagpoles capable of withstanding the effects of wind loads as determined according to NAAMM FP, "Guide Specifications for Design of Metal Flagpoles", or to specified wind speed, whichever is more stringent.
- B. Flagpole Design: Base Design on maximum standard size nylon sign suitable for use with the pole or flag size indicated, whichever is more stringent.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Delegated-Design Submittal: For flagpoles.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Source: Obtain each flagpole as a complete unit from an approved single source, including fittings, accessories, bases, and anchorage devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.
- B. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
  - 1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is 110 mph.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpole: Commercial-grade with Internal Halyard – Revolving, Reinforced with Winch, tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063 -T6, with a minimum wall thickness of .188 inch.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Concord American Flagpole – Titan Series – IWW30D71 Internal Reinforced with Winch.  
4150 Kellway Circle  
Addison TX 75001  
(800) 527-3902  
[www.concordamericanflagpole.com](http://www.concordamericanflagpole.com)
- B. Exposed Height: 30 feet.
- C. Sleeve for Aluminum Flagpole: 16 gauge galvanized corrugated steel foundation sleeve, made to fit flagpole, for casting into concrete foundation.



1. Grounded Sleeve assembly with lightning spike.
- D. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
  1. 0.063-inch spun aluminum, finished to match flagpole.
- E. internal Revolving Truck Assembly: Cast aluminum revolving truck with sealed stainless steel bearing assemblies, aluminum spindle, cast brass exit bushing and removable hood.
- F. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
  1. Halyard Flag Snaps: Stainless-steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.
- G. Flashing Collar: Provide Spun Aluminum Collar to match flagpole.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- B. Sand: ASTM C 33/C 33M, fine aggregate.
- C. Elastomeric Joint Sealant: Single-component nonsag urethane and joint sealant complying with requirements in Section 079200 "Joint Sealants."
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Concrete: Comply with requirements of Division 03 Section 033053 "Miscellaneous Cast-in-Place Concrete".

#### 2.5 ALUMINUM FINISHES

- A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.
  1. Color: Natural – satin finish.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
- D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
- E. Place concrete, as specified in Section 033053 "Miscellaneous Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

#### 3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107516

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Dishwashers.
  - 2. Garbage Disposal.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Field quality-control reports.
- C. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.2 DISHWASHERS

- A. Dishwasher - DW Complying with AHAM DW-1.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. General Electric Company (GE Appliances).
  - 2. Type: Built-in undercounter. Accessible counter height at 34" maximum.
  - 3. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
  - 4. Front Panel: Manufacturer's standard Stainless steel.

### 2.3 GARBAGE DISPOSAL

- A. Disposer – GD Garbage Disposal
  - 1. Manufacturer: Subject to compliance with requirements, provide products by the following:
    - a. In-Sink-Erator "Evolution Essential"
  - 2. Type: Multi-Grind, continuous Feed with with Soundseal Technology.
  - 3. Warranty – Six year.
  - 4. 3/4 HP, 120V/1Ø Motor, with on/off wall switch.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After installation, start units to confirm proper operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 113100

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

1. Quartz agglomerate countertops.
2. Quartz agglomerate backsplashes.
3. Quartz agglomerate end splashes.
4. Quartz agglomerate apron fronts.

- B. Related work:

1. Documents affecting work of this Section include, but are necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 06200: Finish Carpentry
3. Section 06402: Interior Architectural Woodwork

### 1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show countertop drawing indicating the materials, finishes, edge and backsplash profiles, joint locations, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view. Include Quartz and color-matched sealant.

## PART 2 - PRODUCTS

### 2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.
  1. Manufacturers: Subject to compliance with requirements, provide products by the following.

- a. Cambria  
1-866-CAMBRIA  
www.cambriusa.com

2. Colors and Patterns: As selected by Architect from manufacturer's full range. See Interior Drawings Sheet A5.1 Interior Finishes for selections.

- B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

## 2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

- 1. Front: Straight, slightly eased at top and bottom.
- 2. Backsplash: Straight, slightly eased at corner.
- 3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch-thick, quartz agglomerate with front edge built up with same material.

D. Backsplash and End Splash: 3/4-inch-thick, quartz agglomerate, 4" high.

E. Joints: Fabricate countertops without joints.

F. Cutouts and Holes:

- 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

## 2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."



PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- B. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions.
- C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- D. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- E. Install aprons to backing and countertops with adhesive.
- F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- G. Apply color-matched sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Bicycle racks.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for in concrete footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For units with factory-applied finishes.
- C. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.
- D. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings manufactured with preservative-treated wood.
  - 1. Indicate type of preservative used and net amount of preservative retained.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

## PART 2 - PRODUCTS

### 2.1 LOOP BICYCLE RACKS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. American Bicycle Security Company.
  2. Bison, Inc.
  3. Columbia Cascade Company.
- B. Bicycle Rack Construction:
1. Frame: Steel.
    - a. Pipe OD: Not less than 2-3/8 inches – 2" Schedule 40.
  2. Style: Loop Bicycle Racks and detailed.
    - a. Overall Height: 36".
    - b. Overall Depth: As indicated.
    - c. Capacity: Designed to accommodate no fewer than 5 and 13 bicycles.
  3. Security: Designed to lock wheel and frame.
  4. Accessories: Base covers for each pipe and tubing anchored end.
  5. Installation Method: Cast in concrete as indicated.
- C. Steel Finish: Galvanized.

### 2.2 MATERIALS

- A. Steel and Iron: Free of surface blemishes and complying with the following:
1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
  2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
  3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
  4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513/A 513M, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
  5. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.

### 2.3 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- E. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

### 2.4 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### 2.5 STEEL AND GALVANIZED-STEEL FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

### 2.6 IRON FINISHES

- A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored and positioned at locations indicated on Drawings.
- D. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 129300

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Level 3 - Bullet resistant composite fiberglass sheeting at Lobby Reception Desk as detailed on the drawings.

- B. Related Sections:

- 1. Plastic Laminate Faced Architectural Cabinets - Section 064116.
- 2. Solid Surface Countertops – Section 123661.16.
- 3. Glazing - Section 088000.
- 4. Bullet Resistant Deal Tray installed at Reception Counter refer to Section 130750

### 1.3 REFERENCE

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment & ASTM E119-98- Standard Test Methods for Fire Tests of Building Construction and Materials, NIJ Standard 0108.01-(National Institute of Justice) Standard for Ballistic Resistant Protective Materials, MIL-P-46593A-Numerical simulation of ballistic impact on composite laminates, MIL-STD-622F- V50 Ballistic Test for Armor.

### 1.4 SUBMITTALS

- A. The following shall be submitted by the manufacturer in accordance with Section 013300 and any Special Contract Requirements: Submit for approval prior to fabrication: samples, test reports, shop drawings (dimensioned profiles including anchorage and finishes), product specifications, test reports (current UL Listing Verification & UL 752 Test Results as provided by Underwriters Laboratories), and printed data in sufficient detail to indicate compliance with the contract documents. ASTM E119-98 One Hour Fire Rating of Building and Construction Materials. Manufacturer's Instructions for installation of Bullet Resistant Fiberglass Panels. All required submittals shall be approved prior to installation.

### 1.5 DESIGN

- A. Through the design, manufacturing techniques and material application the Bullet Resistant Fiberglass shall be of the "non-ricochet" type. This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

### 1.6 QUALITY ASSURANCE

- A. Manufacturer shall be a Company that specializes in manufacturing products of the specified type with a minimum of three years' experience. Installer shall be a Company that specializes in product type.

### 1.7 DELIVERY, STORAGE & HANDLING

- A. Delivery of the materials to the project with the manufacturer's Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations set by manufacturer. Do not install products that are under conditions outside these limits.

### 1.8 WARRANTY

- A. All materials shall be warranted against defects for a period of 1 year for the date of receipt at the project site. All workmanship, shall be installed by a certified installer, shall be guaranteed against defects for a period of 1 year from the date of installation. Certificates of warranty shall be provided at project completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Total Security Solutions, Inc, 170 National Park Drive, Fowlerville, MI 48836, 866-930-7807. Jim Richards [info@demandtss.com](mailto:info@demandtss.com), [www.tssbulletproof.com](http://www.tssbulletproof.com)

### 2.2 BULLET RESISTANT COMPOSITE (FIBERGLASS) MATERIAL

- A. Composite Panel Product: TSS Total Armor Ballistic Resistant Fiberglass Panel TA-3. The panels shall be made of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets.



Fabrication: the technique and materials used shall provide the controlled internal delamination to permit the encapture of the penetrating projectile with Carbide grit edge saw blades. Exposed fasteners shall be non-corrosive.

1. Product: TA-3
2. Test Criteria / Performance Level: UL 752/Level 3 (UL Listed)
3. Ballistic Data: 357 Mag, 158Gr. 1395 ft. sec.
4. Nominal Thickness: 1/2 inch
5. Lbs. / Sq. Ft.: 4 Lbs.

### 2.3 SECURITY LEVEL

- A. The TSS Bullet Resistant Fiberglass will be rated and tested for UL 752 and NIJ—0108.01 at the Level 3.

## PART 3 - EXECUTION

### 3.1 CONTRACT DOCUMENTS

- A. Prior to installing the bullet resistant material, the contractor shall verify that all supports have been installed as required by the contract documents and architectural drawings, and approved shop/CAD drawings.

### 3.2 INSTALLATION

- A. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings. Prepare all surfaces per recommendations of manufacturer. Install in accordance with manufacturer's instructions and UL 752. Set all equipment plumb. Fire rated assemblies in accordance with NFPA80.
- B. Bullet Resistant Fiberglass panels can be installed using industrial adhesive, mastic, screws and bolts. Method of application shall maintain bullet resistive rating at junctures with concrete floor, door and window frames and other penetrations. Installation tolerance shall not exceed 1/16<sup>th</sup> of an inch for squareness, alignment, twist and plumb. Install hardware as specified.
- C. Field painting is specified in Section 09900.

### 3.3 JOINTS

- A. All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer shall be 4" (2" on each panel) or a 2" overlap minimum. No rigid high-density material shall be used adjacent to the panel's inner surface, allow 1/4" gap.

- B. Bullet Resistant Fiberglass Panels shall be installed in accordance with manufacturer's printed recommendations, including adhering to industrial adhesive, mastic, screws, and bolts. Method of application shall maintain the bullet resistive rating at junctures with concrete floor slabs, the concrete roof slabs, the bullet resistive window frames and all required penetrations.

#### 3.4 INSTALLATION INSPECTION

- A. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements. Clean product and accessories, removing excess sealant, labels and protective covers.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Product Warranty: Applicable warranty shall be issued to owner upon final release of completed project.

END OF SECTION 130700

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Structural-steel framing.
2. Accessories.

- B. Related Sections:

Section 074116 - INSULATED METAL ROOF AND WALL PANELS

Section 074117 – METAL BUILDING ACCESSORIES

- C. General:

1. Unless noted otherwise the Terms "Drawing or Drawings" shall mean the Architect and/or Design Consultant Drawings.
2. Metal Building Systems are a Deferred Submittal for this Project. The Contractor shall provide all labor and material required to design and build a Metal Building System in accordance with the Drawings.
3. This Section shall apply to any Manufacturer and Supplier of Pre-fabricated Metal Building Systems meeting the criteria set forth in the Drawings and in this Section.
4. Sheriff's Substation: The Sheriff's Substation shall be a Metal Framed Building System with Pre-fabricated Metal Panel Roof Deck System. Wall Systems and Exterior Openings shall be attached to the Metal Building Frame as shown on the Drawings.
5. The Sheriff's Substation Tower: The Sheriff's Substation Tower shall be a Painted Shop Fabricated Tube Steel Framed Structure with Pre-fabricated Metal Panel Roof Deck System. Wall Systems and Exterior Openings shall be attached to the Metal Building Frame as shown on the Drawings.
6. Vehicle Storage Building: The Vehicle Storage Building shall be a Metal Framed Building System with Pre-fabricated Insulated Metal Roof and Wall Panel Deck System.

7. Design Basis of each Metal Building System Design is Shown on the Drawings.
8. Metal Building Systems shall match frame spans, slope, clearances and dimensions shown on the Drawings.
9. Columns shall be located as shown on the Drawings.
10. Steel Building Frame type and locations shall match the Drawings with Portal Column locations to be places as shown on the Drawings. Rod Bracing shall be used only where shown on the Drawings.
11. Coordinate interface between Metal Building Systems components with Non-Metal Building System components.

### 1.3 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project site at time and date as requested by the General Contractor.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
- B. Construction Drawings: Provide Two (2) sets of Construction Drawings stamped and signed by a California Licensed Civil or Structural Engineer for submittal to Fresno County Development Services for Plan Check and Building Permit issuance.
- C. Structural Calculations: Provide Two (2) sets of Metal Building Structural Calculations stamped and signed by a California Licensed Civil or Structural Engineer for submittal to Fresno County Development Services for Plan Check and Building Permit issuance.
- D. Shop Drawings: Indicate components of the Metal Building Systems to be provided by other Trades and General Contractor. Include full building plan, elevations, sections, details and attachments to other work. The Contractor shall provide all labor and material for installation of metal or other components not provided by the Metal Building Systems Manufacturer and Installer.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
- C. Material test reports.

- D. Source quality-control reports.
- E. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
  - 1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

#### 1.8 WARRANTY

- 1. Warranty Period: Twenty (20) years from date of Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available Manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. American Buildings Company; a Nucor Company.
  - 2. CBC Steel Buildings; a Nucor Company.
  - 3. Butler Manufacturing.
  - 4. Kirby Steel Buildings.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Metal Building Systems shall be designed by a Licensed California Professional Engineer.
- B. Structural Performance: Metal Building Systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
  - 1. Design Loads: As noted on Drawings.
- C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions in compliance with the 2016 California Building Code.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Wind Loads: Shall comply with the 2016 California Building Code.

## 2.3 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters and rake beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
  - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
- E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
- F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate

- G. framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
- H. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

## 2.4 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
  - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

## 2.5 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
  - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
  - 1. Where required, make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
    - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.



1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  2. Locate and space wall girts to suit openings such as doors and windows.
  3. Provide supplemental framing at entire perimeter of openings, including doors, windows, ventilators, and other penetrations of roof and walls.
- H. Steel Joists: Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.
1. Before installation, splice joists delivered to Project site in more than one piece.
  2. Space, adjust, and align joists accurately in location before permanently fastening.
  3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  4. Joist Installation: Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
  5. Joist Installation: Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for high-strength structural bolt installation and tightening requirements.
  6. Joist Installation: Weld joist seats to supporting steel framework.
  7. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof and sidewalls where shown on the Drawings.
1. Tighten rod and cable bracing to avoid sag.
  2. Locate interior end-bay bracing only where indicated.
- J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.
- ### 3.2 FIELD QUALITY CONTROL
- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports. Provide a minimum of five (5) calendar days notice to the Project Manager for field tasks requiring Special Inspection.
- B. Any Product will be considered defective if it does not pass tests and inspections.

3.3 COORDINATION

- A. The Contractor shall be responsible for Coordination of all Components and Trades to provide a completed Building Envelope in compliance with the Drawings.

END OF SECTION 133419

## PART 1 - GENERAL

### 1.1 GENERAL CONDITIONS

- A. The preceding General Conditions shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall also apply to the following Divisions 21, 22, 23 and 25 of these Specifications and shall be considered a part of those Divisions.

### 1.2 CODES AND REGULATIONS

- A. All work and materials shall be in accordance with current rules and regulations of applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

California Building Code	CCR Title 24, Part 2
California Electrical Code	CCR Title 24, Part 3
California Mechanical Code	CCR Title 24, Part 4
California Plumbing Code	CCR Title 24, Part 5
California Energy Code	CCR Title 24, Part 6
California Fire Code	CCR Title 24, Part 9
Local Codes	

### 1.3 DEFINITIONS

- A. Provide: The term "provide" as used in these specifications or on the drawings shall mean furnish and install.
- B. Piping: The term "piping" as used in these specifications or on the drawings shall mean all pipe, fittings, valves, hangers, insulation, etc. as may be required for a complete and functional system.
- C. Ductwork: The terms "duct" or "ductwork" as used in these specifications or on the drawings shall mean all ducts, fittings, joints, dampers, hangers, insulation, etc. as may be required for a complete and functional system.
- D. Wiring: The term "wiring" as used in these specifications or on the drawings shall mean all wiring, conduit, boxes, connections, transformers, relays, switches etc. as may be required for a complete and functional system.

### 1.4 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work.

## 1.5 COORDINATION OF WORK

- A. Examination: Before starting work, thoroughly examine existing and newly completed underlying and adjoining work and conditions on which the installation of this work depends. Report to the Engineer in writing all conditions which might adversely affect this work.
- B. Layout: Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements.
- C. Verification: If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination. Verify the proper voltage and phase of all equipment with the electrical plans.
- D. Location of Utilities Prior to Trenching or Earthwork: The Contractor shall notify the Owner a minimum of two business days prior to beginning trenching or earthwork. Prior to this notification, the Contractor shall have marked all proposed trenches with paint and shall have contacted a utility locating company and have had this company mark all found underground utilities with paint. The Contractor shall then coordinate and arrange for a site visit with the Owner to review the proposed trenching and/or earthwork areas. Trenching and/or earthwork shall not begin until the Owner agrees. Repair and/or compensation for repair of marked utilities is the responsibility of the Contractor. The Owner retains the right to either self-perform the repair or require the Contractor to complete the repair, as directed by the Owner. If while performing the work, the Contractor discovers utilities that have not been marked, the Contractor shall immediately notify the Owner verbally and in writing.

## 1.6 GUARANTEE

- A. Guarantee shall be in accordance with the General Conditions. The Contractor shall repair any defects due to faulty materials or workmanship and pay for any resulting damage to other work which appears within the guarantee period. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Engineer.

1.7 QUIETNESS

- A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.8 DAMAGES BY LEAKS

- A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.9 EXAMINATION OF SITE

- A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.10 COMPATIBILITY WITH EXISTING SYSTEMS

- A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.11 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance. All HVAC equipment and ductwork shall be covered, sealed and protected per CGBSC Section 5.504.3 from delivery on site until final start-up.

1.12 SUBMITTALS

- A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material or equipment shall not be ordered or installed until written review is processed by the Engineer.

All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be

current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.

2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
  3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
  4. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met. Electronic submittals which do not comply with these requirements will be rejected.
    - a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
    - b. All text shall be searchable (except text that is part of a graphic).
    - c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
    - d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.
    - e. Contractor shall provide Owner and Owner's Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.
- B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired. Proposed substitutions shall comply with the Owner's General Requirements. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

- C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

#### 1.13 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

#### 1.14 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the review of the Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner. HVAC equipment and functions, whether existing or new, shall be maintained in operating condition whenever the facility is occupied, unless otherwise approved by the Owner.

#### 1.15 DEMOLITION

- A. Existing equipment, ducts, piping, etc. noted for removal shall be removed and delivered to the Owner at a location to be determined by the Owner. Those items determined by the Owner to be of no value shall become the property of the Contractor and shall be removed from the job site by the Contractor at the Contractor's expense. Existing piping, ducts, services, etc. requiring capping shall be capped below floors, behind walls, above ceilings or above roof unless otherwise noted. Where items are removed, patch the surfaces to match the existing surfaces.

1.16 HAZARDOUS MATERIAL REMOVAL

- A. All hazardous material removal will be by the Owner. Hazardous material is to be removed before the work is started. If the Contractor discovers hazardous material which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.17 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

1.18 EXCAVATION AND BACKFILL

- A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.
- B. Excavation: Width of trench at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.
- C. Backfill:
  - 1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator.
  - 2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.
- D. Compaction: Compact to density of 95% within building and under walkways,



driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.19 CONTINUITY OF SERVICES

- A. Existing services and systems shall be maintained except for short intervals when connections are made. The Contractor shall be responsible for interruptions of services and shall repair damage done to any existing service caused by the work. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the Engineer immediately.

1.20 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. John-Mansville. Protective coating shall be extended 6" above surrounding grade.

1.21 ACCESS DOORS

- A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"

1.22 HOUSEKEEPING PAD

- A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. Unless otherwise noted, the pad shall have #4 reinforcing bars at 12" on center, each way, located at mid-depth of the pad. If not poured at the same time as the slab with pad rebar tied to slab rebar, the pad shall be anchored as follows: Drill 5/8" diameter, 3" deep hole in slab. Install 7" long, #4 rebar with Simpson Set epoxy system. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.23 CONCRETE ANCHORS

- A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors,

adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-14, Chapter 17, and the anchor's ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

#### 1.24 EQUIPMENT ANCHORING AND OTHER SUPPORTS

- A. Mechanical systems (equipment, ductwork, piping, conduit, etc.) shall be anchored in accordance with the CBC. All systems mounted on concrete shall be secured with a concrete anchor at each mounting point. All air handlers shall be mounted on spring isolators. Secure base plate as indicated above. Attachment of equipment, ductwork, piping, conduit, etc. supported on curbs or platforms shall be made to the side of curbs and platforms, where possible. Where screws or lag bolts must be installed through the top of a sheet metal cap, the installation shall be as follows. Pre-drill pilot hole. Fill pilot hole with polyurethane sealant. Install screw or lag bolt with a flat washer and an EPDM washer adjacent to the sheet metal.

#### 1.25 SUPPORTS AND SEISMIC RESTRAINTS

- A. Any structural element required to hang or support piping, ducts or equipment provided under this Division and not shown on other drawings shall be provided under this Division.
- B. Mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the CBC. Submit anchorage calculations and details stamped and signed by a structural engineer registered in the State of California. Submit shop drawings showing location, type and detail of restraints. Submit manufacturer's data for restraints. Restraint system shall be Mason West, Inc. (OSHPD OPM 0043-13), or other OSHPD preapproved system.

#### 1.26 PAINTING

- A. Paint all black iron supports, hangers, anchors, etc. with two coats of rust resisting primer. Also paint all uninsulated black iron piping exposed to weather with two coats of rust resisting primer.

#### 1.27 ROOF PENETRATIONS AND PATCHING

- A. Whenever any part of the mechanical systems penetrates the roof or exterior wall, the openings shall be flashed and counter-flashed water tight with minimum 22 gauge galvanized sheet metal. Flashing shall extend not less than eight inches from the duct, pipe, or supporting member in all directions unless detailed

otherwise. All roof penetrations and patching shall be in accordance with the recommendations of the National Roofing Contractor's Association and the Owner's roofing standards.

#### 1.28 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.
- C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- D. Valves: Provide stamped brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service.

#### 1.29 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.
- B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

#### 1.30 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be

submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included.

- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.
- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

#### 1.31 RECORD DRAWINGS

- A. The Contractor shall obtain one set of prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, under floor duct, etc. within the building shall be recorded by offset distances from building walls. An electronic copy of the original drawings will be made available to the Contractor. The Contractor shall transfer the changes, notations, etc. from the marked-up prints to the electronic copy. The record drawings (marked-up prints, electronic drawings disc and a hard copy) shall be submitted to the Engineer for review.

#### 1.32 ACCEPTANCE TESTING

- A. The Contractor shall perform, document and submit all acceptance testing as required by California Code of Regulations, Title 24, Part 6.

END OF SECTION 200100

## PART 1 - GENERAL

### 1.1 GENERAL CONDITIONS

- A. The preceding General Conditions shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall also apply to the following Divisions 21, 22, 23 and 25 of these Specifications and shall be considered a part of those Divisions.

### 1.2 CODES AND REGULATIONS

- A. All work and materials shall be in accordance with current rules and regulations of applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

California Building Code	CCR Title 24, Part 2
California Electrical Code	CCR Title 24, Part 3
California Mechanical Code	CCR Title 24, Part 4
California Plumbing Code	CCR Title 24, Part 5
California Energy Code	CCR Title 24, Part 6
California Fire Code	CCR Title 24, Part 9
Local Codes	

### 1.3 DEFINITIONS

- A. Provide: The term "provide" as used in these specifications or on the drawings shall mean furnish and install.
- B. Piping: The term "piping" as used in these specifications or on the drawings shall mean all pipe, fittings, valves, hangers, insulation, etc. as may be required for a complete and functional system.
- C. Ductwork: The terms "duct" or "ductwork" as used in these specifications or on the drawings shall mean all ducts, fittings, joints, dampers, hangers, insulation, etc. as may be required for a complete and functional system.
- D. Wiring: The term "wiring" as used in these specifications or on the drawings shall mean all wiring, conduit, boxes, connections, transformers, relays, switches etc. as may be required for a complete and functional system.

### 1.4 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work.

## 1.5 COORDINATION OF WORK

- A. Examination: Before starting work, thoroughly examine existing and newly completed underlying and adjoining work and conditions on which the installation of this work depends. Report to the Engineer in writing all conditions which might adversely affect this work.
- B. Layout: Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements.
- C. Verification: If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination. Verify the proper voltage and phase of all equipment with the electrical plans.
- D. Location of Utilities Prior to Trenching or Earthwork: The Contractor shall notify the Owner a minimum of two business days prior to beginning trenching or earthwork. Prior to this notification, the Contractor shall have marked all proposed trenches with paint and shall have contacted a utility locating company and have had this company mark all found underground utilities with paint. The Contractor shall then coordinate and arrange for a site visit with the Owner to review the proposed trenching and/or earthwork areas. Trenching and/or earthwork shall not begin until the Owner agrees. Repair and/or compensation for repair of marked utilities is the responsibility of the Contractor. The Owner retains the right to either self-perform the repair or require the Contractor to complete the repair, as directed by the Owner. If while performing the work, the Contractor discovers utilities that have not been marked, the Contractor shall immediately notify the Owner verbally and in writing.

## 1.6 GUARANTEE

- A. Guarantee shall be in accordance with the General Conditions. The Contractor shall repair any defects due to faulty materials or workmanship and pay for any resulting damage to other work which appears within the guarantee period. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Engineer.

1.7 QUIETNESS

- A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.8 DAMAGES BY LEAKS

- A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.9 EXAMINATION OF SITE

- A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.10 COMPATIBILITY WITH EXISTING SYSTEMS

- A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.11 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance. All HVAC equipment and ductwork shall be covered, sealed and protected per CGBSC Section 5.504.3 from delivery on site until final start-up.

1.12 SUBMITTALS

- A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material or equipment shall not be ordered or installed until written review is processed by the Engineer.

All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be

current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.

2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
  3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
  4. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met. Electronic submittals which do not comply with these requirements will be rejected.
    - a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
    - b. All text shall be searchable (except text that is part of a graphic).
    - c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
    - d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.
    - e. Contractor shall provide Owner and Owner's Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.
- B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired. Proposed substitutions shall comply with the Owner's General Requirements. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.



- C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

#### 1.13 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

#### 1.14 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the review of the Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner. HVAC equipment and functions, whether existing or new, shall be maintained in operating condition whenever the facility is occupied, unless otherwise approved by the Owner.

#### 1.15 DEMOLITION

- A. Existing equipment, ducts, piping, etc. noted for removal shall be removed and delivered to the Owner at a location to be determined by the Owner. Those items determined by the Owner to be of no value shall become the property of the Contractor and shall be removed from the job site by the Contractor at the Contractor's expense. Existing piping, ducts, services, etc. requiring capping shall be capped below floors, behind walls, above ceilings or above roof unless otherwise noted. Where items are removed, patch the surfaces to match the existing surfaces.

1.16 HAZARDOUS MATERIAL REMOVAL

- A. All hazardous material removal will be by the Owner. Hazardous material is to be removed before the work is started. If the Contractor discovers hazardous material which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.17 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

1.18 EXCAVATION AND BACKFILL

- A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.
- B. Excavation: Width of trench at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.
- C. Backfill:
  - 1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator.
  - 2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.
- D. Compaction: Compact to density of 95% within building and under walkways,

driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

#### 1.19 CONTINUITY OF SERVICES

- A. Existing services and systems shall be maintained except for short intervals when connections are made. The Contractor shall be responsible for interruptions of services and shall repair damage done to any existing service caused by the work. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the Engineer immediately.

#### 1.20 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. John-Mansville. Protective coating shall be extended 6" above surrounding grade.

#### 1.21 ACCESS DOORS

- A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"

#### 1.22 HOUSEKEEPING PAD

- A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. Unless otherwise noted, the pad shall have #4 reinforcing bars at 12" on center, each way, located at mid-depth of the pad. If not poured at the same time as the slab with pad rebar tied to slab rebar, the pad shall be anchored as follows: Drill 5/8" diameter, 3" deep hole in slab. Install 7" long, #4 rebar with Simpson Set epoxy system. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

#### 1.23 CONCRETE ANCHORS

- A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors,

adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-14, Chapter 17, and the anchor's ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

#### 1.24 EQUIPMENT ANCHORING AND OTHER SUPPORTS

- A. Mechanical systems (equipment, ductwork, piping, conduit, etc.) shall be anchored in accordance with the CBC. All systems mounted on concrete shall be secured with a concrete anchor at each mounting point. All air handlers shall be mounted on spring isolators. Secure base plate as indicated above. Attachment of equipment, ductwork, piping, conduit, etc. supported on curbs or platforms shall be made to the side of curbs and platforms, where possible. Where screws or lag bolts must be installed through the top of a sheet metal cap, the installation shall be as follows. Pre-drill pilot hole. Fill pilot hole with polyurethane sealant. Install screw or lag bolt with a flat washer and an EPDM washer adjacent to the sheet metal.

#### 1.25 SUPPORTS AND SEISMIC RESTRAINTS

- A. Any structural element required to hang or support piping, ducts or equipment provided under this Division and not shown on other drawings shall be provided under this Division.
- B. Mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the CBC. Submit anchorage calculations and details stamped and signed by a structural engineer registered in the State of California. Submit shop drawings showing location, type and detail of restraints. Submit manufacturer's data for restraints. Restraint system shall be Mason West, Inc. (OSHPD OPM 0043-13), or other OSHPD preapproved system.

#### 1.26 PAINTING

- A. Paint all black iron supports, hangers, anchors, etc. with two coats of rust resisting primer. Also paint all uninsulated black iron piping exposed to weather with two coats of rust resisting primer.

#### 1.27 ROOF PENETRATIONS AND PATCHING

- A. Whenever any part of the mechanical systems penetrates the roof or exterior wall, the openings shall be flashed and counter-flashed water tight with minimum 22 gauge galvanized sheet metal. Flashing shall extend not less than eight inches from the duct, pipe, or supporting member in all directions unless detailed

otherwise. All roof penetrations and patching shall be in accordance with the recommendations of the National Roofing Contractor's Association and the Owner's roofing standards.

#### 1.28 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.
- C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- D. Valves: Provide stamped brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service.

#### 1.29 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.
- B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

#### 1.30 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be

submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included.

- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.
- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

#### 1.31 RECORD DRAWINGS

- A. The Contractor shall obtain one set of prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, under floor duct, etc. within the building shall be recorded by offset distances from building walls. An electronic copy of the original drawings will be made available to the Contractor. The Contractor shall transfer the changes, notations, etc. from the marked-up prints to the electronic copy. The record drawings (marked-up prints, electronic drawings disc and a hard copy) shall be submitted to the Engineer for review.

#### 1.32 ACCEPTANCE TESTING

- A. The Contractor shall perform, document and submit all acceptance testing as required by California Code of Regulations, Title 24, Part 6.

END OF SECTION 200100

PART 1 - GENERAL

1.1 GENERAL PROVISIONS FOR FIRE SPRINKLERS:

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. General: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The entire facility shall be fire sprinklered.
- B. Design/Calculations: The sprinkler system has been designed and sized by hydraulic calculations in accordance with 2016 NFPA No. 13 and fire authority requirements. Calculations have been included in submittals. Provide current fire flow information from flow test at nearest fire hydrant. Fire flow test shall be done within 6 months of installation of sprinkler system.
- C. Preparation of Drawings and Material Data Sheets: A complete fire sprinkler submittal (drawings, specifications, materials and hydraulic calculations) has been prepared. Hydraulic calculations shall conform to 2016 NFPA 13, paragraph 23.3.5 in all respects.
- D. Coordination Drawings: Contractor shall submit coordination drawings (including site) with Contractor title block to Engineer for review, in addition to materials submittals. Deviations between bid documents and coordination drawings shall be specifically noted on drawings (highlighted, clouded, etc.). Any contractor requested design changes to these documents, including layout, materials, or calculations, may be considered a substitution and shall comply with paragraph 1.4 below.

1.3 WORK SPECIFIED ELSEWHERE:

- A. Electrical wiring.
- B. Fire alarm system.

1.4 DESIGN CHANGES/SUBSTITUTIONS:

- A. General: Design changes or substitutions of fire sprinkler system shall be submitted to Engineer for review.
- B. Significant changes in design or substitution of materials may require a change order, requiring resubmission to fire authority, as determined by the Architect, Engineer and/or Inspector. Contractor shall bear all expenses incurred due to preparation and processing of design substitutions, up to and including submission to, and obtaining approval from, fire authority. Refer to Specification Section 20 01 00, 1.12, B.

- C. Any substitution of "Flexible" type piping in lieu of "Rigid" pipe or any changes to size, manufacturer or lengths of "Flexible" type piping will require resubmittal of piping plans, product data sheets and hydraulic calculations to fire authority for review and approval.

## PART 2 - PRODUCTS

### 2.1 STANDARDS:

- A. All materials shall be in accordance with 2016 NFPA No.13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".

### 2.2 PIPING MATERIALS:

- A. General: The pressure rating of all piping, valves, flanges and other piping accessories shall be in accordance with code and fire authority requirements. Pressure ratings shall exceed the highest possible working pressure.
- B. Piping:
  - 1. Underground to 5 Feet Outside Building: Polyvinyl chloride, Class 200, DR 14, AWWA C900, with rubber ring joints, ASTM D1869. Cast or ductile iron fittings, AWWA C110 or C153, Class 250 or higher, with rubber ring joints, ASTM D1869.
  - 2. Above Grade:
    - a. 2" and Smaller: Threaded black steel pipe, ASTM A53, schedule 40. 175 psi WOG (min.) black cast iron threaded fittings, ANSI B16.4, UL listed. Unions shall be Class 150 malleable iron threaded, ANSI B16.3.
    - b. 2-1/2" and Larger: Welded black steel pipe, ASTM A53, schedule 10. Standard weight carbon steel welding fittings, ANSI B16.9. Flanges shall be steel, ANSI B16.5. Roll grooved pipe couplings may be used for assembling welded sections, Victaulic, Grinnell, Gruvlok.
- C. Gate Valve:
  - 1. 2" and Smaller: All bronze, rising stem. UL listed.
  - 2. 2-1/2" and Larger: Iron body, bronze mounted, outside screw and yoke. UL listed. (UL listed butterfly valves may be substituted for 4" and larger gate valves above grade.)



- D. Check Valve:
  - 1. 2" and Smaller: All bronze swing check. UL listed.
  - 2. 2-1/2" and Larger: Iron body, bronze mounted swing check. UL listed.
- E. Drain Valve: All bronze angle globe valve. UL listed.
- F. Anchors and Hangers: Shall comply with 2016 NFPA No. 13.

### 2.3 SPRINKLER HEAD:

- A. Automatic sprinkler head, concealed type in areas with finished ceilings and recessed or suspended lighting, semi-recessed in areas with finished ceilings and surface lighting, upright or pendent heads elsewhere (as allowed by NFPA 13). Heads in finished areas shall be Victaulic FireLock V38 quick response concealed, Tyco RFII quick response concealed, or Globe Fire Sprinkler Corp., Quick Response GL Series Concealed Pendent, with chrome-finish metal cover plate. Heads elsewhere shall be quick response, Victaulic FireLock V27, Tyco, Model TY-FRB or Globe Fire Sprinkler Corp., Model GL Quick Response, with standard finish. UL listed. Temperature ratings shall be in accordance with NFPA No. 13. Provide extra heads (of each type installed) in accordance with code requirements. Exposed heads installed with deflector lower than 7'-6" above floor shall have wire guards.

### 2.4 ALARM VALVE ASSEMBLY:

- A. Standard wet type alarm valve assembly complete with trim as required by the authority having jurisdiction. Provide flow switch and Electric Bell for connection to alarm system. Provide tamper switch. UL listed. Coordinate Electric Bell with Division 28.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION:

- A. General: Piping shall be concealed in walls, above the ceilings or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. Depth of cover in traffic areas shall be 36 inches (minimum).
  - 1. Installer Certification: Installation shall be performed by certified fire sprinkler fitter(s) as required by CCR, Title 19, Divisions 1, Chapter 5.5. See CAL FIRE – Office of the State Fire Marshall Information Bulletin 17-002 for more information. The Bulletin can be downloaded from the following:

[http://osfm.fire.ca.gov/informationbulletin/pdf/2017/IB\\_AESCert\\_final\\_05\\_25\\_17.pdf](http://osfm.fire.ca.gov/informationbulletin/pdf/2017/IB_AESCert_final_05_25_17.pdf)

- B. Standards: All piping shall be installed in accordance with 2016 NFPA No. 13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be installed in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".
- C. Miscellaneous:
1. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings or floors in finished areas.
  2. Pattern: Sprinklers shall be installed in a symmetrical pattern with lighting fixtures and with ceiling pattern. Heads located in lay-in ceilings shall be centered in panel, unless shown otherwise on drawings.
  3. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller and 2" annular clearance for piping 4" and larger.
  4. Access: Provide access doors as required for all valves, devices, etc.
  5. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe, or pipe insulation sealed with fire rated materials in accordance with the requirements of 2016 CBC Section 714.
  6. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows, bends, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 3000 psi mix.
  7. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards, except where specifically allowed by CEC.

### 3.2 IDENTIFICATION:

- A. All controls, piping, valves and equipment shall be labeled for function and service in accordance with 2016 NFPA No. 13 and 2016 NFPA No. 24.

### 3.3 TESTS AND ADJUSTMENTS:

- A. Unless otherwise directed, tests shall be witnessed by a representative of the Architect and an inspector of the authority having jurisdiction. Contractor shall notify fire authority at least 48 hours prior to testing. At various stages and upon completion, the system must be tested in the presence of the enforcing agency. Work to be concealed shall not be enclosed until prescribed tests are made.

Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and the entire work retested. Test all systems in accordance with fire authority requirements and 2016 NFPA No. 13 and 2016 NFPA No. 24.

3.4 CERTIFICATION:

- A. At completion of the project, a Contractor's Material and Test Certificate, indicating installation and testing in accordance with referenced standards, shall be completed. Copies shall be prepared by Contractor for the approving authorities, Owner and Contractor. Deliver certificates to Owner through Architect.

END OF SECTION 21000

This page is intentionally left blank.

PART 1 - GENERAL

1.1 GENERAL PROVISIONS FOR FIRE SPRINKLERS:

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. General: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The entire facility shall be fire sprinklered.
- B. Design/Calculations: The sprinkler system has been designed and sized by hydraulic calculations in accordance with 2016 NFPA No. 13 and fire authority requirements. Calculations have been included in submittals. Provide current fire flow information from flow test at nearest fire hydrant. Fire flow test shall be done within 6 months of installation of sprinkler system.
- C. Preparation of Drawings and Material Data Sheets: A complete fire sprinkler submittal (drawings, specifications, materials and hydraulic calculations) has been prepared. Hydraulic calculations shall conform to 2016 NFPA 13, paragraph 23.3.5 in all respects.
- D. Coordination Drawings: Contractor shall submit coordination drawings (including site) with Contractor title block to Engineer for review, in addition to materials submittals. Deviations between bid documents and coordination drawings shall be specifically noted on drawings (highlighted, clouded, etc.). Any contractor requested design changes to these documents, including layout, materials, or calculations, may be considered a substitution and shall comply with paragraph 1.4 below.

1.3 WORK SPECIFIED ELSEWHERE:

- A. Electrical wiring.
- B. Fire alarm system.

1.4 DESIGN CHANGES/SUBSTITUTIONS:

- A. General: Design changes or substitutions of fire sprinkler system shall be submitted to Engineer for review.
- B. Significant changes in design or substitution of materials may require a change order, requiring resubmission to fire authority, as determined by the Architect, Engineer and/or Inspector. Contractor shall bear all expenses incurred due to preparation and processing of design substitutions, up to and including submission to, and obtaining approval from, fire authority. Refer to Specification

Section 20 01 00, 1.12, B.

- C. Any substitution of "Flexible" type piping in lieu of "Rigid" pipe or any changes to size, manufacturer or lengths of "Flexible" type piping will require resubmittal of piping plans, product data sheets and hydraulic calculations to fire authority for review and approval.

## PART 2 - PRODUCTS

### 2.1 STANDARDS:

- A. All materials shall be in accordance with 2016 NFPA No.13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".

### 2.2 PIPING MATERIALS:

- A. General: The pressure rating of all piping, valves, flanges and other piping accessories shall be in accordance with code and fire authority requirements. Pressure ratings shall exceed the highest possible working pressure.
- B. Piping:
  - 1. Underground to 5 Feet Outside Building: Polyvinyl chloride, Class 200, DR 14, AWWA C900, with rubber ring joints, ASTM D1869. Cast or ductile iron fittings, AWWA C110 or C153, Class 250 or higher, with rubber ring joints, ASTM D1869.
  - 2. Above Grade:
    - a. 2" and Smaller: Threaded black steel pipe, ASTM A53, schedule 40. 175 psi WOG (min.) black cast iron threaded fittings, ANSI B16.4, UL listed. Unions shall be Class 150 malleable iron threaded, ANSI B16.3.
    - b. 2-1/2" and Larger: Welded black steel pipe, ASTM A53, schedule 10. Standard weight carbon steel welding fittings, ANSI B16.9. Flanges shall be steel, ANSI B16.5. Roll grooved pipe couplings may be used for assembling welded sections, Victaulic, Grinnell, Gruvlok.
- C. Gate Valve:
  - 1. 2" and Smaller: All bronze, rising stem. UL listed.
  - 2. 2-1/2" and Larger: Iron body, bronze mounted, outside screw and yoke. UL listed. (UL listed butterfly valves may be substituted for 4" and larger

gate valves above grade.)

- D. Check Valve:
  - 1. 2" and Smaller: All bronze swing check. UL listed.
  - 2. 2-1/2" and Larger: Iron body, bronze mounted swing check. UL listed.
- E. Drain Valve: All bronze angle globe valve. UL listed.
- F. Anchors and Hangers: Shall comply with 2016 NFPA No. 13.

### 2.3 SPRINKLER HEAD:

- A. Automatic sprinkler head, concealed type in areas with finished ceilings and recessed or suspended lighting, semi-recessed in areas with finished ceilings and surface lighting, upright or pendent heads elsewhere (as allowed by NFPA 13). Heads in finished areas shall be Victaulic FireLock V38 quick response concealed, Tyco RFII quick response concealed, or Globe Fire Sprinkler Corp., Quick Response GL Series Concealed Pendent, with chrome-finish metal cover plate. Heads elsewhere shall be quick response, Victaulic FireLock V27, Tyco, Model TY-FRB or Globe Fire Sprinkler Corp., Model GL Quick Response, with standard finish. UL listed. Temperature ratings shall be in accordance with NFPA No. 13. Provide extra heads (of each type installed) in accordance with code requirements. Exposed heads installed with deflector lower than 7'-6" above floor shall have wire guards.

### 2.4 ALARM VALVE ASSEMBLY:

- A. Standard wet type alarm valve assembly complete with trim as required by the authority having jurisdiction. Provide flow switch and Electric Bell for connection to alarm system. Provide tamper switch. UL listed. Coordinate Electric Bell with Division 28.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION:

- A. General: Piping shall be concealed in walls, above the ceilings or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. Depth of cover in traffic areas shall be 36 inches (minimum).
  - 1. Installer Certification: Installation shall be performed by certified fire sprinkler fitter(s) as required by CCR, Title 19, Divisions 1, Chapter 5.5.

See CAL FIRE – Office of the State Fire Marshall Information Bulletin 17-002 for more information. The Bulletin can be downloaded from the following:  
[http://osfm.fire.ca.gov/informationbulletin/pdf/2017/IB\\_AESCert\\_final\\_05\\_25\\_17.pdf](http://osfm.fire.ca.gov/informationbulletin/pdf/2017/IB_AESCert_final_05_25_17.pdf)

- B. Standards: All piping shall be installed in accordance with 2016 NFPA No. 13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be installed in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".
- C. Miscellaneous:
  - 1. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings or floors in finished areas.
  - 2. Pattern: Sprinklers shall be installed in a symmetrical pattern with lighting fixtures and with ceiling pattern. Heads located in lay-in ceilings shall be centered in panel, unless shown otherwise on drawings.
  - 3. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller and 2" annular clearance for piping 4" and larger.
  - 4. Access: Provide access doors as required for all valves, devices, etc.
  - 5. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe, or pipe insulation sealed with fire rated materials in accordance with the requirements of 2016 CBC Section 714.
  - 6. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows, bends, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 3000 psi mix.
  - 7. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards, except where specifically allowed by CEC.

### 3.2 IDENTIFICATION:

- A. All controls, piping, valves and equipment shall be labeled for function and service in accordance with 2016 NFPA No. 13 and 2016 NFPA No. 24.

### 3.3 TESTS AND ADJUSTMENTS:

- A. Unless otherwise directed, tests shall be witnessed by a representative of the Architect and an inspector of the authority having jurisdiction. Contractor shall



notify fire authority at least 48 hours prior to testing. At various stages and upon completion, the system must be tested in the presence of the enforcing agency. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and the entire work retested. Test all systems in accordance with fire authority requirements and 2016 NFPA No. 13 and 2016 NFPA No. 24.

3.4 CERTIFICATION:

- A. At completion of the project, a Contractor's Material and Test Certificate, indicating installation and testing in accordance with referenced standards, shall be completed. Copies shall be prepared by Contractor for the approving authorities, Owner and Contractor. Deliver certificates to Owner through Architect.

END OF SECTION 210000

This page is intentionally left blank.

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 20100, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
  2. Domestic water system.
  3. Drain system (including condensate drain).
  4. All equipment as shown or noted on the drawings or as specified.
  5. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
  6. Lead Free: All equipment, fixtures, valves and fixture stops providing water for human consumption installed after January 1, 2010, must meet the "Lead Free" requirements for the State of California.
- B. Work Specified Elsewhere:
1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
  2. Access doors.
  3. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
  4. Painting unless specifically called for in the drawings or specifications.
  5. Carpentry.
  6. Control of circulating pumps, etc.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

A. Sanitary Sewer:

1. Soil, Waste and Vent Piping (Non-Pressurized):

- a. Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Tyler, Charlotte. Couplings shall be heavy-duty shielded couplings. Type 304 stainless steel, with neoprene gasket, ASTM C1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also acceptable. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

**Where required by soil conditions, as determined by the method described in ASTM A74-09, Appendix X2, below grade cast iron pipe and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.**

2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5' outside building may be PVC with PVC plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Water:

1. Hot and Cold Water Piping: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work.
- a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:
- (1) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered,

95-5 tin-antimony solder. All nipples shall be lead-free red brass (85% copper). Above grade fittings may be copper press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. ProPress.

2. Valves and Specialties:

a. Valves:

- (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below. Provide a minimum of two operating "T" handles for underground valves for each underground system where valves are required. The lengths of the handles are dependent upon the depth of the valves and the ability of the handles to fully open and/or close the valves. At least one "T" handle for each system shall be on site at the beginning of the installation of a particular system for emergencies, and the Construction Manager shall have access to these "T" handles and valves.
- (2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge disk. 200 psi CWP. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut.
- (3) Butterfly Valve: Ductile iron threaded lug body. Aluminum bronze disk. EPDM molded-in liner and seals. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Nibco LD-2000.
- (4) Check Valve: Lead-free bronze swing check, regrinding. 200 psi CWP. Nibco T-413-Y-LF. For vertical applications use lead-free bronze, spring-loaded, lift-type. Nibco T-480-Y-LF.
- (5) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.

- (6) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.
- b. Instruments:
  - (1) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20F-240F, 2F divisions for hot water. 25F-125F, 2F divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. For installations over 7 feet above finish floor, provide digital thermometer with remote reader. Marshalltown, Moeller, Taylor, Tel Tru, Winters.
  - (2) Thermometer Well: Brass well. Suitable for thermometer above. Provide 2" extension at insulated pipes.
- c. Miscellaneous Specialties:
  - (1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.
  - (2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.
  - (3) Dielectric Coupling: Insulating union or flange rated for 250 psig. Wilkins DUXL Series.
  - (4) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.
- C. Drain Piping (including Condensate): Same as inside building cold water piping.
- D. Miscellaneous Piping Items:
  1. Pipe Support:
    - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized

finish. B-Line, Anvil, Unistrut.

- b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.
  - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
2. Flashing: Vent flashing shall be 4 lb/ft<sup>2</sup> lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft<sup>2</sup> lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

## 2.2 PIPING INSULATION MATERIALS:

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft<sup>2</sup>-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping to 140°F, thickness shall be 1" for pipe sizes less than 1"; 1-1/2" thickness for pipe sizes 1" and 1-1/2"; 2" thickness for 2" and larger. See Title 24, Part 6 "California Energy Code" for temperatures above 140°F. Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft<sup>2</sup>-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.
- D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.
- F. Vapor Barrier Coating: Childers CP-30, Foster 30-25.
- G. Lagging Adhesive: Childers CP-50A, Foster 30-36.

- H. Aluminum Jacketing: Aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Stucco-embossed finish. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer. Childers.
- I. Outdoor Mastic: Childers CP-10, Foster 65-05.
- J. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft<sup>2</sup>-F or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.
- K. Molded Closed Cell Vinyl (Piping Insulation Under Lavatories and Sinks): Fully molded closed cell vinyl, 1/8" thick, minimum. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft<sup>2</sup>-°F at an average temperature of 73°F. Weep hole in cleanout nut enclosure. Hinged cap over valve to allow access for servicing. Out of sight nylon fastening system and internal ribs on drain insulation to provide air gap (Lav-Guard Only). Truebro Lav-guard, McGuire Pro Wrap, Plumberex.

### 2.3 FIXTURES:

- A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
- B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Eljer, Elkay, Haws, Just, Kohler, Moen, T&S Brass, Willoughby or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.
- C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
  - 1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). McGuire, Speedway.
  - 2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.
- D. Caulking: Caulk fixtures with white G.E. "Sanitary SCS1700", mildew resistant silicone sealant with EPA listed anti-microbial.



2.4 EQUIPMENT:

A. General Requirements:

1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings -Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
5. Electrical:
  - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, and shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
  - b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
  - c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Motors exposed to weather shall be TEFC. Vertical motors with exposed fans shall have rain caps.

- d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
  - e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
  - f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
- B. Water Heater: Electric. Glass lined tank with magnesium anode protection. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. UL listed. A.O. Smith, American Appliance, State Industries.
- C. Circulating Pump: In-line centrifugal. Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos. -Or- Bronze body, brass impeller. Mechanical seals. Bronze sleeve bearings. Integral thermal overload protection. Bell and Gossett, Taco, Thrush.
- D. Electric Drinking Fountain: Wall hung. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self-closing valve. Non-ferrous evaporator. Lead solder shall not be used. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified. Elkay, Halsey-Taylor, Haws, Sunroc.

### PART 3 – EXECUTION

#### 3.1 PIPING INSTALLATION:

- A. General:
- 1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit

expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.

2. Joints:

- a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
- b. Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Brazing shall be performed by a Certified Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
- c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
- d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3. Fittings and Valves:

- a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
- c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
- e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All

such installations must have prior review by the Engineer.

4. Pipe Support:

- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco 707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.

(1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing* Between Supports (ft.)	
	Copper	Sch. 40 steel
1/2	6	6
3/4	6	8
1	6	8
1-1/4	6	10
1-1/2	6	10
2	10	10
2-1/2	10	10
3	10	10
4	10	10
6	10	10

\*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing.

- (2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.

- b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
- c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:
  - a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
  - b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls below grade shall be sealed with Link-Seal.
  - c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2016 CBC Section 714.
  - d. Thermometer Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2". Mount on side of pipe.
  - e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.
- B. Sanitary Sewer Piping:
  1. General: Where inverts are not indicated, sanitary sewer piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
  2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
  3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.
- C. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings. Only

equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart.

- D. Drain Piping (Including Condensate): Install with constant pitch to receptacle, ¼" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass, except in equipment rooms, piping shall be galvanized steel. P&T relief and water heater drain piping shall be galvanized steel. Provide secondary drain piping where required.

### 3.2 PIPING INSULATION INSTALLATION:

- A. Domestic Hot Water:
1. General: All domestic hot water piping, fittings and accessories shall be insulated.
  2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
  3. Fittings and Valves:
    - a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140F or the piping is exposed to weather.
    - b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
  4. Piping Exposed to Weather:
    - a. All piping and fittings exposed to weather shall have, in addition to the above-described insulation, an aluminum jacketing. Secure in place with factory supplied straps. Install all joints to prevent water entry. All joints shall be sealed with outdoor mastic.

- b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with stretchable glass fabric and at least two coats of outdoor mastic.
- 5. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.
- B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with aluminum jacketing where exposed to weather. Short lengths of pipe and valves may be wrapped with insulating tape, 50% overlap. Cover valves to stem. Apply at least two coats of protective finish where exposed to weather.
- C. Piping Insulation Under Lavatories and Sinks: Exposed water piping, water stops and drain piping under lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.

### 3.3 FIXTURE INSTALLATION:

- A. Fixture Height: Shall be as indicated on Architectural drawings.
- B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.
- C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

### 3.4 EQUIPMENT INSTALLATION:

- A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.

- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

### 3.5 TESTS AND ADJUSTMENTS:

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.

- B. Gravity Systems:

- 1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
- 2. Drains (Including Condensate): Similar to Sanitary Sewer.

- C. Pressure Systems:

- 1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
- 2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.

- D. Fixtures: Provide torque testing of water closet carrier anchor bolts in presence of Inspector. If Inspector is not available, a testing agency shall handle the inspection.

### 3.6 DISINFECTION:

- A. Disinfect all domestic water piping in accordance with 2016 CPC Section 609.9, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination – Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect



FRESNO COUNTY SHERIFF SUBSTATION  
FRESNO, CA.

PLUMBING - OFFICE  
SECTION 220400 - 15

before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION 220400

This page is intentionally left blank.

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
  2. Domestic water system.
  3. All equipment as shown or noted on the drawings or as specified.
  4. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
  5. Lead Free: All equipment, fixtures, valves and fixture stops providing water for human consumption installed after January 1, 2010, must meet the "Lead Free" requirements for the State of California.
- B. Work Specified Elsewhere:
1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
  2. Access doors.
  3. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
  4. Painting unless specifically called for in the drawings or specifications.
  5. Carpentry.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS:

- A. Sanitary Sewer:

1. Soil, Waste and Vent Piping (Non-Pressurized):
  - a. Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Tyler, Charlotte. Couplings shall be heavy-duty shielded couplings. Type 304 stainless steel, with neoprene gasket, ASTM C1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also acceptable. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

**Where required by soil conditions, as determined by the method described in ASTM A74-09, Appendix X2, below grade cast iron pipe and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.**

2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5' outside building may be PVC with PVC plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Water:

1. Cold Water Piping: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work.
  - a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:
    - (1) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be lead-free red brass (85% copper). Above grade fittings may be copper press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. ProPress.
2. Valves and Specialties:

a. Valves:

- (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer.
- (2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF.
- (3) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.
- (4) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

b. Miscellaneous Specialties:

- (1) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.
- (2) Dielectric Coupling: Insulating union or flange rated for 250 psig. Wilkins DUXL Series.

C. Miscellaneous Piping Items:

1. Pipe Support:

- a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
- b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.

- c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
2. Flashing: Vent flashing shall be 4 lb/ft<sup>2</sup> lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft<sup>2</sup> lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

## 2.2 PIPING INSULATION MATERIALS:

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft<sup>2</sup>-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. Thickness shall be 1" for freeze protection. Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft<sup>2</sup>-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.
- D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.
- F. Vapor Barrier Coating: Childers CP-30, Foster 30-25.
- G. Lagging Adhesive: Childers CP-50A, Foster 30-36.
- H. Aluminum Jacketing: Aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Stucco-embossed finish. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer. Childers.
- I. Outdoor Mastic: Childers CP-10, Foster 65-05.

- J. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft<sup>2</sup>-F or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

### 2.3 FIXTURES:

- A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
- B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Eljer, Elkay, Haws, Just, Kohler, Moen, T&S Brass, Willoughby or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION:

- A. General:
  - 1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.
  - 2. Joints:
    - a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
    - b. Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Brazing shall be performed by a Certified Brazer as certified by an

organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.

- c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
- d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3. Fittings and Valves:

- a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
- c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
- e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.

4. Pipe Support:

- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco



707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.

(1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing* Between Supports (ft.)	
	Copper	Sch. 40 steel
1/2	6	6
3/4	6	8
1	6	8
1-1/4	6	10
1-1/2	6	10
2	10	10
2-1/2	10	10
3	10	10
4	10	10

\*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing.

(2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.

- b. Cold Water Piping: All cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
- c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

- a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
- b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls below grade shall be sealed with Link-Seal.
- c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2016 CBC Section 714.

- d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. Sanitary Sewer Piping:

1. General: Where inverts are not indicated, sanitary sewer piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.

- C. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings. Only equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart.

3.2 PIPING INSULATION INSTALLATION:

- A. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with aluminum jacketing where exposed to weather. Short lengths of pipe and valves may be wrapped with insulating tape, 50% overlap. Cover valves to stem. Apply at least two coats of protective finish where exposed to weather.

3.3 FIXTURE INSTALLATION:

- A. Fixture Height: Shall be as indicated on Architectural drawings.

- B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.
- C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

#### 3.4 EQUIPMENT INSTALLATION:

- A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

#### 3.5 TESTS AND ADJUSTMENTS:

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.
- B. Gravity Systems:
  - 1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
- C. Pressure Systems:

1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Domestic Cold Water Piping: Maintain 100 psig water pressure for 4 hours.

3.6 DISINFECTION:

- A. Disinfect all domestic water piping in accordance with 2016 CPC Section 609.9, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION 220400

## PART 1 - GENERAL

### 1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

### 1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:

1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified.
3. Refrigeration system.
4. System energy balance.
5. Coordinate with Section 25 09 00 (Direct Digital Control System) regarding location and installation of system sensors, valves, actuators, etc. and to provide simultaneous start-up.
6. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

- B. Work Specified Elsewhere:

1. Line voltage power wiring to equipment, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Sections, unless otherwise noted.
2. Connection of condensate drains and domestic water to equipment.
3. Access doors.
4. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
5. Painting unless specifically called for in the drawings or specifications.
6. Carpentry.
7. Direct Digital Control System.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped. Wrought copper fittings, silver alloy brazed, 1100°F, Silfos. Size 3/8" and smaller may be refrigerant tube, ASTM B280.

- B. Miscellaneous Piping Items:

1. Pipe Support:
  - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Unistrut.
  - b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.
  - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Unistrut.
2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft<sup>2</sup> lead instead of galvanized steel.

## 2.2 PIPING INSULATION MATERIALS

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- C. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre-fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.
- D. Metal Jacketing Sealant: Childers CP-76, Foster 95-44.
- E. Flexible Elastomeric: Closed cell flexible elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft<sup>2</sup>-°F at a mean temperature of 70°F. 1/2" thick. Provide #520 adhesive and Armaflex insulation pipe hangers by same manufacturer. Armacell Armaflex.

## 2.3 DUCTWORK MATERIALS:

- A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2016 CMC.
- B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).
- C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2" thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft<sup>2</sup>-°F at a mean temperature of 75°F. Seamless metalized reinforced polyester vapor barrier jacket. Duct shall comply with NFPA 90A. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. JP Lamborn.
- D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be water based, Foster 32-19/32-17, Childers CP-146/148, United Duct Sealer WB or G.E. "SilPruf" SCS2000 silicone sealant. Joints Not Exposed to Weather (Except Spiral Wound Exposed to View in Finished Areas): Fiber reinforced. White in color. Foster 32-17, Childers CP-148, Design Polymeric DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181. Spiral Wound Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymeric DP 1010, or United Duct Sealer WB.

#### 2.4 AIR TERMINALS AND DUCT FITTINGS:

- A. Grilles: (Grilles, Registers, Diffusers and Louvers)
  - 1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
  - 2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
  - 3. Frame and Accessories: Supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces

designated by the architectural drawings. Key or screwdriver operated, no slide bars.

4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.
- B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).
  - C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.
  - D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.
  - E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

## 2.5 DUCTWORK INSULATION MATERIALS:

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. 3/4 lb/ft<sup>3</sup> or 1 lb/ft<sup>3</sup>, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft<sup>3</sup> **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- C. Acoustic Lining: Glass fiber. **Installed** thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft<sup>3</sup> density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.



D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

## 2.6 EQUIPMENT

A. General Requirements:

1. Start-up: All equipment shall be started and tested in accordance with the manufacturer's written instructions. Start-up procedure shall be performed by a factory trained service technician – not the installing contractor. Provide the inspector of record with factory start-up literature for each mechanical equipment item. Demonstrate to inspector that the start-up procedure has been completed. Start-up sheets shall be completed and submitted with O&M manuals. Start-up sheets shall be submitted, certifying that start-up has been completed per manufacturer's written instructions.
2. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
3. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
4. Ratings: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
5. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. For equipment mounted on springs, provide flex connections. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
6. Electrical:
  - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be NEMA rated, manual reset, shall have

H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.

- b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
  - c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Motors 1 HP and above shall be NEMA premium efficiency, Class F insulation. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors exposed to weather shall be TEFC and shall have rain caps. Horizontal motors exposed to weather shall be TEFC. Motors for use with VFD's shall be inverter ready.
  - d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
  - e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
  - f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
7. Fan Selection:
- a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
  - b. Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork,

filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.

8. Filters:
    - a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.
    - b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw-away frame. Class 2. Camfil AP-Thirteen.
  9. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
  10. Mixing Dampers: Opposed blade, 16 gage. Six inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One half inch diameter pin shaft. 16 gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
  11. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
  12. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
- B. Variable Refrigerant Volume System:
1. General: Variable capacity, heat pump heat recovery air conditioning system providing simultaneous cooling and heating. Refer to Paragraph 2.6A for general requirements. The R2-Series system shall consist of a PURY outdoor unit, BC (Branch Circuit) Controller, multiple indoor units (-E models), and M-NET DDC (Direct Digital Controls). Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no

interruption to system operation. Each indoor unit or group of indoor units shall be independently controlled. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of outdoor rated capacity. The units shall be listed by Electrical Laboratories (ETL) and bear the ETL label. A full charge of R-410A for the condensing unit only shall be provided in the condensing unit. The units shall be covered by the manufacturer's limited warranty for a period of one (1) year from date of installation. In addition the compressor shall have a manufacturer's limited warranty for a period of seven (7) years from date of installation. The mandatory contractor service and install training shall be performed by the manufacturer. Trane-Mitsubishi.

2. Outdoor Units (CU):

- a. General: The R2-Series PURY outdoor unit shall be used specifically with CITY MULTI VRFZ components. The PURY outdoor units shall be equipped with multiple circuit boards that interface to the M-NET controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.
  - (1) All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor.
  - (2) Outdoor unit shall have a sound rating no higher than 60 dB(A) individually or 64 dB(A) twinned. Units shall have a sound rating no higher than 50 dB(A) individually or 53 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.
  - (3) Both refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller (Single or Main) shall be insulated.
  - (4) There shall be no more than 3 branch circuit controllers connected to any one outdoor unit.
  - (5) Outdoor unit shall be able to connect to up to 50 indoor units depending upon model.
  - (6) The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

- (7) The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.
- (8) The outdoor unit shall have the ability to operate with a maximum height difference of 164 feet and have total refrigerant tubing length of 1804-2625 feet. The greatest length is not to exceed 541 feet between outdoor unit and the indoor units without the need for line size changes or traps.
- (9) The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperature or cooling mode down to 23°F ambient temperature, without additional low ambient controls. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.
- (10) The outdoor unit shall be capable of operating in cooling mode down to -10°F with optional manufacturer supplied low ambient kit.
- (11) Manufacturer supplied low ambient kit shall be provided with predesigned control box rated for outdoor installation and capable of controlling kit operation automatically in all outdoor unit operation modes.
- (12) Manufacturer supplied low ambient kit shall be listed by Electrical Laboratories (ETL) and bear the ETL label.
- (13) Manufacturer supplied low ambient kit shall be factory tested in low ambient temperature chamber to ensure operation. Factory performance testing data shall be available when requested.
- (14) The outdoor unit shall not cease operation in any mode based solely on outdoor ambient temperature.
- (15) The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.
- (16) Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend "no or reduced heating" periods shall not be allowed.

- b. Unit Cabinet: The casing(s) shall be fabricated of galvanized steel, bonderized and finished. Units cabinets shall be able to withstand 960 hours per ASTM B117 criteria for seacoast protected models (-BS models)
  
- c. Fan:
  - (1) Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan. The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch.
  - (2) All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
  - (3) All fan motors shall be mounted for quiet operation.
  - (4) All fans shall be provided with a raised guard to prevent contact with moving parts.
  - (5) The outdoor unit shall have vertical discharge airflow.
  
- d. Refrigerant: R410A refrigerant shall be required for PURY-P-T/Y(S)JMU-A outdoor unit systems.
  
- e. Coil:
  - (1) The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
  - (2) The coil fins shall have a factory applied corrosion resistant blue-fin finish.
  - (3) The coil shall be protected with an integral metal guard.
  - (4) Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.
  - (5) The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.
  
- f. Compressor:
  - (1) Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor. Non inverter-driven compressors shall not be allowed.

- (2) A crankcase heater(s) shall be factory mounted on the compressor(s).
- (3) The outdoor unit compressor shall have an inverter to modulate capacity. The capacity shall be completely variable with a turndown of 19%-5% of rated capacity, depending upon unit size.
- (4) The compressor will be equipped with an internal thermal overload.
- (5) The compressor shall be mounted to avoid the transmission of vibration.
- (6) Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

g. Electrical:

- (1) The outdoor unit electrical power shall be 208/230 or 460 volts, 3-phase, 60 hertz.
- (2) The outdoor unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz), 207-253V (230V/60Hz) or 414-506V (460V/60Hz).
- (3) The outdoor unit shall be controlled by integral microprocessors.
- (4) The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

3. Branch Controller (BSU):

- a. General: The BSU (Branch Selector Unit) Controllers shall be specifically used with R410A R2-Series systems. These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BSU Controller shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of rated capacity.

- b. BSU Unit Cabinet:
  - (1) The casing shall be fabricated of galvanized steel.
  - (2) Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.
  - (3) The unit shall house two tube-in-tube heat exchangers.
- c. Refrigerant: R410A refrigerant shall be required.
- d. Refrigerant Valves:
  - (1) The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH and up to three indoor units. Branches may be twinned to allow more than 54,000 BTUH.
  - (2) Each branch shall have multiple two-position valves to control refrigerant flow.
  - (3) Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.
  - (4) Linear electronic expansion valves shall be used to control the variable refrigerant flow.
- e. Integral Drain Pan: An integral condensate pan and drain shall be provided.
- f. Electrical:
  - (1) The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
  - (2) The unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253V (230V/60Hz).
  - (3) The BC Controller shall be controlled by integral microprocessors.
  - (4) The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.



4. Indoor Units (IDU):

- a. General: The PEFY shall be a ceiling-concealed ducted indoor fan coil design that mounts above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The PEFY shall be used with the R2-Series outdoor unit and BC Controller, Y-Series outdoor unit, or S-Series outdoor unit. The PEFY shall support individual control using M-NET DDC controllers.
- b. Indoor Unit. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
- c. Unit Cabinet:
  - (1) The unit shall be, ceiling-concealed, ducted.
  - (2) The cabinet panel shall have provisions for a field installed filtered outside air intake.
- d. Fan:
  - (1) PEFY models shall feature external static pressure settings from 0.14 to 0.60 in. WG.
  - (2) The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.
  - (3) The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
  - (4) The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function
  - (5) The indoor unit shall have a ducted air outlet system and ducted return air system.
- e. Filter:
  - (1) Return air shall be filtered by means of a standard factory installed return air filter.

- (2) Optional return filter box (rear or bottom placement) with high-efficiency filter shall be available for all PEFY indoor units.
- f. Coil:
- (1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
  - (2) The tubing shall have inner grooves for high efficiency heat exchange.
  - (3) All tube joints shall be brazed with phos-copper or silver alloy.
  - (4) The coils shall be pressure tested at the factory.
  - (5) A condensate pan and drain shall be provided under the coil.
  - (6) The condensate shall be gravity drained from the fan coil.
  - (7) Both refrigerant lines to the PEFY indoor units shall be insulated.
- g. Electrical:
- (1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
  - (2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
- h. Controls:
- (1) This unit shall use controls provided by Mitsubishi Electric Cooling & Heating to perform functions necessary to operate the system. Please refer to Part 5 of this guide specification for details on controllers and other control options.
  - (2) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

- (3) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.
- (4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
- (5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
- (6) Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery. Sensor shall require no external power for operation and shall have an audible indication of low battery condition.
- (7) The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

C. Energy Recovery Ventilator:

1. General: Rooftop packaged energy recovery ventilator. Refer to Paragraph 2.6A for general requirements. Units shall be listed per ANSI/UL 1995, Heating and Cooling Equipment. Energy transfer ratings of the energy recovery wheel shall be ARI Certified. Ventilators shall bear the AMCA Certified Rating Seals for Air Performance. Performance shall be as scheduled on plans. Outdoor air shall not mix with exhaust air in a common plenum. Exhaust discharge and outside air intake shall not be located on the same side on roof top units. Greenheck Model ERV.
2. Unit Casing And Frames: Unit shall be of internal frame type construction of galvanized steel. Frame and panels shall be G90 galvanized steel. All panels exposed to the weather shall be a minimum of 18 gauge galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal seams shall be sealed, requiring no caulking at job site. Permator exterior finish is available for outdoor units. Unit base to be designed for curb mounting. Unit base shall over hang the curb for a positive seal against water run-off.
3. Weatherhood: Weatherhoods shall be the same finish as the unit. Outdoor air weatherhood shall incorporate a louvered design and moisture eliminator. Weatherhoods shall be tested in accordance with

AMCA Standard 500-L and achieve an 'A' water penetration classification rating up to 8 in/hr rainfall at 50 mph.

4. Insulation: Unit casing to be insulated with 1 inch fiberglass with Foil-Scrim-Kraft facing. Insulation shall meet requirements of NFPA 90A and tested to meet UL 181 erosion requirements. Insulation shall be secured to unit with waterproof adhesive and permanent mechanical fasteners.
5. Energy Recovery Wheel: Wheel shall be of the enthalpy type for both sensible and latent heat recovery and be designed to insure laminar flow. Energy transfer ratings must be ARI Certified to Standard 1060 and bear the ARI certification symbol for ARI Air-to-Air Energy Recovery Ventilation Equipment Certification Program based on ARI 1060. Ratings "in accordance with 1060" without certification are not acceptable. Desiccant shall be silica gel for maximum latent energy transfer. Wheel shall be constructed of lightweight polymer media to minimize shaft and bearing loads. Polymer media shall be mounted in a stainless steel rotor for corrosion resistance.

Wheel design shall consist of removable segments (for wheels greater than 26 inches in diameter) for ease of service and/or cleaning. Silica gel desiccant shall be permanently bonded to wheel media to retain latent heat recovery after cleaning. Wheels with sprayed on desiccant coatings are not acceptable. Wheels with desiccant applied after wheel formation are not acceptable. Energy recovery device shall transfer moisture entirely in the vapor phase.

Energy recovery drive belt material shall be high strength urethane and shall be factory installed in a pre-stretched state, eliminating the need for field belt tension adjustment. Link style belts are not acceptable.

6. Access Doors: All components shall be easily accessible through removable doors for exhaust, supply, filter, and damper compartments. Energy recovery wheels (smaller than 54 inches) shall be mounted in a slide-out track for ease of inspection, removal, and cleaning.
7. Roof Curbs: Factory sloped roof curb to be supplied by unit manufacturer for field assembly. Curb shall consist of die formed galvanized steel sections. Curb shall be full perimeter type with gasketing provided for field installation between curb and unit base.
8. Fan Sections: Centrifugal fans to be double width, double inlet, single fan forward curved type. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Separate motors for exhaust and supply blowers shall be provided. Adjustable sheaves on belt-driven fans with motors less than 10 hp shall allow independent balancing of exhaust

and supply airflows. Optional speed controllers on direct-drive fans shall allow independent balancing of exhaust and supply airflows. Fan and motor assemblies are mounted to unit base with neoprene isolators as standard. Fans shall be located in draw-through position in reference to the energy recovery wheel.

9. Motors and Drives: Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase, and enclosure. Belt-drive motors shall be factory mounted to an adjustable motor plate having two heavy-duty adjusting bolts for alignment and belt tension. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast type, keyed and securely attached to the fan wheel and motor shafts; 10 horsepower and less shall be supplied with an adjustable drive pulley. Energy wheel motors and direct-drive motors shall have integral overload protection.
10. Filters: Supply and exhaust air filters shall be 2-inch thick pleated fiberglass, tested to meet UL Class 2. Filter racks shall be die-formed galvanized steel.
11. Electrical: All internal electrical components shall be factory wired for single point power connection. All electrical components shall be UL Listed, Approved or Classified where applicable and wired in compliance with the California Electrical Code.

Weatherproof, integral door interlocking disconnect switch, motor starters, control circuit fusing, control transformer for 24 VAC circuit, and terminal strip shall be supplied as standard components in the control center. Motor starters consist of a contactor and Class 20 adjustable overload protection and shall be provided for all motors in the unit.

12. Warranty: The energy recovery wheel shall be warranted to be free from defects in material and workmanship for a period of five years from the purchase date.

D. Computer Room Unit CRAC/C:

1. General: See Paragraph 2.6A for General Requirements. The unit shall be a split system, electrically operated unit, equipped with a factory assembled refrigeration system which shall be ready for full capacity operation after connection to utilities and connection to a remote, air-cooled condenser. The unit shall consist of compressor(s), fan, motor, coils, humidifier, and all necessary valves, tubing, controls, piping, safety devices, and accessories for a complete operating unit. Each unit shall be provided with a factory operating charge of refrigerant and oil or a holding charge. Where units are shipped with refrigerant holding charge, the system shall be completely charged in the field. Refrigerant shall be R-407C. Liebert.

2. Evaporator Cabinet Construction: The cabinet and chassis shall be constructed of heavy gauge galvanized steel, and shall be serviceable from one side only. Mounting brackets shall be factory attached to the cabinet.
3. Air Distribution: The air distribution system shall be constructed with a quiet, direct-drive fan assembly equipped with double-inlet blower, self-aligning ball bearings, and lifetime lubrication. Fan motor shall be permanent-split capacitor, high efficiency type, equipped with two speeds for air flow modulation. Dehumidification shall utilize the lower fan speed. The circulating-air fan shall be two speed for precise dehumidification control. System shall be suitable for plenum or ducted air distribution.
4. Microprocessor Control: The control system shall be microprocessor based. The wall-mounted control enclosure shall include a 2-line by 16 character LCD display providing continuous display of operating status and alarm condition. An 8-key membrane keypad for setpoint/program control, unit on/off, and fan speed shall be located below the display.
  - a. Monitoring: The LCD display shall provide an on/off indication, fan speed indication, operating mode indication (cooling, heating, humidifying, dehumidifying) and current day, time, temperature and humidity (if applicable) indication.
  - b. Control Setpoint Parameters
    - Temp. Setpoint 65-85°F (18 to 29°C)
    - Temp. Sensitivity 1 to 5°F (1 to 3°C)
    - Humidity Setpoint 20-80% RH
    - Humidity Sensitivity 1 to 10% RH
  - c. Unit Controls

Compressor Short-Cycle Control: The control system shall prevent compressor short-cycling by a 3 minute timer from compressor stop to the next start.

Common Alarm and Remote On/Off: A common alarm relay shall provide a contact closure to a remote alarm device. Two (2) terminals shall also be provided for remote on/off control. Individual alarms shall be "enabled" or "disabled" from reporting to the common alarm.

Setback Control: The control shall be programmable on a daily basis or on a 5 day/2 day program schedule. It shall be capable of accepting 2 programs per day.

Temperature Calibration: The control shall include the capabilities to calibrate the temperature and humidity sensors and adjust the

sensor response delay time from 1 to 90 seconds. The control shall be capable of displaying temperature values in °F or °C.

System Auto Restart: For start-up after power failure, the system shall provide automatic restart with a programmable (up to 9.9 minutes in 6-second increments) time delay. Programming can be performed either at the unit or from the central site monitoring system.

d. Alarms

Unit Alarm: The control system shall monitor unit operation and activate an audible and visual alarm in the event of the following factory preset alarm conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- High Water Alarm - Lockout Unit Operation
- High Head Pressure
- Loss of Power
- Compressor Short Cycle

Custom Alarms (2x): User customized text can be entered for the two (2) custom alarms

- Humidifier Problem
- Filter Clog
- Water Detected
- Smoke Detected

e. Alarm Controls: Each alarm (unit and custom) shall be separately enabled or disabled, selected to activate the common alarm (except for high head pressure).

f. Audible Alarm: The audible alarm shall annunciate any alarm that is enabled by the operator.

g. Common Alarm: A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

5. Direct Expansion System Evaporator Components

a. Direct Expansion Coil: The evaporator section shall include evaporator coil, thermostatic expansion valve, and filter drier. The evaporator coil shall have 3.1 sq. ft. face area, 3 rows deep. It shall be constructed of copper tubes and aluminum fins. The coil shall be provided with a stainless steel drain pan. Refrigerant flow

shall be controlled by an externally equalized thermostatic expansion valve.

6. Air-Cooled Centrifugal Fan Condensing Unit: The condenser coil shall be constructed of copper tubes and aluminum fins. The condensing unit shall be factory charged with refrigerant, sealed, and shall be capable of being connected to the evaporator section directly. The condensing unit can be mounted directly to the evaporator or can be mounted remote to the evaporator. The condensing unit shall be designed for 105°F ambient and be capable of operation to -20°F ambient. The fan motor assembly shall be direct drive.
7. Factory Installed Options
  - a. Electric Reheat: The electric reheat shall be low-watt density, 304/304 stainless steel, finned-tubular and shall be capable of maintaining room dry bulb conditions when the system is calling for dehumidification. The reheat section shall include a U.L. approved safety switch to protect the system from overheating.
  - b. Disconnect Switch, Non-Locking: The non-automatic, non-locking, molded case circuit breaker shall be factory mounted in the high voltage section of the electrical panel. The switch shall be accessible from the front of the unit.
8. Ship-Loose Accessories
  - a. Air Distribution Plenum: The evaporator section shall be supplied with an air distribution plenum with integral filter. The plenum shall be 29 x 49 in size and shall provide 4-way air distribution, for installation into a standard 29 x 49 ceiling grid. Filter size shall be 40", deep pleated type with minimum efficiency of 30%, based on ASHRAE 52-76.
  - b. Condensate Pump: The condensate pump shall have the minimum capacity of 30 GPH at 20 ft. head. It shall be complete with integral float switch, pump, motor assembly, and reservoir.
  - c. Refrigerant Line Sets: Pre-charged refrigerant line sets shall be provided by Liebert in proper lengths for application. **-OR-** Refrigerant Line Sweat Adapter Kit: Provide a sweat adapter kit to permit field brazing of refrigerant line connections.
  - d. Single Point Power Kit: A Single Point Power Kit shall be provided for a close-coupled system to allow a single electrical feed to supply power to both the evaporator and condensing unit.



## PART 2 - EXECUTION

### 3.1 PIPING INSTALLATION

#### A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Engineer. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. For piping connected to equipment mounted on springs, provide flex connections. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.
2. Joints:
  - a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
  - b. Brazed: Welding and brazing shall conform to American Welding Society (AWS) standards. Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100°F. Brazing shall be performed by a Certified Brazer as certified by an organization/institution that uses standards recognized by the AWS and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9. The Contractor shall submit welding procedures per AWS for project welds for testing lab review.
  - c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
3. Fittings and Valves:
  - a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.

- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
4. Pipe Support:
- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below (based on straight lengths of pipe with couplings only). Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.
  - b. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle or Cooper B-Line Armafix clamps. 5' spacing. Use isolation shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.
  - c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
5. Miscellaneous:
- a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
  - b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or pipe insulation.
  - c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2016 CBC Section 714.
- B. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70°F. After evacuation, fill with dry nitrogen to 250 psi and maintain for two hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment.

Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight. VRF system fittings shall be as recommended by manufacturer. Installers shall have successfully completed manufacturer's installation training within 6 months of installation. Provide training certificate or letter from manufacturer's rep stating such.

### 3.2 PIPING INSULATION INSTALLATION

- A. Refrigerant Piping: Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered with aluminum jacketing, install all joints and seams to prevent water entry, seal with 1/8" bead of gray metal jacketing sealant.

### 3.3 DUCTWORK INSTALLATION:

A. General:

1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Ventlok 666 concealed remote actuator with zinc finish on cover.
3. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
4. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):

1. Sheet Metal Ductwork:
  - a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.

- b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
  - c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with silicone sealant. (See Part 2 of this Specification). All joints on spiral wound metal ductwork not exposed to weather shall be sealed air tight with grey duct sealant.
  - d. Dampers: Install volume control damper and damper regulator in all branch ducts.
2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

#### 3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

- A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

#### 3.5 DUCTWORK INSULATION INSTALLATION:

- A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.
- B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.
- C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

- D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

### 3.6 EQUIPMENT INSTALLATION

- A. General: The equipment installer shall ensure that no work done under other specification sections will in any way block or hinder the equipment. All equipment shall be securely anchored in place. Provide factory start-up for all equipment in the Central Plant.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

### 3.7 TESTS AND ADJUSTMENTS

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Engineer. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

### 3.8 SYSTEM ENERGY BALANCE

- A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.
- B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council or National Environmental Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope. The Contractor must have sufficient personnel to respond to a trouble call at the site within two hours.
- C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC or NEBB standards.

- D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted for review.
- E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.
- F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.
- G. Air Balance Procedure (For Each Air Handling System):
  - 1. All air filters shall be clean when air balance is performed.
  - 2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
  - 3. Adjust blower RPM to design requirements.
  - 4. Record motor full load amperes.
  - 5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
  - 6. Record system static pressures, inlet and discharge.
  - 7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
  - 8. Adjust system for design CFM recirculated air.
  - 9. Adjust system for design CFM outside air.
  - 10. Record entering air temperatures. (DB heating, DB and WB cooling.)
  - 11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
  - 12. Adjust all main supply and return air ducts to design CFM.
  - 13. Adjust all zones to design CFM, supply and return.

14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

END OF SECTION 230800

This page is intentionally left blank.



## PART 1 - GENERAL

### 1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

### 1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:

1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified.
3. System energy balance.
4. Coordinate with Section 25 09 00 (Direct Digital Control System) regarding location and installation of system sensors, valves, actuators, etc. and to provide simultaneous start-up.
5. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

- B. Work Specified Elsewhere:

1. Line voltage power wiring to equipment, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Sections, unless otherwise noted.
2. Connection of condensate drains and domestic water to equipment.
3. Access doors.
4. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
5. Painting unless specifically called for in the drawings or specifications.
6. Carpentry.
7. Direct Digital Control System.

## PART 2 - PRODUCTS

### 2.1 DUCTWORK MATERIALS:

- A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2016 CMC.
- B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).

- C. Duct Sealants: All Joints Exposed to Weather: Sealant shall be water based, Foster 32-19/32-17, Childers CP-146/148, United Duct Sealer WB or G.E. "SilPruf" SCS2000 silicone sealant. Joints Not Exposed to Weather: Fiber reinforced. White in color. Foster 32-17, Childers CP-148, Design Polymeric DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181

## 2.2 AIR TERMINALS AND DUCT FITTINGS:

- A. Grilles: (Grilles, Registers, Diffusers and Louvers)
1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
  2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
  3. Frame and Accessories: Supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
  4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.
- B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).
- C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey

Deflectrol.

- D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.
- E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

### 2.3 DUCTWORK INSULATION MATERIALS:

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. 3/4 lb/ft<sup>3</sup> or 1 lb/ft<sup>3</sup>, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft<sup>3</sup> **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

### 2.4 EQUIPMENT

- A. General Requirements:
  - 1. Start-up: All equipment shall be started and tested in accordance with the manufacturer's written instructions. Start-up procedure shall be performed by a factory trained service technician – not the installing contractor. Provide the inspector of record with factory start-up literature for each mechanical equipment item. Demonstrate to inspector that the start-up procedure has been completed. Start-up sheets shall be completed and submitted with O&M manuals. Start-up sheets shall be submitted, certifying that start-up has been completed per manufacturer's written instructions.
  - 2. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
  - 3. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
  - 4. Ratings: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.

5. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. For equipment mounted on springs, provide flex connections. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
6. Electrical:
  - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be NEMA rated, manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
  - b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
  - c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Motors 1 HP and above shall be NEMA premium efficiency, Class F insulation. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors exposed to weather shall be TEFC and shall have rain caps. Horizontal motors exposed to weather shall be TEFC. Motors for use with VFD's shall be inverter ready.
  - d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
  - e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

- f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
7. Fan Selection:
- a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
  - b. Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
8. Filters:
- a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.
  - b. Filter Media: 2" media. MERV-8. Clean filter resistance 0.31" water at 500 fpm. Throw-away frame. Class 2. Camfil 30/30.
9. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
10. Mixing Dampers: Opposed blade, 16 gage. Six inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One half inch diameter pin shaft. 16 gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
11. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
12. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%,

selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.

B. Energy Recovery Ventilator:

1. General: Rooftop packaged energy recovery ventilator. Refer to Paragraph 2.4A for general requirements. Units shall be listed per ANSI/UL 1812. Energy transfer ratings of the energy recovery core shall be ARI Certified. Performance shall be as scheduled on plans. Outdoor air shall not mix with exhaust air in a common plenum. Exhaust discharge and outside air intake shall not be located on the same side on roof top units. Greenheck Model Minicore.
2. Unit Casing and Access: Unit shall be constructed of G90 galvanized steel. All components shall be easily accessible through removable access panels. Energy recovery core shall be mounted to slide out of the cabinet for ease of inspection, removal and cleaning. Housing shall be insulated with 1/2-inch insulation. Outdoor air and exhaust air discharges shall have integral backdraft dampers. Duct adapters shall be factory installed on all four intake/discharge ports.
3. Intake Location: Standard end connections shall be designed for optional relocation in the field. Alternate intake and discharge connections are easily integrated into various duct connections.
4. Energy Recovery Core: Core shall be of the enthalpy type for both sensible and latent heat recovery. Energy transfer ratings must be AHRI certified to standard 1060 and bear the AHRI certification symbol for AHRI Air-to-Air Energy Recovery Ventilation Equipment Certification Program based on AHRI 1060 ratings. Ratings "in accordance with 1060" without certification are not acceptable. The total energy core shall be constructed of specially processed hydroscopic resin layered in a cross-flow corrugated structure.
5. Fans and Motors: Fans shall be forward-curved direct drive with EC motors. Fans shall be statically and dynamically balanced. Fan motors shall have voltage as scheduled, single phase, thermally protected and be compatible for use with speed controller.
6. Filters: The outdoor air shall be filtered with a 2-inch deep, 30% efficient, disposable filter. Filter rack shall be internal to the unit and factory installed.

7. Electrical: All internal electrical components shall be factory wired for single point power connection. All electrical components shall be UL listed, approved, or classified where applicable and wired in accordance with the California Electrical Code.
8. Warranty: The energy recovery ventilator shall be warranted to be free from defects in material and workmanship for a period of one year from the shipment date. The energy recovery core shall be warranted to be free from defects in material and workmanship for a period of five years from the shipment date. Motors shall be warranted by the motor manufacturer for a period of one year from the shipment date.

C. Exhaust Fan:

1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.4A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers. All exhaust fans shall have a disconnect switch. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Inline Fan (Belt): Shall be a belt driven, tubular mixed-flow inline blower. Fan shall be UL 705 listed and shall bear the AMCA Certified Ratings Seal for Sound and Air Performance. Performance shall be certified for both inlet and outlet sound. Fan shall be of welded and bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 12 gauge steel with integral inlet and outlet collars for slip fit duct connections. Straightening vanes shall be included to assure maximum efficiency and low noise levels. Adjustable motor plate shall utilize threaded studs for positive belt tensioning. Copper extended lube lines shall be furnished for lubrication of fan bearings. Lifting lugs shall be provided for ease of installation. Adjustable mounting feet shall allow field adjustment of motor position. Unit shall bear an engraved aluminum nameplate. All steel fan components shall be coated with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method. Wheel shall be steel, non-overloading, high efficiency mixed-flow type. Contoured single thickness blades shall incorporate 3-D curvature for maximum efficiency across the entire surface of the blade. Blades shall be continuously welded to the backplate and inlet shroud. Hubs shall be keyed and securely attached to the fan shaft. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standards. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Blower shaft shall be AISI C-1045 hot rolled and accurately turned,

ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM. Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty regreaseable ball or roller type in a cast iron pillowblock housing selected for a minimum L10 life in excess of 80,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. Greenheck.

3. Utility Fan (Belt): Fan shall be a single width, single inlet backward inclined airfoil blade steel wheel, belt driven centrifugal blower. Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance. The fan shall be of bolted and welded steel construction utilizing stainless steel fasteners. The scroll wrapper and scroll side panels shall be a minimum 12 gauge steel. The entire fan housing shall have continuously welded seams for leakproof operation and shall have a minimum 1 1/2" outlet discharge flange. A performance cut-off shall be furnished to prevent the recirculation of air in the fan housing. Bearing support shall be minimum 10 gauge welded steel. Lifting eyes shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate. All steel fan components shall be coated with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method. Wheel shall be steel, non-overloading, centrifugal backward inclined, airfoil type. Blades on all sizes shall be continuously welded to the backplate and deep spun inlet shroud. Hub shall be keyed and securely attached to the fan shaft. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Blower shaft shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM. Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball or roller type in a cast iron pillow block housing and selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. Greenheck.
4. Ceiling Fan: Ceiling mounted, 6 airfoil blades with winglets, 14 foot diameter fan. Mounting hardware. 1 hp motor with Class F insulation.



Inline helical cut gears, permanently lubricated. Onboard NEMA 4X, VFD with RFI and EMI filters and wall mounted keypad. Rotary switch disconnect. Optional BAS interface (coordinate with factory). Blade retainer links. Safety cable. Guy wires. Big Ass Fans.

## PART 2 - EXECUTION

### 3.1 DUCTWORK INSTALLATION:

#### A. General:

1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Ventlok 666 concealed remote actuator with zinc finish on cover.
3. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
4. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.

#### B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):

1. Sheet Metal Ductwork:
  - a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
  - b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
  - c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water

tight with silicone sealant. (See Part 2 of this Specification). All joints on spiral wound metal ductwork not exposed to weather shall be sealed air tight with grey duct sealant.

- d. Dampers: Install volume control damper and damper regulator in all branch ducts.

- 2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

### 3.2 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

- A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

### 3.3 DUCTWORK INSULATION INSTALLATION:

- A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.
- B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.
- C. Concealed Ductwork: Wrap energy recovery ductwork, including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

### 3.4 EQUIPMENT INSTALLATION

- A. General: The equipment installer shall ensure that no work done under other specification sections will in any way block or hinder the equipment. All equipment shall be securely anchored in place. Provide factory start-up for all equipment in the Central Plant.
- B. Connections to Equipment: Where size changes are required for connections to

equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

### 3.5 TESTS AND ADJUSTMENTS

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Engineer. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

### 3.6 SYSTEM ENERGY BALANCE

- A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.
- B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council or National Environmental Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope. The Contractor must have sufficient personnel to respond to a trouble call at the site within two hours.
- C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC or NEBB standards.
- D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted for review.
- E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.
- F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

- G. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
  2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
  3. Adjust blower RPM to design requirements.
  4. Record motor full load amperes.
  5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
  6. Record system static pressures, inlet and discharge.
  7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
  8. Adjust system for design CFM recirculated air.
  9. Adjust system for design CFM outside air.
  10. Record entering air temperatures. (DB heating, DB and WB cooling.)
  11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
  12. Adjust all main supply and return air ducts to design CFM.
  13. Adjust all zones to design CFM, supply and return.
  14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
  15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
  16. Each grille, diffuser and register shall be identified as to location.
  17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
  18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
  19. Readings and tests of diffusers, grilles, and registers shall include

required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.

20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

END OF SECTION 230800

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

### 1.2 SCOPE

Included: Provide all labor, materials and services necessary for a complete, lawful and operating direct digital control (DDC) system as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:

1. Control panels, control devices, line and low voltage wiring, conduit and related equipment as required for proper operation of all controlled systems.
  2. Power wiring required for control devices such as actuators, controllers, sensors and power supplies. Power wiring for these devices shall be fed from circuits dedicated to the DDC system.
- B. Work Specified Elsewhere:
1. Line voltage dedicated power circuits for stand-alone building controllers are included in the Electrical Divisions unless otherwise noted.

### 1.3 CONTRACTOR QUALIFICATIONS

- A. All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls and VRV manufacturer for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor shall have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.
- B. Quality Assurance
1. General
    - i. The Building Management System (BMS) Contractor shall be Authorized Building Controls Specialist contractor that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems. Bids from wholesalers, distributors or contractors who do not purchase directly from Johnson Controls are not allowed.

- ii. The BMS Contractor shall have a branch facility within a 25-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis. The BMS Contractor shall have at this facility at least eight (8) factory trained, directly employed and full time technical staff, spare parts inventory, and all necessary test and diagnostic equipment.
  - iii. As evidence and assurance of the BMS contractor's ability to support the Owner's system with service and parts, the BMS contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.
  - iv. The BMS architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Management Systems, and shall be the manufacturer's latest standard of design at the time of bid.
2. Workplace Safety and Hazardous Materials
- a. Provide a safety program in compliance with the Contract Documents.
  - b. The BMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
  - c. The BMS Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.
  - d. The BMS Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA rules that have jurisdiction for at least each topic listed in the Safety Certification Manual.
  - e. Hazards created by the BMS Contractor or its subcontractors shall be eliminated before any further work proceeds.
  - f. Hazards observed but not created by the BMS Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The BMS Contractor shall be required to avoid the hazard area until the hazard has been eliminated.
  - g. The BMS Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.
  - h. The BMS Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.



- i. The BMS Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

3. Quality Management Program

- a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:
  - ◇ Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
  - ◇ Manage the financial aspects of the BMS Contract.
  - ◇ Coordinate as necessary with other trades.
  - ◇ Be responsible for the work and actions of the BMS workforce on site.

1.4 BASIS OF DESIGN

- A. The system shall be Johnson Metasys Building Systems, without substitution, to match County of Fresno Standard.

1.5 SUBMITTALS AND OPERATION AND MAINTENANCE MANUALS

- A. Submittals shall be in accordance with Section 20 01 00 and shall include the following:
  1. Contractor qualifications. Manufacturer licenses, contracts or certifications for the installer shall be submitted on manufacturer's letterhead.
  2. Manufacturer's data for all devices.
  3. Manufacturer's data for all software.
  4. Diagrams showing control schematics. Diagrams shall include all sensors, terminal strips, panels and control devices. Locations of all devices shall be indicated.
  5. Sequence of operation.
  6. Site plan showing conduit trench and pullbox locations. This plan shall also show the conduit termination points inside the buildings.
- B. Operation and Maintenance Manuals: Furnish Operation and Maintenance Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:

1. General description and specifications.
2. Installation and initial checkout procedures.
3. Complete trouble-shooting procedures and diagrams.
4. Complete alignment and calibration procedures for all components.
5. Preventative maintenance requirements.
6. Detailed schematics and assembly drawings.

## 1.6 SYSTEM ARCHITECTURE

- A. The direct digital control system shall employ a multi-level distributed processing architecture. A web based front end controller shall act as the host and shall communicate with both the system operator and the stand-alone controllers. The stand-alone controllers shall be microprocessor based and perform the specified data acquisition and control functions. They shall connect to and supervise multiple application specific controllers (ASC). The stand-alone controllers shall perform stand-alone control functions whether in communications with the web based front end controller or not. All independent control loops shall be processed and controlled by the stand-alone controllers. Each stand-alone controller shall store historical data for all connected points for a minimum of 24 hours. Historical data shall include total run-time for each digital point. For analog data, periodic samples shall be stored at the frequency of once per minute. The physical connection and interface with the actual field points shall be accomplished through the ASC's. The ASC's shall be located throughout the data environment, communicate with, and be controlled by the stand-alone controllers. The stand-alone controllers shall be accessible by laptop computer with proper software via cable connection. Access to the system shall also be available through connection at selected space sensors.

## PART 2 - PRODUCTS

### 2.1 SENSORS

- A. Space Temperature Sensor: Room sensor with occupant adjustable set point. Occupant adjustable set point shall be limited by software. Wall mounted temperature sensors shall be mounted with bottom of sensor at 48" above finish floor.
- B. Outside Air Temperature Sensor: Provide one outside air sensor per stand-alone building controller. Install on north wall of building.
- C. Duct Sensor: Averaging sensor shall be used at ducts with greater than 9 square feet of cross sectional area. Sensor shall extend across 75% of the duct. Sensor

shall be housed in a NEMA 3R enclosure with proper extension at insulated ducts. Provide access door.

- D. Photocell: Wattstopper EM-24 A 2.
- E. Status Sensor: Current sensing status sensor with sensitivity adjustment.
- F. Smoke Detector: Photoelectric type, 115 VAC. The detector shall operate at air velocities from 300 FPM to 4000 FPM. The detector head shall not require additional filters or screens. Mounted in a sheet metal housing with a removable cover. A visual indication of alarm and power shall be provided on detector front. Manual test and reset switch on front of detector. Power supervisory relay. Minimum of two sets of alarm contacts. UL listed. California State Fire Marshal listed. Air Products and Controls, SM-501Series.

## 2.2 SYSTEM COMPONENTS

- A. Electric Actuators:
  - 1. General: Fully modulating, UL listed. Visual position indicator, manual override, spring return. Factory weatherproof enclosure where exposed to weather. Belimo.
  - 2. Valve Actuators: Provide with factory mounting brackets and linkage to the control valve. Capable of shutting off against a 50 psi differential.
  - 3. Damper Actuators: Actuators shall be direct mounted onto the damper control shaft without linkage. Damper actuators shall be sized to provide a minimum of 5 inch-pounds of torque per square foot of damper face area.
- B. Lighting Contactors: Contactor with metal enclosure. Square D. Provide low voltage relays to complete the lighting control. For low voltage (120 volt) outside lighting, provide status relay for lighting status. For 277 volt outside lighting, provide current sensor for lighting status.
- C. Web Based Front End Controller with Graphical Interface: Provide color graphics accessible through the Owner's system (with security protocol) which will allow the user to override on/off and temperature set points directly. Real time data shall be continuously updated. The minimum graphic screens shall include the following:
  - 1. Site lay-out locations of all equipment being controlled, control component locations and spaces served. Provide multiple screens – minimum of one screen per building, plus site and others as needed for clarity. By selecting the desired equipment item, a flow diagram shall be displayed for the related equipment (as described below). By selecting a conditioned space, a graphic display of the zone conditions shall be displayed (as described below).

2. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system with all inputs and outputs dynamically displayed.
3. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.
4. Scheduling screens allowing on/off times shall be set for all the following:
  - a. Pre-determined individual days
  - b. Pre-determined blocks of days (from/to)
  - c. Schedules for "Routine" days
  - d. Schedules for "Special" days
- D. Enclosures: Hinged, lockable front panel. The panel shall be identified with a label as specified. No conduit or other penetration of any kind shall be made on top of the enclosure. If any such entry is made, a plug is not acceptable; replace the enclosure. Hoffman with metal back panel. NEMA 1 for indoor; NEMA 3R for outdoor, NEMA 12 for hazardous locations.
- E. Wiring: Sensor and communication cable shall be shielded cable, wire gage and number of wires as recommended by the system manufacturer. Install per manufacturer's recommendations. No splices will be allowed. Identify both ends at terminal blocks. All wiring that is routed below grade shall have a PVC jacket, CL2-0552. All other wiring shall be plenum-rated, CL3P-0552.
- F. Conduit: Size conduit per the California Electrical Code and then increase by one size, except that the minimum conduit size for low voltage shall be 1" and the minimum conduit size for 120 volt power shall be ¾". For underground conduit, provide 100% spare capacity by installing a second conduit (empty) along all conduit routes.
- G. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.
- H. Mitsubishi Controller. CITY MULTI Controls Network (CMCN) controller with on-site LCD and internet IP accessibility with Factory BACnet Interface Card.
- I. Mitsubishi Room Sensor/Controller: Shall be wall mounted "in-room" wired remote controller.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: A dedicated ASC shall be provided for every item of new equipment and for every item of existing equipment. All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run in conduit parallel to room surfaces; location shall be approved by the Engineer. Wiring in walls or in mechanical rooms, janitor rooms, or storage rooms shall be in conduit. Conduit above roofs shall be rigid conduit. Low voltage wiring in accessible attics may be run without conduit. This wiring shall be strapped to structure at 48" on center, and shall not lay on the ceiling. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide power wiring for each device requiring external power. Dedicated circuits shall be provided for devices as required by the manufacturer. Devices or wiring exposed to the weather shall be protected in NEMA 3R enclosures and weatherproof conduit. All conduit shall include a pull wire. Set, test, and adjust the system for proper operation. Provide connection to the Owner's network for web-based access to stand-alone controllers.
- B. Programming: The Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. All point lists and programming blocks shall be provided by the Contractor. For upgrades or additions to existing systems, all existing programming and existing sequences of operation shall be incorporated into the new system and equipment. The project will not be considered complete until all programming and graphics have been completed and all systems are operational from the location of the web based front end controller.
- C. Control Panels/Enclosures:
1. ASC's, transformers, relays, etc. shall be housed in enclosures. Enclosures shall be installed as shown on plans. Wherever practical, do not locate enclosures above ceilings. Maintain access to enclosures that are located above ceilings (e.g. at VAV boxes).
  2. For all enclosures, provide a disconnect switch and an in-line fuse. All wiring shall be terminated at terminal strips – no wire nuts. Provide a plastic covered wiring diagram in each enclosure. All wiring (field and inside enclosures) shall be labeled at both ends with machine printed markers – black on white tape. At packaged equipment, locate the enclosure on the side of the unit without obstructing access or service clearance.
  3. Separate 120 volt circuits from low voltage circuits horizontally. A physical barrier is not required. Enclose wiring within the enclosure in 2"x2" Panduit.

### 3.2 TRAINING

- A. Prior to final acceptance, the Contractor shall provide operational training to the

Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided - 20 hours initially, and 20 hours to be spread throughout the first year of operation. The Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The Contractor shall submit a copy of this log on request.

### 3.3 TESTING AND ACCEPTANCE

- A. The Contractor shall verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
  2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
  3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.
  4. Deliver all record drawings, wiring diagrams, equipment specifications, operation and maintenance manuals and other documentation as required to describe the system.
  5. Complete operator training in the use, programming, and operation of the system.

### 3.4 SERVICE WORK

- A. Service work shall be performed by service personnel in the direct employ of the controls contractor. The service technicians shall be factory trained and certified by the manufacturer to be competent in all aspects of the installed system. The technician shall have a working knowledge of calibration techniques, preventive maintenance, troubleshooting, software diagnostics and microprocessor repair. Precaution shall be taken to minimize disruption of facility operations by service work.

### 3.5 SEQUENCE OF OPERATION

- A. System Operation Schedule: The systems shall operate at the following schedule (adjustable by Owner) except as noted:
- Systems shall operate per specified sequences on Monday through Friday from 7 AM to 6 PM. Systems shall be off on Monday through Friday from 6 PM to 7 AM. Systems shall be off on Saturday and Sunday.

- B. Alarm Condition Display: On any alarm, the Central Workstation shall display the equipment mark number and the specific alarm condition. Upon highlighting the alarming equipment, the program shall have a graphic display function that displays the plan of the building floor with the location of the alarming equipment indicated.
- C. System Report: The DDC/EMS shall prepare a system report on demand. The report shall include the following items in the report:

Date and time of the current report.

Date and time of the previously reviewed report.

List of any alarms that have occurred since the last report. The list shall include the time of the alarm, unit that had the alarm, and the type of alarm.

List of any still active run time notices. The list shall include the time of the initial notice, unit that had the notice, and the type of notice.

List of any still active filter change notices. The list shall include the time of the initial notice, unit that had the notice, and the type of notice.

List of any off-hours operations that have occurred since the last report. The list shall include the date and time of the off-hours operation, the unit identification number, the physical / service location of the unit, and the duration of the off-hours operation.

- D. Variable Refrigerant Volume Air Conditioner (CU / BSU / IDU): Refer to the Control Wiring Diagrams on the plans.

DDC/EMS Interface: Provide a DDC/EMS panel and connect to the existing WAN DDC/EMS. Connect to the DDC/EMS interface on the VRV Central Controller. Provide programming to allow the DDC/EMS to monitor the room temperatures from the Indoor Units, reset the room temperature setpoints, display alarm conditions from the VRV system.

Central Controller: Locate the Central Controller per plans. Wire the central controller to each Condensing Unit (CU) system controller as the system is installed. Program the controller to operate the system on the schedule noted above. Alarm conditions of any component on the connected systems shall be able to be reviewed through the Central Controller.

Condensing Unit (CU-1, 2, 3) / Branch System Unit (BSU-1, 2): Wire each Branch System Unit (BSU) controller to the CU controller it serves. The BSU shall coordinate its total heating / cooling requirements with its connected CU.

Indoor Unit (IDU-1 to 11): (Heating setpoint 72°F, Cooling setpoint 75°F) The Indoor Unit (IDU) operation shall be controlled by a factory furnished controller to be mounted on the wall. The wall-mounted controller shall operate the IDU to maintain the heating or cooling setpoint. Wire each IDU controller to the BSU controller it serves.

Areas that are required to operate continuously by the Owner shall have the IDU controller set to operate the IDU continuously maintaining setpoint.

Install wall or ceiling occupancy sensors (see plan for location) in the rooms and

spaces served by the IDU. If all of the occupancy sensors in the rooms and spaces served by the IDU show no occupants for 15 minutes (adj.), the IDU will turn off until any of the sensors show an occupant.

- E. Energy Recovery Ventilator (ERV-1): ERV shall interface with the site DDC/EMS through the DDC/EMS interface card in the unit controller. Interlock an Energy Recovery Ventilator (ERV) to start / stop with CU-1, 2, 3. Supply air and exhaust air fans shall run continuously during occupied hours. The energy recovery wheel shall run through internal controls when the outside air is above 78°F (adj.) or below 56°F (adj.). A rotation sensor shall monitor the wheel. On rotation failure, an alarm shall be sent to the DDC/EMS.  
Provide temperature sensors connected to the DDC/EMS at the OSA intake and discharge, and the EA intake and discharge to monitor the air temperatures. A smoke detector in the outside air discharge duct shall shut the unit off on alarm and send a signal to the fire alarm system (Div. 28). The DDC/EMS shall signal a unit shutoff alarm.
- F. Computer Room Air Conditioning Unit / Condenser (CRAC-1A/C-1A, CRAC-1B/C-1B): Lead unit shall run continuously on internal controls to maintain 75°F / 50% RH. Contractor is to install interlock wiring between each CRAC indoor unit controller to allow lead / lag operation with a weekly changeover (adj.). Contractor is to install interlock wiring between each computer room air conditioning unit and its associated condenser. On lead unit failure, the unit controller shall start the lag unit. On power failure, system shall restart on restoration of power.  
Factory head pressure sensors in the condensers shall modulate condenser fan speed to maintain head pressure.  
DDC/EMS is to connect to each unit controller to interface with the system controls. The DDC/EMS shall be able to monitor the following points and reset the room temperature.

- Room air temperature
- Room temperature setpoint (Setpoint can be reset)
- Lead computer room air conditioning unit status (alarms on unit failure)
- Lag computer room air conditioning unit status (Verifies unit start on lead computer room air conditioning unit failure, alarms on unit failure)
- Lead condenser status (alarms on unit failure)
- Lag condenser status (Verifies unit start on lead computer room air conditioning unit failure, alarms on unit failure)

A wall mounted temperature sensor shall monitor room temperature. If the room temperature rises above 85°F (adj.), the DDC/EMS shall signal a high room temperature alarm.

END OF SECTION 250900



## PART 1 - GENERAL

### 1.1 GENERAL MECHANICAL PROVISIONS

- A. The General Mechanical Provisions, Section 200100, shall form a part of this Section with the same force and effect as though repeated here.

### 1.2 SCOPE

- A. Included: Provide all labor, materials and services necessary for a complete, lawful and operating direct digital control (DDC) system as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
  - 1. Control panels, control devices, line and low voltage wiring, conduit and related equipment as required for proper operation of all controlled systems.
  - 2. Power wiring required for control devices such as actuators, controllers, sensors and power supplies. Power wiring for these devices shall be fed from circuits dedicated to the DDC system.
- B. Work Specified Elsewhere:
  - 1. Line voltage dedicated power circuits for stand-alone building controllers are included in the Electrical Divisions unless otherwise noted.

### 1.3 CONTRACTOR QUALIFICATIONS

- A. All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor shall have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.
- B. Quality Assurance
  - 1. General
    - i. The Building Management System (BMS) Contractor shall be Authorized Building Controls Specialist contractor that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems. Bids from wholesalers, distributors or contractors who do not purchase directly from Johnson Controls are not

allowed.

- ii. The BMS Contractor shall have a branch facility within a 25-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis. The BMS Contractor shall have at this facility at least eight (8) factory trained, directly employed and full time technical staff, spare parts inventory, and all necessary test and diagnostic equipment.
- iii. As evidence and assurance of the BMS contractor's ability to support the Owner's system with service and parts, the BMS contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.
- iv. The BMS architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Management Systems, and shall be the manufacturer's latest standard of design at the time of bid.

## 2. Workplace Safety and Hazardous Materials

- a. Provide a safety program in compliance with the Contract Documents.
- b. The BMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
- c. The BMS Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.
- d. The BMS Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA rules that have jurisdiction for at least each topic listed in the Safety Certification Manual.
- e. Hazards created by the BMS Contractor or its subcontractors shall be eliminated before any further work proceeds.
- f. Hazards observed but not created by the BMS Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The BMS Contractor shall be required to avoid the hazard area until the hazard has been eliminated.
- g. The BMS Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.
- h. The BMS Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.

- i. The BMS Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

### 3. Quality Management Program

- a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:
  - ◇ Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
  - ◇ Manage the financial aspects of the BMS Contract.
  - ◇ Coordinate as necessary with other trades.
  - ◇ Be responsible for the work and actions of the BMS workforce on site.

## 1.4 BASIS OF DESIGN

- A. The system shall be Johnson Metasys Building Systems, without substitution, to match County of Fresno Standard.

## 1.5 SUBMITTALS AND OPERATION AND MAINTENANCE MANUALS

- A. Submittals shall be in accordance with Section 20 01 00 and shall include the following:
  1. Contractor qualifications. Manufacturer licenses, contracts or certifications for the installer shall be submitted on manufacturer's letterhead.
  2. Manufacturer's data for all devices.
  3. Manufacturer's data for all software.
  4. Diagrams showing control schematics. Diagrams shall include all sensors, terminal strips, panels and control devices. Locations of all devices shall be indicated.
  5. Sequence of operation.
  6. Site plan showing conduit trench and pullbox locations. This plan shall also show the conduit termination points inside the buildings.
- B. Operation and Maintenance Manuals: Furnish Operation and Maintenance Manuals for all components. These manuals shall contain full documentation

which shall include, without being limited to, the following:

1. General description and specifications.
2. Installation and initial checkout procedures.
3. Complete trouble-shooting procedures and diagrams.
4. Complete alignment and calibration procedures for all components.
5. Preventative maintenance requirements.
6. Detailed schematics and assembly drawings.

## 1.6 SYSTEM ARCHITECTURE

- A. The direct digital control system shall employ a multi-level distributed processing architecture. A web based front end controller shall act as the host and shall communicate with both the system operator and the stand-alone controllers. The stand-alone controllers shall be microprocessor based and perform the specified data acquisition and control functions. They shall connect to and supervise multiple application specific controllers (ASC). The stand-alone controllers shall perform stand-alone control functions whether in communications with the web based front end controller or not. All independent control loops shall be processed and controlled by the stand-alone controllers. Each stand-alone controller shall store historical data for all connected points for a minimum of 24 hours. Historical data shall include total run-time for each digital point. For analog data, periodic samples shall be stored at the frequency of once per minute. The physical connection and interface with the actual field points shall be accomplished through the ASC's. The ASC's shall be located throughout the data environment, communicate with, and be controlled by the stand-alone controllers. The stand-alone controllers shall be accessible by laptop computer with proper software via cable connection. Access to the system shall also be available through connection at selected space sensors.

## PART 2 - PRODUCTS

### 2.1 SENSORS

- A. Space Temperature Sensor: Room sensor with occupant adjustable set point. Occupant adjustable set point shall be limited by software. Wall mounted temperature sensors shall be mounted with bottom of sensor at 48" above finish floor.
- B. Outside Air Temperature Sensor: Provide one outside air sensor per stand-alone building controller. Install on north wall of building.
- C. Duct Sensor: Averaging sensor shall be used at ducts with greater than 9 square

feet of cross sectional area. Sensor shall extend across 75% of the duct. Sensor shall be housed in a NEMA 3R enclosure with proper extension at insulated ducts. Provide access door.

- D. Photocell: Wattstopper EM-24 A 2.
- E. Status Sensor: Current sensing status sensor with sensitivity adjustment.
- F. Smoke Detector: Photoelectric type, 115 VAC. The detector shall operate at air velocities from 300 FPM to 4000 FPM. The detector head shall not require additional filters or screens. Mounted in a sheet metal housing with a removable cover. A visual indication of alarm and power shall be provided on detector front. Manual test and reset switch on front of detector. Power supervisory relay. Minimum of two sets of alarm contacts. UL listed. California State Fire Marshal listed. Air Products and Controls, SM-501Series.

## 2.2 SYSTEM COMPONENTS

- A. Electric Actuators:
  - 1. General: Fully modulating, UL listed. Visual position indicator, manual override, spring return. Factory weatherproof enclosure where exposed to weather. Belimo.
  - 2. Valve Actuators: Provide with factory mounting brackets and linkage to the control valve. Capable of shutting off against a 50 psi differential.
  - 3. Damper Actuators: Actuators shall be direct mounted onto the damper control shaft without linkage. Damper actuators shall be sized to provide a minimum of 5 inch-pounds of torque per square foot of damper face area.
- B. Lighting Contactors: Contactor with metal enclosure. Square D. Provide low voltage relays to complete the lighting control. For low voltage (120 volt) outside lighting, provide status relay for lighting status. For 277 volt outside lighting, provide current sensor for lighting status.
- C. Web Based Front End Controller with Graphical Interface: Provide color graphics accessible through the Owner's system (with security protocol) which will allow the user to override on/off and temperature set points directly. Real time data shall be continuously updated. The minimum graphic screens shall include the following:
  - 1. Site lay-out locations of all equipment being controlled, control component locations and spaces served. Provide multiple screens – minimum of one screen per building, plus site and others as needed for clarity. By selecting the desired equipment item, a flow diagram shall be displayed for the related equipment (as described below). By selecting a conditioned space, a graphic display of the zone conditions shall be displayed (as described below).

2. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system with all inputs and outputs dynamically displayed.
3. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.
4. Scheduling screens allowing on/off times shall be set for all the following:
  - a. Pre-determined individual days
  - b. Pre-determined blocks of days (from/to)
  - c. Schedules for "Routine" days
  - d. Schedules for "Special" days
- D. Enclosures: Hinged, lockable front panel. The panel shall be identified with a label as specified. No conduit or other penetration of any kind shall be made on top of the enclosure. If any such entry is made, a plug is not acceptable; replace the enclosure. Hoffman with metal back panel. NEMA 1 for indoor; NEMA 3R for outdoor, NEMA 12 for hazardous locations.
- E. Wiring: Sensor and communication cable shall be shielded cable, wire gage and number of wires as recommended by the system manufacturer. Install per manufacturer's recommendations. No splices will be allowed. Identify both ends at terminal blocks. All wiring that is routed below grade shall have a PVC jacket, CL2-0552. All other wiring shall be plenum-rated, CL3P-0552.
- F. Conduit: Size conduit per the California Electrical Code and then increase by one size, except that the minimum conduit size for low voltage shall be 1" and the minimum conduit size for 120 volt power shall be  $\frac{3}{4}$ ". For underground conduit, provide 100% spare capacity by installing a second conduit (empty) along all conduit routes.
- G. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: A dedicated ASC shall be provided for every item of new equipment and for every item of existing equipment. All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise

noted. Exposed wiring shall run in conduit parallel to room surfaces; location shall be approved by the Engineer. Wiring in walls or in mechanical rooms, janitor rooms, or storage rooms shall be in conduit. Conduit above roofs shall be rigid conduit. Low voltage wiring in accessible attics may be run without conduit. This wiring shall be strapped to structure at 48" on center, and shall not lay on the ceiling. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide power wiring for each device requiring external power. Dedicated circuits shall be provided for devices as required by the manufacturer. Devices or wiring exposed to the weather shall be protected in NEMA 3R enclosures and weatherproof conduit. All conduit shall include a pull wire. Set, test, and adjust the system for proper operation. Provide connection to the Owner's network for web-based access to stand-alone controllers.

- B. Programming: The Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. All point lists and programming blocks shall be provided by the Contractor. For upgrades or additions to existing systems, all existing programming and existing sequences of operation shall be incorporated into the new system and equipment. The project will not be considered complete until all programming and graphics have been completed and all systems are operational from the location of the web based front end controller.
- C. Control Panels/Enclosures:
  - 1. ASC's, transformers, relays, etc. shall be housed in enclosures. Enclosures shall be installed as shown on plans. Wherever practical, do not locate enclosures above ceilings. Maintain access to enclosures that are located above ceilings (e.g. at VAV boxes).
  - 2. For all enclosures, provide a disconnect switch and an in-line fuse. All wiring shall be terminated at terminal strips – no wire nuts. Provide a plastic covered wiring diagram in each enclosure. All wiring (field and inside enclosures) shall be labeled at both ends with machine printed markers – black on white tape. At packaged equipment, locate the enclosure on the side of the unit without obstructing access or service clearance.
  - 3. Separate 120 volt circuits from low voltage circuits horizontally. A physical barrier is not required. Enclose wiring within the enclosure in 2"x2" Panduit.

### 3.2 TRAINING

- A. Prior to final acceptance, the Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided - 20 hours initially, and 20 hours to be spread throughout the first year of operation. The Contractor shall maintain a log of

training sessions including dates, times and names/titles of those attending. The Contractor shall submit a copy of this log on request.

### 3.3 TESTING AND ACCEPTANCE

- A. The Contractor shall verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
  2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
  3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.
  4. Deliver all record drawings, wiring diagrams, equipment specifications, operation and maintenance manuals and other documentation as required to describe the system.
  5. Complete operator training in the use, programming, and operation of the system.

### 3.4 SERVICE WORK

- A. Service work shall be performed by service personnel in the direct employ of the controls contractor. The service technicians shall be factory trained and certified by the manufacturer to be competent in all aspects of the installed system. The technician shall have a working knowledge of calibration techniques, preventive maintenance, troubleshooting, software diagnostics and microprocessor repair. Precaution shall be taken to minimize disruption of facility operations by service work.

### 3.5 SEQUENCE OF OPERATION

- A. System Operation Schedule: All air conditioning and fan systems shall operate at the following schedule (adjustable by Owner):
- All systems shall operate as scheduled on Monday through Friday from 7 AM to 6 PM. All systems shall be off on Monday through Friday from 6 PM to 7 AM. All systems shall be off on Saturday and Sunday.
- B. Alarm Condition Display: On any alarm, the Central Workstation shall display the equipment mark number and the specific alarm condition. Upon highlighting the alarming equipment, the program shall have a graphic display function that displays the plan of the building floor with the location of the alarming equipment indicated.



- C. System Report: The DDC/EMS shall prepare a system report on demand. The report shall include the following items in the report:
- Date and time of the current report.
  - Date and time of the previously reviewed report.
  - List of any alarms that have occurred since the last report. The list shall include the time of the alarm, unit that had the alarm, and the type of alarm.
  - List of any still active run time notices. The list shall include the time of the initial notice, unit that had the notice, and the type of notice.
  - List of any still active filter change notices. The list shall include the time of the initial notice, unit that had the notice, and the type of notice.
  - List of any off-hours operations that have occurred since the last report. The list shall include the date and time of the off-hours operation, the unit identification number, the physical / service location of the unit, and the duration of the off-hours operation.
- D. Evidence Storage Exhaust System (EF-1): The fan shall run continuously on start by the DDC/EMS and modulate fan speed through a wall mounted VFD. Install CO sensors as shown on the plans. The DDC/EMS shall use the sensor in the space with the highest PPM of CO to control the fan speed. The fan shall start at the minimum speed of 25% (adj.) of full speed when one of the CO sensors is at 5 PPM. The DDC/EMS shall modulate the fan speed from 25% to 100% of full speed proportional to the PPM of CO measured from 5 PPM to 25 PPM of CO. Coordinate fan speeds with the balance contractor.  
On a signal from the fire alarm system, the fan shall shut off until the alarm is reset.
- E. Collateral Vehicle Storage Exhaust System (EF-2A, 2B): The fans shall run continuously on start by the DDC/EMS and modulate fan speeds through a wall mounted VFD. Install CO sensors as shown on the plans. The DDC/EMS shall use the sensor in the space with the highest PPM of CO to control the fans speed, with both fans running at the same speed. The fans shall start at the minimum speed of 25% (adj.) of full speed when one of the CO sensors is at 5 PPM. The DDC/EMS shall modulate the fans speed from 25% to 100% of full speed proportional to the PPM of CO measured from 5 PPM to 25 PPM of CO. Coordinate fans speeds with the balance contractor.  
On a signal from the fire alarm system, the fans shall shut off until the alarm is reset.
- F. Energy Recovery Ventilator (ERV-1): ERV shall interface with the building DDC/EMS through the DDC/EMS interface card in the unit controller. Supply air and exhaust air fans shall run continuously during occupied hours. The factory DDC controller shall monitor the temperatures of the outside air intake, exhaust air discharge, outside air discharge, and exhaust air intake; dirty filter sensors; current sensors on the fans. These will be reported to the DDC/EMS through the unit controller.  
If the fans stop, the DDC/EMS shall signal a unit shutoff alarm.

The unit controller will signal to the DDC/EMS when the unit filters need to be changed.

- G. Ceiling Fan (CF-1A, 1B, 2A to 2D): The ceiling fan shall interface with the building DDC/EMS through the DDC/EMS interface card in the wall mounted fan controller furnished with the fan. The fan shall start/stop by the DDC/EMS per the building schedule. The fan speed shall be adjusted through the wall mounted fan controller.

END OF SECTION 250900

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

Contact requirements of the foregoing GENERAL CONDITIONS, SPECIAL CONDITIONS and supplements thereto and all requirements of Division 1 of these Specifications shall form a part of this Section with the same force and effect as though repeated herein. The provisions of this Section shall apply to all of the following Sections of Division 26, 27 and 28 of these Specifications. All applicable portions of the work under Division 26, 27 and 28 shall conform fully to all provisions of all other Division Sections along with other Sections of these Specifications.

### 1.2 SUMMARY OF WORK

The Contractor shall provide all materials, tools, equipment, labor and services necessary to furnish and install complete working electrical systems as shown on the plans and described within these Specification. All systems, at project completion and before final acceptance, shall be demonstrated to have a complete and working functional operation. The work includes but is not specifically limited to items indicated on Drawings and specified herein.

### 1.3 DESCRIPTION AND INSTALLATION OF SYSTEMS

- A. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.
- B. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.
- C. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- D. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with Section 1.09 SUBSTITUTIONS.

#### 1.4 RELATED DOCUMENTS

A. Codes and Regulations: All electrical equipment and material and its installation shall conform to the current requirements of the following authorities and Section 01-080 CODES AND STANDARDS:

1. Occupational Safety and Health Act (OSHA).
2. California Electric Code (CEC), 2019 Edition.
3. California Administrative Code (CAC).
  - a. Title 8, Safety Orders.
  - b. Title 19, Fire and Panic Safety Standard.
  - c. Title 24, Building Standard.
4. California Fire Code.
5. California Building Code.
6. California Mechanical Code.
7. California Plumbing Code.
8. Local Codes, if applicable.

NOTE: Where two or more codes conflict, the most restrictive shall apply. Nothing in these Plans and Specifications shall be construed to permit work not conforming to applicable codes.

B. Tests and Standards: The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).
2. Underwriters Laboratories, Inc. (UL).
3. National Electric Manufacturers Association (NEMA).
4. Electrical Testing Laboratories (ETL).
5. National Fire Protection Association (NFPA).
6. Insulated Power Cable Engineers Association (IPCEA).
7. Institute of Electrical and Electronic Engineers (IEEE).

8. Illumination Engineering Society (IES).

1.5 EXAMINATION OF DOCUMENTS AND SITE

Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.

By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Plans and Specifications and upon all existing conditions and limitations applying to his work.

1.6 EXECUTION

- A. Workmanship: The work shall be performed by competent workmen, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these Specifications and the satisfaction of the Architect or Electrical Engineer.
- B. Safety: All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.
- C. Coordination: The Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size and voltage and other requirements to any equipment to be installed. The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided.  
Prior to commencing construction the Electrical Contractor shall arrange a conference with the Mechanical and Plumbing Contractors and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them. Prior to roughing in, he shall, in writing, inform the Architect or Electrical Engineer that all phases of coordination of this equipment have been covered.  
Exact equipment rough-in locations shall be verified from shop drawings.
- D. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.

- E. Sleeves and Openings: Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.
- F. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or closets shall be field painted per painting specifications, finish M2, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.

#### 1.7 QUALITY CONTROL

- A. Supervision: The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.
- B. Inspection and Tests: The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.
  - 1. Arrange for all tests and inspections and provide minimum 48 hours' notice to the Architect or Electrical Engineer.
  - 2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
  - 3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.
  - 4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
    - 1. Check and tighten nuts, bolts, lugs, and similar elements of equipment; switchboards, motor control centers, busways, panels, etc.
    - 2. Submit complete test reports with maintenance manual submission.

- C. Guarantee: The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Plans and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees between Contractor and his suppliers shall not affect guarantees between Contractor and Owner.

## 1.8 GROUNDING

- A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.
- B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6B&S gauge, rubber covered, double braided wire with ground clamps.
- C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
- D. A separate grounding conductor shall be run in all pvc conduit runs.

## 1.9 SUBSTITUTIONS

- A. The Specifications or Plans are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.
- B. All requests for substitution shall be made in accordance with the General requirements - SUBSTITUTIONS.
- C. All requests for substitutions shall be in writing, received at least 7 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.
- D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.

- E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.
- F. Representative samples may be required for determination of equality.

#### 1.10 SUBMITTAL

- A. Make submittal for all material to be used on the project, whether as specified or substitutions, within thirty-five (35) days after award of Contract by the Owner, in accordance with the SUBMITTALS section, and the following:
  - 1. All submittal shall be neat and bound in a suitable folder or binder.
  - 2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
  - 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.
  - 4. All submittal shall be submitted in coherent groups, e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.
  - 5. Organize submittal in same sequence as they appear in specification sections, articles or paragraphs.
- B. Product Data: Submit eight copies, in groups, as follows:
  - 1. Lighting, Fixtures, and Controls
  - 2. Switchboards, Panels, Disconnects, and Transformers
  - 3. Fire Alarm and Special System Equipment
  - 4. Wiring devices
  - 5. Conduits and raceway types required, including fittings
  - 6. Electric Wire, cable, connectors, medium voltage cable, junctions, splices.
  - 7. Each type of support, anchor, sleeve and seal
- C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources,



circuit numbers, and shall be compatible with the Contract Drawings and Specifications.

- D. Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.
- E. Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

#### 1.11 DOCUMENTATION

- A. Construction Record Drawings: The Contractor shall furnish to the Architect or Engineer, in accordance with the GENERAL REQUIREMENTS, a complete set of "as constructed" drawings which clearly indicate all deviations from the basic contract drawings, including exact dimension locations and depths for all stubbed conduits, location and size of spare conduits, & conductors, all new and uncovered existing work outside the buildings, power feeder runs, and communications "primary" conduit runs. Corrections and changes shall be kept up to date at all times.
- B. All submittal and shop drawings will be resubmitted with record drawings showing all revisions and changes made, clearly marked with field termination wire so as to reflect actual construction record conditions. Revisions and changes will be enumerated, and new dates of drawings shown.

#### 1.12 EARTHWORK

- A. Scope: Do all earthwork required for installation of the underground electrical work in accordance with EARTHWORK Specifications and the following.
- B. Existing Utilities: Prior to performing any excavation, Contractor shall establish all existing utilities in area.
- C. Patching and Paving: General Contractor to patch and pave all surfaces involved with underground utilities after fill compacted by Contractor to specified values.
- D. After Excavation: Raceways shall be installed as quickly as possible and the excavation backfilled in order to reduce hazards. Barricades, construction signs, battery operated flashing lights and guards, as required, shall be placed and maintained during the progress of the construction to protect persons from injury and to avoid property damage as per General Conditions.

#### 1.13 EXISTING SUB-SURFACE STRUCTURES

- A. The civil plans indicate all known electrical and major sewer and water systems on the site, underground. No exact recorded information is available on any and/or all buried systems on the site. Responsibility for absolute accuracy of site data indicated on electrical plans is not assumed by the Architect or Electrical Engineer.

- B. It shall be the Contractor's responsibility to protect all underground systems and structures while excavating and installing the electrical distribution system. Any damage done to the existing system during the course of electrical work shall be repaired to the satisfaction of the Owner and the utility or agency involved, at the expense of the Contractor.

#### 1.14 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 his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

#### 1.15 OPERATION AND SERVICE MANUALS

- A. Contractor shall prepare manuals describing the operations, servicing, and maintenance requirements of all electrical equipment provided and complete parts lists, in accordance with the SUBMITTALS section.
- B. Equipment: Equipment described in the manual shall include all equipment listed under "Submittal", and on all other auxiliary miscellaneous systems.
- C. Information contained in the manual shall consist of 8-1/2" x 11" size catalog data on each item, together with parts lists, description of operation, maintenance information, shop drawings, wiring and riser diagrams and test reports as installed. Catalogs and data in the manuals shall be neat, clean copies. Drawings shall be accordion folded to letter size and installed in an envelope within the manual. An index shall be provided, which shall list all contents in an orderly manner with the respective equipment supplier's name, address and telephone number, and the manufacturer's recommended servicing instructions. Diagrams shall be complete for each system installed. Provide divider sheets with identifying tabs between each category.

END OF SECTION 260000

## PART 1 – GENERAL

### 1.1 SCOPE

Furnish and install material and equipment as indicated on the drawings and as specified.

### 1.2 MATERIALS AND EQUIPMENT

Shall be new and of the best quality used for the purpose in good commercial practice.

### 1.3 UL APPROVAL

All material and equipment within the scope of the UL re-examination service shall be approved by the Underwriters' Laboratories for the purpose for which they are used and shall bear their label.

### 1.4 STORAGE

All material and equipment shall be stored in a manner to prevent damage or corrosion. Equipment with components which can be damaged due to moisture shall be placed in special heated storage facilities.

### 1.5 DRAWINGS

Drawings for all equipment are intended to be diagrammatic only. Any location not actual dimension is not to be considered as necessarily final or accurate. Exact locations must be determined in the field from the requirements of the equipment that is to be installed.

### 1.6 COORDINATION

Before rough-in of any utility lines, services, and feeders, or of any equipment, this Contractor must coordinate his work with that of other crafts and trades so that these services shall be installed in their proper locations and without interference to the equipment or building structure. This will require cooperation among all crafts and trades, the inspector, and General Contractor, along with study of shop drawings and the building plans.

### 1.7 ELECTRICAL WORK EXPOSED TO MOISTURE

- A. All electrical devices and equipment installed in outdoor exposed locations shall be protected by suitable NEMA type 3R enclosures, cast boxes with gasketed covers, or other Engineer approved methods.
- B. All electrical devices and equipment installed in exposed locations of PVC coated cast boxes with gasketed covers, or other Engineer approved methods.
- C. All ferrous metal portions of electrical work exposed to weather including conduits, clamps, supports, etc. shall be hot-dip galvanized.

## 1.8 SEISMIC ANCHORAGE

- A. Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and electrical equipment, as required by the California Building Code, and the following.
- B. Anchorage of Equipment: All mechanical and electrical equipment shall be braced or anchored to resist a horizontal force acting in any direction.
- C. Conduit that crosses structural separation between buildings or building units shall be installed with flexible connections, suitable to accommodate longitudinal and transverse displacements.

## 1.9 SUBMITTAL

- A. Product Data: Submit manufacturer's data including specifications, installation instruction and general recommendations for each item submitted under Submittal, Section 260000, 1.10.

## PART 2 – PRODUCTS

### 2.1 CONDUIT MATERIALS AND COMPONENTS

- A. Galvanized Rigid Steel: Exposed exterior damp locations, in concrete walls and slabs, in concrete block walls, or elsewhere shown on plans. Rigid metal conduit shall be new galvanized thickwall threaded, furnished in 10-foot lengths.
- B. PVC Coated Rigid Steel: Exposed interior damp locations, threaded, furnished in 10-foot lengths, with PCV coated Couplings.
- C. Flexible Liquidtight Metallic Conduit: Connections to machinery. Conduit shall be flexible interlocking single strip steel conduit with liquidtight exterior cover, with all connections made with plastic bushed fittings and with copper ground wire. Maximum length 36".
- D. Plastic P.V.C., Schedule 40: Underground locations and below vapor barrier of slabs, and in solid grouted masonry walls where wall entry and exit points are made with rigid galvanized steel. P.V.C. conduit shall be Type 40 heavy thickwall polyvinyl chloride conduit, minimum 3/4" size, Underwriters' Laboratories tested, furnished in 10-foot lengths.
- E. Thin Wall E.M.T.: Interior dry, concealed locations, exposed only at 8 feet above finished floor and in non-finished areas. E.M.T. shall be new galvanized, furnished in 10-foot lengths. E.M.T. shall be coupled with steel screw type connectors in concealed locations, and plastic bushed sealing type couplings in exposed locations. Crimp and die cast type connectors are not acceptable. E.M.T. shall be factory colored as follows:

Natural – 120/208V wiring  
Yellow – 277/480V wiring  
Red – Fire Alarm Systems  
Blue – Data and other Low Voltage Systems  
Orange – Fiber Optic Cable

- F. Flexible Metallic Conduit: Connections from junction boxes to lay-in light fixtures to 6 feet or less in accessible ceilings. Conduits shall be flexible interlocking single strip zinc coated, or steel with copper ground wire.

## 2.2 OUTLET AND SWITCH BOXES

- A. Boxes shall be one-piece die formed galvanized steel of shape and with fittings necessary to suit location and use. Boxes shall be of sufficient size to contain all wires, devices, and connection fittings required without crowding. Ceiling and surface mounted boxes shall be minimum 4" square or octagonal. Plaster rings shall be provided where required.
- B. Exposed exterior boxes shall be cast type with gasketed weatherproof cover.

## 2.3 WIRING DEVICES

- A. Wall Switches:
  - 1. 120-277 Volt Switches: Quiet slow make, slow break design, Decora handle, with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, 3-way, and 4-way switches.
  - 2. Color: Verify exact device colors with Architect prior to purchase and installation.
- B. Receptacles:
  - 1. Standard Duplex Receptacles: Full gang size, polarized duplex, parallel blade, U-grounding slot, specification grade, nylon face, Decora rated at 20 amperes, 125 volts, designed for split feed service.

Acceptable types are decora, heavy-duty, industrial specification grade:

	<u>Standard</u>	<u>GFI type</u>
Normal power, Uncontrolled	Leviton 16352-W	Leviton G5263-TW
Normal power, Controlled	Leviton 16352-1PW	Leviton G5362-2TW

Isolated Ground      Leviton  
16352-IGW

2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex receptacles, indicating voltage, phase and amperes.
3. Verify colors of all devices with Architect and Fresno County IT department prior to purchase and installation.

#### 2.4 WALL PLATES

- A. Scope: Provide plate for each wiring device and for each signal or communication outlet.
- B. Interior Flush: All locations unless noted otherwise; smooth stainless steel.
- C. Weatherproof Plates: Cast metal, gasketed; for receptacles, provide spring loaded gasketed doors. Provide at all weatherproof locations.
- D. Where two gang boxes are required for single gang devices, provide special plates with devices opening in one gang and second gang blank.
- E. Plates with Engraving: Provide black paint filled engraving for the following.
  1. Switch plates for all outlets not within sight of switch. Engrave with function and location of outlet.
  2. Lighting controls; engraved area identification of each switch where 3 or more switches are ganged together.
- F. Blank bushed or special outlet plates shall be provided for all signal and communications systems outlets as required.

#### 2.5 WIRE

- A. Low Voltage - (Under 600 Volt):

Branch circuit wire shall be copper type THWN/THHN-2, 90°C, 600 volt, from new fresh stock, bearing U.L. label, delivered to site in unbroken packages; minimum power size 12 AWG. All 20/1 home runs over 125 feet from panel shall be increased to next larger size. Conductors #8 or larger, shall be stranded copper, #10 AWG and smaller shall be solid copper or as shown on plans. All control wires shall be stranded.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION OF CONDUIT RACEWAYS

- A. General: Install conduits in a neat manner, concealed except as noted. Mount conduits directly to building structure with clamps or one-hole straps where possible. Secure straps with cadmium plated wood screws into wood, and machine screws into metal or inserts preset in concrete. Where impractical to secure directly to structure, suspend on conduit hangers. Wherever possible, group and rack multiple conduit runs.
- B. Installation and Cleaning: Install free from dents, kinks and bruises. Red lead all threaded conduit joints before coupling. Plug ends at time of installation to prevent entry of dirt or moisture. Thoroughly clean out conduits before installing conductors. Thoroughly clean all exposed conduit exteriors.
- C. Provide tagged pullwire in all empty conduits. Pullwire shall be 1/8" stranded nylon, leave 36" free coiled each end.
- D. Plastic conduit shall be installed in accordance with manufacturer's recommendations and accepted trade practice. Plastic conduit shall be encased in 3" concrete envelope. Where plastic conduit rises above ground in exposed locations, the riser bend and riser shall be of rigid metal conduit installed according to rigid metal portion of this specification item.
- E. All plastic, flexible, feeder and receptacle branch conduits shall carry a grounding bond wire with the size as shown, or where not shown, as determined by applicable codes for the ampacity of the circuit being carried.
- F. Protective Coating: All metallic conduits installed in contact with earth or in concrete on contact with earth shall be coated with a minimum 40 mil P.V.C. coating on all conduit lengths and fittings. The coating shall correspond to ATSM D638-68, D1706, D140-64, and D746-64T specifications and Federal test standard 141, method 615z. Coating shall be continuous without flaws showing exposed metal. Coating shall extend to the device conduit is terminated to in exposed locations and 12" above grade in unexposed locations.
- G. Conduits which stub-up through floor shall be installed so that none of the curved portions of the elbow is exposed. Conduit bends and risers terminating below-grade runs shall be 40 mil PVC coated galvanized rigid steel.
- H. Conduit Routing: Route exposed conduits parallel or perpendicular to walls or floors. Install conduits in masonry walls at time of wall construction. NO conduits will run under heavy equipment, footing or other structural elements. Where runs must cross footings, install in sleeves per structural details.
- I. Conduit Runs in Ceiling Areas: Conduits run above accessible ceiling shall be routed parallel or perpendicular to ceiling system and structural members. All conduit runs shall be coordinated to avoid conflicts with mechanical and structural systems, lighting fixtures and ceiling support system. Conduits shall be installed as close to the above structure as possible to avoid conflict with removal of ceiling panels.

- J. Conduits Penetrating Membranes: Where conduits penetrate wall or slab membrane moisture barriers, penetration shall be sealed in accordance with the requirements of applicable sections of these Specifications for "Thermal and Moisture Protection".
- K. Conduits Penetrating Roof: Provide flashing and counter flashing making watertight joints where conduits pass through roof or waterproofing membranes, in accordance with existing roofing manufacturer's warranty requirements.
- L. Escutcheons: Conduits penetrating wall, floors, or ceiling in exposed locations shall be installed with appropriate escutcheon plates.
- M. Separations: Coordinate with all other crafts to allow minimum of 12" running and 6 inches crossing clearance at flues, hot water pipes, steam pipes, and heat sources. Keep electrical conduits free from contact with all other piping runs of other systems or of dissimilar metals.
- N. Conduits Crossing Building Joints: Conduits shall not be run in concrete slab or wall construction where passing through an earthquake or expansion joint. At such condition, conduit shall be run exposed or in furred ceiling space with 24" length of flexible conduit crossing joints.
- O. Conduits Penetrating Floors and Walls: Provide grouting around raceways where penetrating floor slabs, concrete or masonry walls. At fire separation walls or floors, use Engineer approved expanding type putty, Nelson Flameseal or equal, to maintain the fire rating of the surface penetrated.
- P. Conduit Support: Support of conduit and tubing in steel stud walls shall be by #18 gauge steel wire, secured to steel bars or straps attached to steel studs. Conduits rising vertically between wall studs shall be tied to a horizontal cross support attached tightly to eliminate any movement.
- Q. Conduit Hangers:
  - 1. Conduit hangers spaced at 8'-0" on center maximum with one hanger adjacent to each outlet box, shall be installed wherever conduit cannot be directly attached to structure. Hangers shall be secured to wood structures with steel brackets and wood screws, to steel structures with appropriate clamps, and to concrete structures with preset imbedded inserts or machine screws with expansion shields. Present inserts are preferred to provide a secure anchorage with greatest location flexibility. Power or velocity driven type attachments will not be allowed. Complete hanger installation shall provide a safety factor of 5 based upon maximum CEC allowed conduit fill.
  - 2. Hangers for rigid conduit and EMT 2" and smaller in concealed spaces shall be galvanized perforated type strap wrapped around raceway and bolted; then fastened to structure as described above.



3. Trapeze type supports shall be used where conduits are run grouped together. such hangers shall consist of 3/8" minimum steel rods, structural steel channels, and clamps of Kindorf, Unistrut, or approved equal manufacture.

### 3.2 INSTALLATION OF EXTERIOR PULL BOXES AND MANHOLES

- A. Where pull boxes are used without bottoms they shall be set on six inches of 3/4" crushed rock of a volume equal to that of the pull box used.
- B. Where pre-case units are used all joints are to be tongue and groove, sealed with a suitable sealer.
- C. Where conduits enter horizontally, they shall be bushed with belled ends and terminate flush with the inside of window. All cracks and openings shall be grouted smooth.
- D. Where conduits enter, other than from horizontal runs, they shall be properly bushed and extended a minimum 1/2" from inside of wall or bottom into pull box. They shall be at no more than 45 degrees rise from the horizontal runs.
- E. All conduits entering pull boxes and manholes shall be sealed watertight with suitable duct sealing compound.

### 3.3 INSTALLATION OF JUNCTION BOXES AND INTERIOR PULL BOXES

Locate pull boxes and junction boxes above removable ceilings or in electrical rooms, utility rooms, or storage areas. No junction box will be installed in an inaccessible area.

### 3.4 INSTALLATION OF OUTLET AND SWITCH BOXES

- A. Mounting: Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above removable ceilings. Boxes shall be set true and flush with all necessary and correct adapters and/or plaster rings. All boxes set deeper than code allowable shall be corrected by use of factory-made extension rings such as Raco #976 or equal.
- B. Device Locations: Locations of devices on plans are approximate only. Contractor shall study the architectural and structure plans and locate the outlets so that his work is coordinated with the work of others and the fixtures and devices present a pleasing and symmetrical appearance when installed. The location of outlets centered on any architectural feature shall be exact. Outlet locations may be moved a maximum of 10' from the location shown on the drawings before roughing-in without cost to Owner. Switches in relation to door swings and cabinets must be coordinated with architectural drawings. This Contractor shall coordinate with Mechanical Contractor and security and fire alarm Contractor regarding thermostat and security outlets and other equipment locations.
- C. Device Height: The following dimensions for locating wall outlets represent the

distance from the finished floor to the center of the outlet, unless noted otherwise.

Outlet	Inches to center
Data/ Computer	18
Convenience receptacle	18
Lighting switch	45

Adjust outlet mounting height to agree with required location for equipment served.

- D. Boxes located in stud walls shall be mounted as follows:
1. Blocking material shall be installed behind all boxes with conduit entrances on one side only or on opposite sides. Outlet box shall be securely attached to both the adjacent stud and the blocking material. Blocking material shall be same as wall studs and shall be attached to two adjacent studs.
  2. Rear blocking may be omitted for boxes with conduit entrances on two adjacent sides if conduits are secured within 8" of box to adjacent wall stud or to a horizontal support between studs. Box shall be securely attached to adjacent stud. Support material shall be same as wall studs or a piece of tubing secured between studs.
- E. Boxes in counterbacks or casework shall be installed in accordance with architectural details. Where not indicated in details, the Architect shall be consulted prior to installation.
- F. Boxes above accessible suspended ceilings shall be mounted to horizontal trapeze hangers, secured to rod attached to structure above, or attached to ceiling system suspension wire with "Caddy" clips. Conduit and boxes shall be located a minimum of 12" above ceiling where suspended depth permits. conduit and boxes shall not be installed prior to ceiling unless system is attached or braced to structure as to prevent horizontal movement of conduit.
- G. Boxes Located in Masonry Walls: Coordinate cutting of masonry walls to achieve neat openings for boxes. Use rotary cutting equipment to cut masonry work for installation. Where furring occurs, install extension rings to bring box flush to furred surface. Where masonry is the finished surface, locate boxes uniformly for each height at either the top of bottom of a block course and install so that devices plate will fit tight to block wall without extending over mortar joints.
- H. Outlets in acoustical tile ceilings shall be located either centered on the joint between tiles, or in the center of a tile. All such outlet locations shall be carefully planned and verified with Architect.
- I. Exterior Wall Outlets: Conduits shall enter boxes or exterior wall mounted devices at the sides or top only. No conduit shall enter the bottom of such boxes.
- J. Common Boxes and Alignment: Devices shown adjacent to each other at the same

mounting shall be gang installed under a common plate, except for outlets of different voltages such as telephone and duplex receptacles. Outlets mounted one over the other, or side by side, shall be in exact alignment, centered on one another.

- K. Box Separation: Boxes and conduit shall be installed in a manner which minimizes sound transmission between rooms. Boxes mounted in a common wall shall be off-set horizontally a minimum of 12 inches and mounted in different stud spaces wherever possible. Boxes in fire rated construction shall be installed per CBC. No boxes shall be mounted back to back. No through boxes shall be used. Off-set boxes shall be connected with flexible conduit not to exceed 18" in length.
- L. Sealing: All unused holes or openings in boxes shall be slugged or sealed by an acceptable means.

### 3.6 INSTALLATION OF WIRING DEVICES

- A. Devices shall be securely fastened to outlet box with face flush with plate.
- B. Mount receptacles vertically in appropriate boxes.

### 3.7 INSTALLATION OF WIRE

- A. Scope: Provide all wiring for complete electrical work, installed in code conforming raceway. Branch circuit wiring shall be #12 AWG minimum, unless noted otherwise.
- B. Home Runs: Branch circuit conductors shall be home run to panelboards or motor control centers in groupings shown on the drawings. Combining branch circuit home run conductors in single conduits other than that shown shall not be permitted.
- C. Color coding shall be strictly adhered to and shall be as follows:
  - 1. Color coding shall be:

120/208 Volt	277/480 Volt
A Phase - Black	A Phase - Brown
B Phase - Red	B Phase - Orange
C Phase - Blue	C Phase - Yellow
Neutral - White	Neutral - Grey
Ground - Green	
Travelers - Pink	
  - 2. Color coding utilized shall be noted on electrical "as constructed" drawings and shop drawings.
  - 3. The wires shall be of solid colors in size #6 and smaller. In sizes #4 and larger the wires shall be black and 3" width of the appropriate color tape

shall be applied around the wire at 12" intervals starting 2" from the termination of the end of the wire.

4. The color coding for control circuit wires will be as noted on the plans or as agreed upon with the Architect or Electrical Engineer and will be of a color other than that designated for the phase wires. Where control wires are installed and various colors are used, they shall be noted on the "as constructed" drawings and shop drawings turned in at the completion of the job.
- D. Pulling: Use approved wire pulling lubricant for pulling #4 AWG and larger wire. Oil or grease is prohibited as a conductor pulling lubricant. All conductors #8 and smaller shall only be pulled by hand. Pulling lubricant for conductors over 600 V will be approved by the conductor manufacturer and the Architect or Electrical Engineer.
- E. Splices: Join the conductors securely, both mechanically and electrically using crimp, compression, or pressure type connectors, except that screw-on type connectors shall not be used for wires larger than #10 AWG. The splice area shall be taped to provide equal or greater insulation than the original. Tape run-back over the original insulation shall extend 3 to 5 overall diameters of the insulated wire.
- No splices in conductors over 600 V or feeders over #6 AWG is permitted.
- F. Splice only in accessible junction or outlet boxes.
- G. Wiring in panelboards, switchboards, and cabinets shall be neatly installed. Wiring shall be grouped, laced or clipped, and fanned out to wiring terminals.
- H. Identification and Markings: In addition to all other requirements for identification and marking of wires, panelboards, and junction boxes, the following shall be strictly adhered to:
1. The identification of individual wires terminating in either junction boxes, circuit breakers, terminal strips, or on control devices shall be done by means of appropriate tape marker.
  2. Where subdistribution wires terminate they shall be marked with the point of origination or point of destination, phase, and voltage to ground. This will include all subdistribution circuits originating from 480/277 volt or 208/120 volt distribution panels serving lighting circuits, receptacle circuits, small power equipment, and small mechanical equipment.
  3. Thus each end of a particular feeder or subdistribution class circuit shall be marked as to its phase and point of origination or destination and either voltage line to line in distribution class circuits or voltage to ground in subdistribution class circuits.

4. All control circuits will be marked at each control panel as to their function and where they terminate.  
Where control wires terminate into relays or enclosures or terminal cans remote from the main point of control, the wires will be marked as to their function and where they originate.
  5. All associated wiring integral within a control cabinet may be marked with the printed circular wire wrapping at each end.
  6. Where wires are pulled through or looped through a junction box, they shall be marked as to the point of origin and the point of destination. All markings in above ground junction boxes will be via linen tags with indelible ink and all markings on junction boxes or pull boxes below ground level will be by means of 1/4" plastic tape with embossed letters. This plastic tag will circle the wire and both ends stapled together.
- I. All junction boxes in attic spaces terminating or serving as gathering points for 208 volt circuits will have the cover painted blue.
  - J. Testing: All wires under 600 volt potential shall be tested with a 600 volt megohm prior to energization and the readings shall be recorded and handed in with the record drawings at the completion of the project. The tests shall be conducted from phase to phase and from each phase to ground.

### 3.8 INSTALLATION OF MECHANICAL AND OWNER'S EQUIPMENT WIRING

- A. Furnish all power supplies for Mechanical Division equipment as shown on the mechanical plans.
- B. Make all connections of power to all mechanical and Owner's equipment along with installation of required disconnection means. This Contractor shall make all connections to other miscellaneous equipment which required line or low voltage power. Verify accessibility of all outlets and re-adjust outlets if necessary to meet the Code. Verify sizes and current characteristics of all equipment before installation of wiring and adjust wiring properly as required.
- C. Supply all electrical junction boxes for mechanical equipment.
- D. After all wiring to each unit is complete, Electrical Contractor shall cooperate with Mechanical or Equipment Contractors in testing equipment for proper operation and shall correct wiring as required for proper operation.

END OF SECTION 260500

This page is intentionally left blank.

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 - Specification sections, apply to work of this section.
- B. Section 26 00 00 - General Electrical, and Section 26 05 00 - Basic Materials and Methods sections apply to work specified in this section.

### 1.2 SCOPE

- A. Work included: Furnishing and installation of a complete electrical distribution and grounding system. Conditions of this section apply to all other 26 40 00 series sections included.
- B. Related Work: Refer to other sections, particularly those listed below, so as to properly coordinate work specified herein with that specified elsewhere to produce a finished, workmanlike, fully functioning installation.

All other Electrical Sections: Division 26, 27, and 28

### 1.3 QUALITY ASSURANCE

Codes and Regulations, Reference Standards: See Section 26 00 00.

### 1.4 NAMEPLATES

Laminated phenolic plastic, color coded black for equipment, with white letters. Provide for identification of each transformer, panelboard and motor control center, secure to face with two (2) chrome plated screws each. A schedule of nameplates shall be included with the shop drawings for approval.

### 1.5 SUBMITTAL

- A. Product Data: Submit manufacturer's data on service entrance equipment, switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.
- B. Trip Curves: When requested, submit trip timing curves for all circuit interrupting devices.
- C. Nameplate Schedule: Submit nameplate schedule for approval.

### 1.6 COMPONENT COORDINATION

In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum.

Equipment manufacturer shall be General Electric or Square D. It shall be the manufacturer's responsibility though the Electrical Contractor to coordinate all components of the system in order to ensure systems that will provide maximum protection of equipment and reliable safe operation.

#### 1.7 FEEDER CONNECTIONS

Provide cast, saddle type bolted lugs or hydraulically set compression lugs for all bus connections. Manufacturer shall be Thomas and Betts, Burndy, O.Z. or approved equal. Lugs in which the set of screw embeds directly into feeder conductor shall not be used.

#### 1.8 MISCELLANEOUS

- A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment.
- B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.
- C. Space for Future Protective Device: Provide as indicated on drawings; shall be completely equipped for the future addition of a circuit breaker or fused switch, including all connections.

### PART 2 - PRODUCTS

#### 2.1 PANELBOARDS

- A. Panelboards shall be Air Circuit Breaker bolted type, with voltage, phase, and breakers as specified in panelboard schedules. Panelboards shall be installed flush or surface or specified, at locations as indicated on plans. Panelboards shall be installed in code gauge rust proof steel cabinets with flush door having flush locks all keyed alike and with trim cut square and true.
  - 1. Panelboards: Square D or General Electric
- B. All panelboards and breakers shall meet the requirements of the indicated available symmetrical short circuit current or have a minimum bus bracing to meet figure shown. The minimum rating shall be 35kAIC for 120/208V systems and 42kAIC for 277/480V systems when not indicated or known.
- C. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling or tapping.
- D. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.



- E. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug or each outgoing feeder requiring a neutral connection. A ground bus will be included in all panels.
- F. Boxes shall be at least 20 inches wide made from galvanized steel. Provided minimum gutter space in accordance with California Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.
- G. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike and directory frame and card having a transparent cover shall be furnished with each door.
- H. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.
- I. All main bus bars shall be copper sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.
- J. Circuit breakers shall be quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multipole breakers. (Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when the breaker is tripped). Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" and carry the SWD marking. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120V ac branch circuits as specified on the plans or panel board schedule. This protection shall be an integral part of the branch circuit breaker which also provided overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional slide pole circuit breaker. Connections to the bus shall be bolt on.

## 2.2 DISCONNECTS

- A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.
- B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof, and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be of type specified on plans.
- C. When the disconnect is not clearly visible from the control location, provide it with an operating handle which is lockable in the open position.

### 2.3 GROUNDING

- A. Clamps, bonds, etc. suitable and as necessary to provide continuous ground system.
- B. All grounding conductors shall be copper, sizes not less than that required under CEC requirements.

### 2.4 MOTOR STARTERS

- A. Manual motor starters to be quick-make, quick break, with overload protection. General Electric cr 101 for 120/240 volt 1 hp or less.
- B. Magnetic motor starters shall be full voltage non-reversing unless indicated with control power transformer (120 volt coil) and with overload relay protection. Reduced voltage type starters shall have starting timing relays and multi-tap autotransformers. Combination type shall have integral fused switch, motor circuit protector, or circuit breaker as indicated. Provide Hand-Off-Auto selector switches, pushbuttons, pilot lights, control circuit disconnect, elapsed time meters, interlocks, and other control devices as required or indicated. Provide spare 2 normally open and 2 normally closed auxiliary contacts.
- C. Motor control centers shall be floor standing, NEMA I enclosures, and with Class 1, Type B wiring, unless noted otherwise.

### 2.5 DRY PAD-MOUNTED TRANSFORMERS

- A. Transformers shall be compartment type, K-4 rated, self-cooled, tamper resistant and weather resistant for mounting on a pad and shall comply with the latest applicable standards. The coils shall be wound with copper conductors.
- B. Transformers shall have a maximum temperature rise of 80°C above a 40°C ambient.
- C. Primary taps shall be full capacity, with a minimum of two 2 1/2% above and below rated voltage.
- D. KVA sizes and voltages shall be as shown on the drawings.

## 2.6 SWITCHBOARDS AND SERVICE

- A. Manufacturer's: Subject to compliance with requirements, provide switchboards of one of the following or approved equal:

General Electric Company or Square D Company

- B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation. Service entrance switchboards shall comply with serving utility requirements.
- C. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54 degrees F, and 90 degrees F for circuit breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color. Construct units for outdoor, NEMA Type 3R.
- D. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility as indicated. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load slide terminals. Coat enclosures with manufacturer's standard corrosive resistant finish.
- E. Bussing: Provide switchboard with sufficient cross-sectional area to fulfill U.L. Standard 891 pertaining to temperature rise.

## PART 3 – EXECUTION

### 3.1 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS

- A. Install switchgear and switchboards as indicated, in accordance with manufacturer's written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and NEC standards, and applicable portions of NECA's "Standard of Installation".
- B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

### 3.2 INSTALLATION OF PANELBOARDS

- A. Provide mounting brackets, busbar drilling, and filler pieces for unused spaces.
- B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.
- C. All distribution panelboards shall have all sub feeders and main breakers marked with 1" x 3" plastic name tags secured with two self tapping screws.
- D. All panelboards shall be provided with a 2" x 3-1/2" plastic name tag on the front of the panel door or on the trim, indicating panel designation and distribution panel and circuit feeding above panel, secured with two self tapping screws.
- E. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed.
- F. Contractor shall check and tighten all factory made wire or lug connections. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.
- G. Install four (4) spare 3/4" conduits from all panelboards to accessible ceiling space.

### 3.3 INSTALLATION OF DISCONNECTS

Install disconnects for all equipment and motors of the size required and as recommended by manufacturer.

### 3.4 INSTALLATION OF GROUNDING

- A. Scope: Provide grounding system complying with the codes and ordinances specified. Grounding system shall provide continuity through the entire electrical system.
  - 1. Panelboard ground buses.
  - 2. PVC conduit or other raceways.
  - 3. All motors.
  - 4. All lighting fixtures.
  - 5. Grounding terminals of all receptacles.
  - 6. Miscellaneous grounds required by code.
- B. Equipment and raceway bonding procedures shall be rigidly maintained and meet

all jurisdictional requirements of codes and regulations.

- C. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded round the boxes with a 6 BS gauge, rubber covered, double braided wire with ground clamps.
- D. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and power, etc. panelboards, motor control outlets, etc., back to their respective service or distribution panelboards.
- E. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.
- F. Receptacle Circuits: Provide a separate grounding conductor in all receptacle circuit conduit runs, back to serving panelboard.
- G. Fence grounding: Fence shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 12 inches below grade. Attach a No.4 AWG copper conductor, by fusion weld process, to the ground rods and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 12 inches of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence. Each gate section shall be bonded to its gatepost by a 1/8 - inch by 1 - inch flexible braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

### 3.5 INSTALLATION OF MOTOR STARTERS

- A. In finished areas, mount motor protection switches flush and install suitable coverplates.
- B. Install heaters correlated with full load current of motors provided.
- C. Set overload devices to suit motor provided.

END OF SECTION 262000

This page is intentionally left blank.

## PART 1 – GENERAL

### 1.1 DESCRIPTION

- A. Work Included: Furnish and install lighting fixtures including lamps; connect fixtures to circuits, occupancy sensors, relays, room controllers, contactors, control panels, and gateways, where applicable.
- B. Related Work:
  - 1. Common Work Results for Electrical: Section 26 05 00.
  - 2. Low Voltage Electrical Transmission: Section 26 20 00.

### 1.2 DESIGNATION

- A. Unless otherwise shown on the plans, fixture type designation for an individual fixture shall be typical for similarly indicated fixtures within the entire room or defined area.
- B. Unless otherwise shown on the plans, fixtures mounted in a continuous row shall be of the same type as any individual designated fixture within the row.
- C. In the event a fixture is un-designated on plans, it shall be of the same type as fixtures of similar function within rooms or areas.

### 1.3 COORDINATION

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Architect or Electrical Engineer, and defer ordering until clarified.
- B. Supply plaster frames, trim rings, and back boxes to other trades.
- C. Coordinate with Division 15 to avoid conflicts between luminaire supports, fittings & mechanical equipment.
- D. All fixtures shall be coordinated with the architectural reflected ceiling plan. If any discrepancies occur, the Architect or Electrical Engineer must be notified in writing before installation is started.

### 1.4 MOUNTING REQUIREMENTS

Comply with State of California earthquake requirements and CEC requirements for lighting fixture installations and support.

### 1.5 SUBMITTALS

- A. All submittals shall be made in accordance with Division 1 Submittal Procedures.
- B. List of Materials: Submit a complete list of material proposed for this Section.
- C. Shop Drawings for Lighting Fixtures: Provide detailed and dimensioned working drawings showing kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size and color of lamps, and complete details of the method of fitting, suspension and securing the fixtures in place. Drawings shall contain sufficient information to enable a workman to construct and install the fixtures without further instructions.
- D. Shop Drawings for Lighting Controls: Provide detailed and complete wiring diagrams and plans for lighting controls. Provide cut sheets for lighting control devices and cabling.

#### 1.6 GUARANTEE

- A. Guarantee lighting components against service failure for five years. Indicate installation date on each driver by inscribing month, day and year on the housing.

### PART 2 – PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

The fixtures described in the light fixture schedule on the drawings are to be used as a standard of quality to be maintained. Substitute items of same function, performance and dimension, are acceptable in conformance with Section 260000.

#### 2.2 FIXTURES: General

- A. Provide fixtures complete with all fittings, internal or external drivers, stems, hangers, joiner bands, end caps, and component parts to make a complete installation. Fixtures shall have a suitable interior means of grounding the enclosure.
- B. All fixtures shall bear the U.L. label and shall be suitable for installation location.
- C. All attaching devices for recessed or surface mounted fixtures mounted in the ceiling shall be of formed or rolled steel and of sufficient strength to prevent movement of fixture after installation.
- D. The Architect or Electrical Engineer shall have the right to reject any fixture damaged due to improper packaging. Any fixture with broken or cracked porcelain, broken or bent metal, broken lenses, or an appearance deemed not to be normal, may also be rejected by the Architect or Electrical Engineer at the expense of the Contractor.



- E. Provide gasketing, stops, and barriers to form light traps and prevent light leaks.
- F. Trademarks or Monograms: There shall be no visible trademarks or monograms on the lighting fixtures.
- G. Trims and Doors: The Electrical Contractor shall use the following fixture trim frame designs unless specified otherwise.
  - 1. Lay-in frames: Lay-in frames for all exposed "T" ceiling systems.
  - 2. Flanged Trims: Flanged trims for plasterboard, spline or metal lathe and plaster ceiling systems. Provide plaster or mounting frames where required.
  - 3. Hidden "T" Systems: Electrical Contractor to provide vinyl fixture trim-outs for all fixtures installed in hidden "T" systems to complete unfinished edge of tile openings.

### 2.3 MATERIAL AND FABRICATION

- A. Each lighting fixture shall be the type indicated on the drawings and as specified herein. Fixtures of the same type shall be of identical make, design and appearance. The size of each lighting fixture shall be as specified herein for the lamp or fixture wattage indicated on the drawings.
- B. The design of all lighting fixtures, accessories and supports, as well as the method of hanging fixtures, shall comply with all requirements for earthquake resistant construction of the State of California.

### 2.4 LIGHT SOURCE

- A. LED Drivers: Drivers shall be electronic type specifically designed to save energy while maintaining full light output. Drivers shall have "A" sound rating, thermal protectors and guaranteed against service failure for three years. Drivers shall comply with FCC and NEMA limits governing electromagnetic and Radio Frequency Interference and meet all applicable ANSI, State and Federal standards. The contractor shall indicate the installation date on each driver by inscribing the month, day and year on the ballast case. Drivers shall be noiseless, high power factor type and shall be ETL certified under CBM Standards and Underwriters' Laboratory listed.
- B. LED Diodes shall have the following minimum characteristics:
  - 1. Efficacy – 100 lumens per watt or greater
  - 2. Color rendition index – 80 or greater
  - 3. Standard deviation color matching for diodes shall fall within 1 MacAdam ellipse.

## 2.5 LIGHTING CONTROLS

- A. Lighting controls and control systems shall meet all requirements of the State of California Title 24 energy code.
- B. Lighting control systems shall be commissioned by a factory lighting commissioner. Commissioning by the contractor is not acceptable.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Install lighting fixtures where shown on plans.
- B. Fixture installation shall conform to all applicable standards for installation, mounting, wiring, and quality.
- C. All fixtures shall be grounded and bonded in accordance with applicable codes. Where fixtures are installed in rows, a bonding screw shall be used to maintain bonding integrity from fixture to fixture.
- D. All fixtures, lenses, and other trim shall be aligned, cleaned, free of paint and blemishes before final acceptance.
- E. Fixtures weighing more than two pounds shall be supported by means other than the outlet box. All outlet boxes shall be able to support a minimum of eight pounds.
- F. For fixtures weighing more than two pounds, support shall be provided at all four corners, plus the outlet box. Each support shall be able to carry a minimum of four times its intended load.
- G. No support or insert, except pendant canopies, shall be visible from the floor.
- H. Fixture voltage shall be as shown on drawings and in the fixture schedule.
- I. Install recessed and surface-mounted fixtures with mounts or plaster frames compatible with the ceiling and wall systems employed and secure fixtures mechanically to frames.
- J. Align rows of surface-mounted fluorescent fixtures to form straight lines at uniform elevations. Provide factory joiner bands for contiguous fixtures, and end caps on ends.
- K. Recessed fixtures shall fit snugly against ceilings to prevent light leakage.
- L. Support suspended recessed fixtures in a T-bar ceiling as follows: All fixtures shall be attached to the ceiling grid to resist a horizontal force equal to the weight of the fixtures. For heavy duty grid systems, fixtures weighing less than 56 pounds must

also have two 12 gauge slack safety wires from diagonal corners to the structure above; fixtures weighing more than 56 pounds shall be independently supported by not less than 4 taut No. 12 gauge wires capable of supporting four times the load. For intermediate duty grid systems, fixtures shall be independently supported by not less than four taut No. 12 gauge wires capable of supporting four times the load. All fixture hanger wire ends shall be twisted three tight turns within a 2" distance. Fixture installation shall be coordinated with the acoustical ceiling installation.

M. Light Pole Installation:

1. Set in concrete footings; set poles plumb and straight. Grout and drypack after leveling poles. Concrete, grout and drypack are specified under Section 03 30 00, Cast-in-Place Concrete.
2. Electrically ground the fixtures and poles.
3. Solder and tape splices as required for the floodlight fixture installations.
4. Each standard shall be tapered galvanized steel, with handhole, anchor bolts, fixture mounting brackets and all accessories.
5. Poles shall be designed to withstand a minimum wind velocity of 80 mph sustained, 104 mph gusts.

N. Provide factory commissioning for lighting controls and devices. The completed installation shall comply in every way with the requirements of Title 24.

3.2 CLEANING

- A. Clean surfaces of all dirt, cement, plaster and other debris. Use cleansers compatible with material surfaces being cleaned.
- B. Clean lenses, reflectors, and the like of dust, fingerprints, and grime.

3.3 TESTING

- A. Check and adjust fixtures for even illumination.
- B. Replace defective fixtures and fixture components with new.
- C. The lighting control system shall be acceptance tested by an independent company. The agent shall not be an employee of or affiliated with the contractor. The contractor is responsible for passing the acceptance tests.

END OF SECTION 265000

This page is intentionally left blank.

## PART 1 – GENERAL

### 1.1 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures
- B. Section 26 00 00 – Electrical
- C. Section 27 00 00 – Communications

### 1.2 APPLICABILITY

This section provides the minimum requirements for Electronic Safety and Security Systems. Additional requirements are to be found in subsections of this specification.

### 1.3 SUBMITTALS

- A. General Requirements
  - 1. All submittals shall be made in accordance with section 01 33 00.
- B. Licensure
  - 1. Submit proof of possession of a valid C-7 California State Contractor's License in good standing.
- C. System Submittals and Shop Drawings
  - 1. Submit a complete list of equipment and materials proposed for the system with catalog cuts, technical data, manufacturer's Specifications and detail drawings.
  - 2. Submit a complete set of detailed, scaled Shop Drawings of all racks, cabinets, and equipment, with all designations, dimensions, color, controls, wiring, and schematic diagrams of all circuits. Show interfaces to all equipment furnished, including equipment furnished by other contractors, identifying numbers of wires, termination requirements, voltages and other pertinent details. Include front elevations, cabinet dimensions, types of mounting, door barriers, catalog number of locks and finishes of terminal cabinets.
- D. Spare Parts Data
  - 1. After shop drawings are approved, and not later than thirty (30) calendar days prior to the date of beneficial occupancy, a list of spare parts data for each item of specified materials and equipment shall be submitted. The data shall include a complete list of parts and supplies with current unit prices and source of supply.

E. Operating and Maintenance Documents

1. The contractor shall furnish to the architect (3) copies of operating and maintenance instructions.
2. Documentation shall outline the step-by-step procedures required for system start-up, operation, and shutdown.
3. Documentation shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides.
4. Documentation shall be submitted at least thirty (30) calendar days prior to acceptance test. The instructions shall include the manufacturer's name, system model number, service manual, parts list, and a description of all equipment and their basic operating features.

F. Warranty

1. A copy of the manufacturer's warranty for all equipment and materials shall be provided.

G. Close-Out Documents

1. Upon completion of the installation, the contractor shall provide four copies (one hard copy and three electronic copies) of Project Close-Out Documents to the Owner. Documentation shall include the items detailed below.
2. As-Built Drawings
  - a. The contractor shall provide a complete set of as-built drawings for the entire system upon installation completion.
  - b. These drawings shall include, but not be limited to, the exact locations of all equipment, connections between all equipment, and wiring for all equipment as the system is installed.
  - c. printout of configuration
3. All System source codes and passwords (Crestron Programs) must be handed over to, and become property of, the Owner upon completion of this project.

H. All submittals called for shall be instruments of the Contractor, even though they may have been prepared by a subcontractor, supplier, dealer, manufacturer, or by any other person, firm or organization. Prior to submission, the Contractor shall undertake its own review and stamp with its acceptance prior to submittal.

#### 1.4 SCOPE OF WORK

It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required to accomplish work indicated or specified in this or other sections, it shall be the responsibility of the Contractor to provide all materials and equipment which is usually furnished with such systems in order to complete the installation, whether or not specifically mentioned herein.

#### 1.5 APPROVAL

- A. Installation of the system shall not commence until all approvals are granted by the Division of the State Architect (DSA).
- B. Installation of the system shall not commence until all shop drawings and submittals are approved by the Owner, Architect of Record, and Engineer of Record.

#### 1.6 QUALITY ASSURANCE

- A. Contractor Qualifications
  1. Must hold a valid State of California C-7 license in good standing;
  2. Must have completed at least three (3) projects of equal scope within the last three (3) years;
  3. Must maintain a service office within 50 miles of the project;
  4. Must be bonded to assure performance and satisfactory service during the guarantee period;
  5. Contractor must be registered with BICSI and have at least one RCDD on staff;
  6. Must have personnel fluent in the use of Computer Aided Design and possess and operate CAD software using .DWG or .DXF format.
- B. All equipment and wiring shall be furnished and installed by the authorized factory distributor of the equipment. The manufacturer's representative of each system shall provide a letter from the manufacturer of all major equipment with submittals stating that he is the representative and that the manufacturer will have a service representative assigned to this area for the life of the equipment.
- C. The Contractor shall furnish a letter from the manufacturer of the equipment specified, which certifies that the equipment has been installed according to factory recommended practices and that the system is operating satisfactorily.
- D. The Contractor shall provide not less than sixteen (4) hours of instruction to personnel in the operation, programming, and maintenance of each system.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

#### 1.8 COORDINATION

Coordinate the Work of this section with the Work of other sections, including sprinkler systems, fire alarm systems, HVAC systems, security systems, etc., as applicable.

#### 1.9 WARRANTY

The entire system shall be guaranteed free of mechanical or electrical defects for a period of one year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the Owner. Guarantee period shall begin from the date of final acceptance by the Owner.

### PART 2 – PRODUCTS

#### 2.1 MANUFACTURER

References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality. Equivalent equipment from the specified manufacturer's may be substituted for the specified equipment, so long as the minimum standards are met.

### PART 3 – EXECUTION

#### 3.1 GENERAL

- A. All Work described in the specifying documents and on the Project Drawings shall be performed in accordance with the acknowledged Professional and industry standards and practices. All installed equipment shall meet or exceed the specified manufactures regulations.
- B. Materials shall be installed in strict compliance with all local, state, county, province, federal and other applicable building, safety, and fire standards, laws, codes, regulations, and guidelines including, but not limited to, all appendices and amendments and the requirements of the local authority having jurisdiction (AHJ).
- C. Examine areas and surfaces to receive each system.
  - 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
  - 2. Do not begin installation until unacceptable conditions are corrected.



- D. The Contractor shall maintain a competent Supervisor and Manufacturer Certified Technicians assigned to this installation for the duration of the Project.
- E. Furnish and install all materials, devices, components and equipment required for a complete and operational system.
- F. It is the Contractor's responsibility and obligation to coordinate with all necessary trades to ensure that the integrity of and compliance with Manufacturer and industry standards are met during the duration of the installation.

### 3.2 INSTALLATION

- A. Furnish control panels, components, devices, cabinetry, wire, connectors, materials, parts, equipment, labor, etc. necessary for the complete installation of the systems in full accordance with the recommendations of the equipment manufacturers and the requirements of the drawings and specifications.
- B. Coordinate the required space in Data equipment frames with this and other network-based Communications systems that may share rack space. Provide racks with sufficient space to accommodate patch panels, switches, power supplies, etc. for all network interfaced systems.
- C. Installations shall follow standard wiring and installation practice and shall meet or exceed industry standards of such work.
- D. Wire not installed in equipment racks, not portable, in unrated ceiling space, or not installed in conduit shall be fire rated and meet all applicable codes.
- E. Wire and cable for all other devices shall be supplied in accordance with the recommendations of the device manufacturer, CEC, and NEC.
- F. Equipment shall be held firmly in place with proper types of mounting hardware. All equipment affixed to the building structure must be self-supporting with a safety factor of at least three. All equipment shall be installed so as to provide reasonable safety to the operator. Supply adequate ventilation for all enclosed equipment items which produce heat.
- G. Furnish each system to facilitate expansion and servicing using modular, solid-state components. All equipment shall be designed and rated for continuous operation and shall be UL listed, or manufactured to UL standards.
- H. Shields of audio cables shall be grounded at one end only, at the input side of all equipment items in the system.
- I. Observe proper circuit polarity and loudspeaker wiring polarity. No cables shall be wired with a polarity reversal between connectors with respect to either end. Special care shall be taken when wiring microphone cables, to ensure that constant polarity is maintained.

- J. Route cables and wiring within equipment racks and cabinetry according to function, separating wires of different signal levels (data, fire alarm SLC, fire alarm NAC, speaker, intrusion, etc.) by as much physical distances possible. Neatly arrange and bundle all cables loosely with Velcro cable ties. Cables and wires shall be continuous lengths without splices.
- K. All cables in conduits shall be insulated from each other and from the conduit the entire length and shall not be spliced. All cables and wires are to be continuous lengths without splices.
- L. Mechanical connections shall be made using approved connectors of the correct size and type for the connection. Wire nuts will not be accepted.
- N. Label all wires in racks and console as to destination and purpose. Clearly and permanently label all jacks, controls, and connections. All labeling shall be completed prior to final system inspection.

### 3.3 PROGRAMMING

- A. Contractor shall provide all necessary programming to provide complete operating systems.
- B. Contractor shall include in their bid one (1) four (4) hour planning meeting with the Owner and their Representatives for each system to outline all specific programming issues for each system, as well as, but limited to:
  - 1. Contractor will be informed of any specific requirements for use of the system.
  - 2. Contractor will provide overview of system capabilities.
  - 3. Contractor will address all concerns of the Owner and their Representatives.

### 3.4 TESTING

- A. Completed systems shall be physically inspected by the Owner's representative to assure that all equipment is installed in a neat and professional manner and in accordance with these Specifications.
- B. Final systems testing and commissioning shall be performed after all installation and initial testing has been completed by the Installer, but prior to any use of the systems.
- C. The Contractor, prior to requesting systems testing and demonstration to the Owner's representative, shall ensure that all systems are in first-class working condition and free of shorts, ground faults/loops, parasitic oscillations excessive hum and noise, RF interference, or instability of any form.
- D. The Contractor shall be responsible for properly performing all setup and alignment of the systems, and all assembly and setup of portable equipment.

3.5 COMMISSIONING

- A. All testing documentation shall be supplied with the as-built documentation.
- B. The Contractor will include in their bid price six (6) hours for onsite commissioning and will provide the installation technician who was responsible for this project to be present at the system commissioning to tune, fix, repair, and/or replace all system components that do not operate within the tolerance as set forth in the specifications, project documents, and industry standards.
- C. The final acceptance of the system by the Owner will be based upon the report of its representative following inspection, testing, and commissioning. A list of items in need of completion or correction shall be generated the Owner and their consultants, which must be corrected by the Installer before final acceptance will be granted.

END OF SECTION 280000

This page is intentionally left blank.

## PART 1 – GENERAL

### 1.1 GENERAL

- A. Furnish as described and hereinafter specified, a complete fire alarm master panel, including, power supplies, zone modules, boards, batteries, complete SFM listed components, etc., fully operational, and completion certification. The intent of these specifications is to provide a complete and satisfactory operating system. As only a complete operable master will be acceptable, all equipment required for this function, whether or not enumerated herein, shall be supplied as part of this bid.
- B. Fire Alarm master panel shall be U.L. listed. The integrated signaling system shall be approved by California State Fire Marshal.
- C. The entire system shall be manufactured and assembled by the authorized manufacturer. The supplier shall maintain a fully equipped service organization, stocking the manufacturer's standard parts and capable of furnishing, in the sole judgement of the district, adequate inspections and service to the system. All equipment shall be supplied by a registered and certified factory trained vendor.

### 1.2 CODES AND STANDARDS

- A. All equipment, devices, cables, etc. shall be listed by Underwriters Laboratories, Inc., and/or approved by Factory Mutual for the purpose of fire alarm systems.
- B. The System shall comply with the applicable provisions of 2019 NFPA 72.
- C. The System shall comply with all local and state codes.
- D. All equipment shall be State of California Fire Marshal listed.

### 1.3 OPERATION

- A. The operation of a manual station or automatic activation of any smoke detector, heat detector or waterflow device shall cause:
  - 1. All evacuation horns to sound and lamps to flash in a march time code pattern. Indicate on the control panel the zone in alarm. Indicate on the remote annunciator the zone in alarm. Automatically close all magnetically held doors. Perform any additional function as specified herein or as shown on the plans. Summon the fire department. The operated device is returned to normal and the control panel is manually reset except that the alarms may be silenced as described elsewhere in these specifications.
- B. An alarm may be silenced by a switch on the zone card in the control alarm. When silenced this shall not prevent the resounding of subsequent alarms if another zone should alarm (subsequent alarm feature).

- C. When alarms are silenced: The zone indicating red LED's on the control panel and the remote annunciator shall remain on until the operated device is returned to normal and the control panel is manually reset.
- D. A green pilot LED shall normally be on, indicating that the system is receiving normal 120VAC power. A failure of normal power shall cause the LED to extinguish.
- E. An amber system trouble LED and sonalert, operating together, shall signal any trouble condition. Failure of normal power, opens, or short circuits on the indicating circuits, disarrangements in system wiring, or ground faults shall cause the trouble LED to light and sonalert to sound. A silencing switch shall be provided to silence the sonalert which shall be so arranged that the trouble LED will remain lit until the system is restored to normal. When the system is restored to normal, the sonalert shall resound to remind service personnel to return the silencing switch to the normal position (ringback feature).
- F. All alarm signals shall be automatically "locked in" at the control panel until the operated device is returned to its normal condition, and the control panel is manually reset. A switch shall be provided on each zone card in the control panel for silencing the alarm devices by zone. Once silenced, it will not prevent the resounding of all alarm signals if an alarm condition should occur in another zone elsewhere in the building (subsequent alarm feature). When used for waterflow, the silence switch shall be bypassed through the use of a selectable jumper wire.
- G. Each initiating circuit shall be represented on the zone cards in the control panel by an amber trouble LED and a red alarm LED. The LED's for each zone shall be identified on the control panel by custom lettering showing the zone designation. Circuit trouble shall be indicated by the amber LED. Audible trouble and alarm devices shall be supervised. Control panels with incandescent lamps or control panels without supervised alarm lamps will not be accepted.
- H. Each initiating and signal circuit shall be electrically supervised for opens and ground faults in the wiring, and for short circuit faults on the signal circuit wiring, and shall be so arranged that a fault condition in any circuit or groups of circuits will not cause an alarm to be sounded. The occurrence of any fault will light a trouble LED and sound the sonalert but will not interfere with the proper operation of any circuit which does not have a fault condition. The system shall be capable of being wired using Class A supervised circuits (a break or ground fault in one or both conductors will not prevent a device from operating on either side of the break) or Class B (a break or ground fault in any conductor will be reported as a trouble condition) at no extra cost.
- I. All printed boards shall be of the plug-in type and shall be electrically supervised for position. All control panel components shall be contained in a 16-gauge steel cabinet. All groups of circuits or common equipment shall be clearly marked, and shall be expandable by inserting interchangeable plug-in units. Control panels that have plug-in modules that can be removed without causing a trouble condition will not be accepted.

- J. Circuitry shall be provided in the control panel to permit transmission of trouble alarm signals over leased or privately owned telephone cables to a remote receiving panel. A reverse polarity transmitter and/or a masterbox circuit as required shall be provided in the control panel. There shall be a supervised disconnect switch to allow testing of the fire alarm system without transmitting an alarm signal to the central station.
- K. The control unit shall be beige in color and shall include the following features:
1. Auxiliary SPDT contacts in the control unit per zone and one set of SPDT contacts which will operate on general alarm.
  2. Auxiliary circuitry in the control panel to operate remote relays to control blowers in air handlers.
  3. 24 hours of battery standby (as required) using rechargeable batteries with automatic hi-low rate charger to maintain standby batteries in a fully charged condition. There shall be a low/no battery trouble indicator that shall also operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.
  4. A power transfer circuit that will switch to standby power automatically and instantaneously if normal power fails. This circuit shall not be an integral part of the power supply but of the basic fire card to allow operation of the completed fire alarm system on the secondary source of power with the primary power supply removed.
  5. Ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. The ground fault detector shall have an individual LED for visual indication of either a positive or negative ground fault and operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.
  6. A short circuit LED shall be a standard feature of the fire alarm control panel. This circuit shall monitor the signal circuits for short circuits and shall have an individual LED for visual indication of circuits as well as operating trouble devices as specified herein but shall not cause an alarm to be sounded.
  7. All relays on printed circuit boards shall be plug-in type with dust proof protecting covers.
  8. All transistors on common control and individual zone printed circuit boards shall be of the same exact type and shall be plug-in.
  9. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits, signal circuits, smoke detector power circuits, and telephone line

- circuit. Systems that require an optional module to provide this protection will not be considered equal.
10. Individual circuit fuses shall be provided for the following: smoke detector power, main power supply, signal circuit #1, signal circuit #2, battery standby power and auxiliary output.
  11. A battery test switch shall be a standard feature of the fire alarm control panel and shall test all supervised red alarm LED's and yellow trouble LED's power zone.
  12. An overvoltage sensing circuit shall cause an amber LED to light and operate the system trouble devices should a fault occur within the power supply causing too high a voltage being supplied to the FC-72 OR 7200 system.
  13. Provisions for supervised remote reset capabilities.
  14. Provisions for a remote drill switch capability.
  15. The control unit shall be flush mounted in a textured finish, #16 gauge steel cabinet, UL Listed, equipped with a hinged door, and secured by a lock keyed common to the manual station fire alarm boxes. Reset switches, silence switches, fuses, etc., shall be clearly marked and shall be behind the locked door to prevent unauthorized entry. Opening of the main door shall expose all components for inspection or adjustment without further dismantling of the cabinet, control unit or wiring. The panel shall have provisions for a supervised remote trouble indication.
  16. The audible trouble signal shall be an integral part of the control unit. Provisions shall be provided for an optional supervised remote trouble signal.
  17. The 120VAC main power shall be converted to low voltage, rectified and regulated 24VDC for system operation. The entire system shall operate on 24VDC.
  18. The rated current available from the power supply shall be 4 amps of filtered and regulated DC and shall comply with the latest issue of UL Standard #864.
  19. Battery charging unit shall be an automatically dual-rate type, having both a high rate and float charge capability.
- L. Manual fire alarm boxes shall not depend on the glass rod to hold the station in normal position.
- M. Stations shall be of extruded aluminum design with Fire Lettering on each side, for semi-flush or surface mounting and shall be of the double action design. Once



activated, it must be clearly visible which station was activated from either the front or side view. Stations shall not be resettable without the use of a reset key and physically opening the station to reset. The key shall be the same as that used to open the control panel.

- N. Audible and visual indicating devices shall be horn and flashing light assembly with the word "FIRE" on two sides. The horn and light assembly shall be capable of being flush or semi-flush mounted. Units shall be installed where shown on plans using supervised circuits. There are to be no more than twenty horn and light combination units per signal circuit.
- O. All magnetic door holders shall operate through the contacts of the control panel after an alarm condition has been initiated from any zone on the plans. All door holder circuits shall be separately fused.
- P. The electromagnetic door holder devices shall hold fire and smoke barrier doors open until released by an alarm condition. The door holders have approximately 35 lb (15.9 kg) holding power and offer fail safe operation.

#### 1.4 SPECIAL INSTRUCTIONS

- A. The entire fire alarm system shall be connected via leased telephone lines to a central station. The fire department shall be consulted as to the authorized central station companies serving the city/town. The fire alarm system shall transmit both alarm and trouble conditions.
- B. The owner shall be responsible for telephone company lease charges.
- C. An annunciator shall be an integral part of the control unit and shall indicate both alarms and trouble by zone. Provisions shall be provided for a supervised LED remote zone annunciator. All zones shall be properly labeled with custom lettering for ease of identification.
- D. Where shown, furnish and install a remote LED type annunciator as shown on the plans. The annunciator shall be capable of being flush or surface mounted for indoor or outdoor applications. One zone of annunciation shall be for system trouble. The unit shall be capable of having a remote key reset feature. Furnish in a black textured enclosure. Removal of the front cover shall provide easy access to replace the display. The number of zones shall be as shown on the drawings with two additional spares provided. All alarm LED's and wiring shall be supervised or provide two indicators per zone if unsupervised lights are used.
- E. Detailed functions and operations of the following listed equipment, that is part of its factory specification sheet, shall be considered an integral part of this specification wherein enumerated or not.

PART 2 – MATERIAL

2.1 EQUIPMENT:

- A. Refer to drawings for equipment.
- B. Quantities of equipment to be determined by the contract drawings for the project. Supplier is responsible to supply new drawings to the Architect for approval if he is supplying equipment other than that specified.

PART 3 – INSTALLATION

3.2 WIRING:

- A. The installer shall coordinate the installation of the Fire Alarm equipment with the manufacturer or his authorized distributor. All conductors and wiring shall be installed per the manufacturer's recommendations. It shall be the installers responsibility to coordinate with the supplier the correct wiring procedures prior to installing any conduits or conductors.
- B. System components shall be installed in accordance with the latest revisions of the NFPA 72 - 2019, the requirements contained herein, California Electrical Code and state regulations. Pigtail connections between circuit wires and detector terminals are not acceptable. Devices shall be connected directly to the circuit line wires. Inside wiring refers to the appropriate NFPA standard for acceptable wiring and installation requirements. All wire used on the fire alarm system shall have a minimum insulation rating of 105 Centigrade. Bell wire or thermostat wire is not acceptable. Low energy UL listed fire protective signaling circuit cable with 105-degree insulation may be used when allowed by the local authority having jurisdiction.

END OF SECTION 283100

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Expansive Soils
2. Site Preparation
3. Engineered Fill
4. Temporary Excavations
5. Trench Backfill
6. Concrete Slab on Grade
7. Footing Inspections
8. Concrete Slab on Grade
9. Grading
10. Subbase and base course for asphalt paving.
11. Excavating and backfilling trenches for utilities and utility structures.
12. Field Quality Control
13. Protection

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Special Conditions of these Specifications.
2. Geotechnical Investigation Report.
3. Section 015639 Temporary Tree and Plant Protection
4. Section 033000: Cast-In-Place Concrete
5. Section 321216: Asphalt Paving
6. Section 321313: Concrete Paving

1.3 DEFINITIONS

- A. All reference to relative compaction, maximum density, and optimum moisture is based on ASTM Test Method D1557.
- B. Earthwork encompass all areas to receive fill or to support proposed improvements and should extend horizontally a minimum distance of 5 feet beyond the perimeter of the improvements.
- C. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- D. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- E. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- F. Borrow Soil: Approved satisfactory soil imported from off-site for use as fill or backfill.
- G. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- H. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by the Project Manager, shall be without additional compensation.
- I. Fill: Soil materials used to raise existing grades.
- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- 1.4 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct conference at Project site prior to starting the Earthwork operations.

1.5 INFORMATIONAL SUBMITTALS

- A. Material test reports.

1.6 FIELD CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.
- B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Existing Soil on site is moderately expansive silty sand with clay soil. These expansive soils are susceptible to volume changes associated with changes in soil moisture content. The potential for future differential movement resulting from these soils can be reduced to normally tolerable levels by following the moisture conditioning and compaction recommendations presented in the Geological Report.
- C. Unsatisfactory Soils: Will be determined by sample testing by the Geotechnical Engineer.
  - 1. Undocumented fill soils discovered on site.
  - 2. Unsatisfactory soils also include satisfactory soils not maintained within 4 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: All engineered fill soils should be nearly free of organic or other deleterious debris and less than 3 inches in maximum dimension. The on-site soil exclusive debris may be used as engineered fill, provided it contains less than 3 percent organics by weight (ASTM D2974). Should any imported material be used for engineered fill, it should be sampled and tested by a representative of the project Geotechnical Engineer prior to being transported to the site.

- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, landscaping and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

### 3.2 EXPANSIVE SOILS

- A. The Geotechnical investigation has revealed a surface horizon of moderately expansive silty sand with clay soil. These expansive soils are susceptible to volume changes associated with changes in soil moisture content. The potential for future differential movement resulting from these soils can be reduced to normally tolerable levels by following the moisture conditioning and compaction recommendations presented in the Geological Report. Moisture conditioning and compaction mitigation implemented during grading should be consistent with the expansiveness determined. Careful attention must be paid to future maintenance, including a site drainage and irrigation practices.
- B. The moisture content attained during grading and building pad preparation should be

maintained between the completion of grading and the placement of the vapor retarder, concrete slabs, and footings. If the moisture content is not maintained between the conclusion of grading and the start of building construction, the moisture content and compaction will need to be re-established prior to building construction.

### 3.3 SITE PREPARATION

#### A. Demolition of Existing Trees and Structures

1. Where project improvements dictate removal of exiting trees, the root areas should be thoroughly cleared of root balls as well as isolated roots greater than ½ - inch in diameter as well as concentrated smaller diameter roots and root mats, depending on the volume of smaller roots encountered. The amount of soil lost or disturbed with removal will likely vary with the moisture conditions at the time of removal, soil type, and the methods of removal. The root system removal may disturb a significant quantity of soil. It is suggested a tree service and demolition contractor be contacted for more detailed information regarding the typical soil loss and disturbance associated with tree removal. Following removal of underground utilities, structure demolition, and tree removal, disturbed soils should be mitigated as described in Sections 5.3.3 and 5.3.4 of the Geological Report.

#### B. Stripping

1. All surface vegetation and any miscellaneous surface obstructions should be removed from the project area, prior to any site grading. Stripping of vegetation could involve the upper 1 to 3 inches of the site. Surface strippings should not be incorporated into fill unless they can be sufficiently blended to result in an organic content less than 3 percent by weight (ASTM D2974). Stripped topsoil, with an organic content between 3 and 12 percent by weight, may be stockpiled and used as non-structural fill (i.e. landscaped areas). If used in landscape areas, soil with an organic content between 3 and 12 percent should be placed with 2 feet of finished grade and at least 5 feet outside of building perimeters. Soil with an organic content greater than 12 percent by weight should be excluded from fill.

#### C. Disturbed Soil, Undocumented Fill and Subsurface Obstructions

1. Initial site grading should include a reasonable search to locate and remove any undocumented fill soils, abandoned underground structures, existing utilities, etc., that may exist within the area of construction.
2. All underground utilities should be rerouted beyond the perimeter of the proposed improvements and all previous trench backfill and any loose soils generated by the utility removal should be removed to expose undisturbed native soil.
3. Any subsurface obstructions should be removed from the project area.
4. Any areas or pockets of soft or loose soils, void spaces made by burrowing animals, undocumented fill, or other disturbed soil that is encountered, should be excavated to expose firm native material.

5. Care should be taken during site grading to mitigate excavating and recompacting all soil disturbed by stripping and demolition.
  6. Excavations for removal of any unsuitable conditions should be dish-shaped and backfilled with engineered fill per Section 5.4 of the Geotechnical Report.
- D. Over-excavation: Over-excavation is typically reserved for soils that, in their natural state, will not provide adequate bearing for structures. The foundation soils at the project site should provide adequate bearing for the proposed improvements. Provided the recommendations called out in sections 5.3.2 and 5.3.3 of the Geological Report are followed, no general over-excavation of the overall site is required.
- E. Scarification and Compaction: After stripping the site, and performing any other removals, the exposed subgrade soil to receive fill or areas to support proposed foundations/improvements should be scarified to a minimum depth of 12 inches, uniformly moisture conditioned to at, or above optimum moisture, proof rolled to detect soft or pliant areas, and compacted to the requirements for engineered fill see Section 5.4 of the Geotechnical Report. Soft or pliant areas should be mitigated in accordance with Section 5.3.3 Geotechnical Report.
- F. Construction Considerations: Should site grading be performed during or subsequent to wet weather, near-surface site soils may be significantly above optimum moisture content. These conditions could hamper equipment maneuverability and efforts to compact site soils to the recommended compaction criteria. Disking to aerate, chemical treatment, replacement with drier material, stabilization with a geotextile fabric or grid, or other methods may be required to mitigate the effects of excessive soil moisture and facilitate earthwork operations. Any consideration of chemical treatment (e.g. lime) to facilitate construction would require additional soil chemistry evaluation and could affect landscape areas and some construction materials.

### 3.4 ENGINEERED FILL

- A. Materials: All engineered fill soils should be nearly free of organic or other deleterious debris and less than 3 inches in maximum dimension. The on-site soil exclusive debris may be used as engineered fill, provided it contains less than 3 percent organics by weight (ASTM D2974). Should any imported material be used for engineered fill, it should be sampled and tested by a representative of the project Geotechnical Engineer prior to being transported to the site. Table 5.4-1 in the Geological Report provides general criteria for imported soil. The import criteria for corrosion are typical threshold limits for non-corrosive soil. Should corrosion concentrations of import soils fall outside of the threshold limits indicated above, revised protection measures will be necessary.
- B. Compaction Criteria: Soils used as engineered fill should be uniformly moisture-conditioned to at least 4 percent above optimum moisture, placed in horizontal lifts less than 8 inches in loose thickness, and compacted to at between 88 and 92 percent relative compaction. Disking and/or blending may be required to uniformly moisture condition soils used for engineered fill. The actual level of moisture conditions and compaction will be based on the expansion potential and moisture density relationships determined during grading. The general intent is to bring the expansive material to about 80 to 85 percent saturation at the time of construction.



### 3.5 TEMPORARY EXCAVATIONS

- A. General: All excavations must comply with applicable local, State, and Federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety generally is the responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations.
- B. Excavations and Slopes The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, State, and/or Federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). All excavations should be constructed and maintained in conformance with current OSHA requirements (29 CFR Part 1926) for a Type C soil. If excavations encounter saturated soils or groundwater, temporary excavations will have to be laid back or shored and the trench dewatered to maintain stability. Contact Geotechnical Engineer if these conditions are encountered for recommendations.
- C. Construction Considerations: Heavy construction equipment, building materials, excavated soil, and vehicular traffic should be kept sufficiently away from the top of any excavation to prevent any unanticipated surcharging. If it is necessary to encroach upon the top of an excavation, contact the Geotechnical Engineer for review and comments. Shoring, bracing, or underpinning required for the project (if any), should be designed by a professional engineer registered in the State of California. During wet weather, earthen berms or other methods should be used to prevent runoff water from entering all excavations. All runoff should be collected and disposed of outside the construction limits.

### 3.6 TRENCH BACKFILL

- A. Materials: Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of soil compatible with design requirements for the specific types of pipes. Refer to Geotechnical Report. Randomly excavated near surface soil will likely be Class III material per ASTM D2321.
  - 1. Trench zone backfill may consist of native soil which meets the requirements for engineered fill.
- B. Compaction Criteria: All trench backfill should be placed and compacted in accordance with recommendations provided for engineered fill. Trench backfill deeper than 5 feet should be to at least 95 percent relative compaction. Mechanical compaction is recommended; ponding or jetting should not be used.

### 3.7 FOOTING INSPECTION

- A. Prior to placing steel or concrete, footing excavations should be cleaned of all debris, loose or soft soil, and water. All footing excavations should be observed by a representative of the project Geotechnical Engineer immediately prior to placing steel or concrete. The purpose of these observations is to check that the bearing soils

encountered in the foundation excavations are similar to those assumed in analysis and to verify the recommendations contained herein are implemented during construction.

### 3.8 CONCRETE SLABS-ON-GRADE

- A. Subgrade Preparation: Slabs-on-grade should be supported on recompacted soils or engineered fill placed as described in Section 5 of Geological Report. Subgrade soil within 24 inches of pad grade should have a moisture content of at least 4 percent above optimum, immediately prior to placing the slab concrete or placing the vapor retarding membrane.
- B. Capillary and Moisture/Vapor Break: Considering the groundwater depth and soil types, a capillary break (i.e. clean sand or gravel layer) is considered unnecessary.
  - 1. In areas to receive moisture-sensitive floor coverings, the subgrade is to be covered by a vapor retarding membrane meeting the specifications of ASTM E1745, (Class C with minimum puncture resistance of 475 grams. See Section 071500 – Under-Slab Vapor Barrier for materials and installation. The subgrade surface should be smooth and care should be exercised to avoid tearing, ripping, or otherwise puncturing the vapor retarding membrane. If the vapor retarding membrane becomes torn or disturbed, it should be removed and replaced or properly patched. All laps, splices, and utility penetrations should be properly sealed according to the manufacturer specifications.
  - 2. The vapor retarding membrane should be covered with approximately 1 to 2 inches of saturated surface dry (SSD) sand to protect it during construction. Concrete should not be placed if sand overlying the membrane has been allowed to attain a moisture content greater than about 5 percent (due to precipitation or excessive moistening). In addition, penetrations through the concrete slab shall be sealed or protected to prevent inadvertently introducing excess water into the sand cushion layer due to curing water, wash-off water, rainfall, etc. Excessive water beneath interior floor slabs could result in future significant vapor transmission through the slab, adversely affecting moisture-sensitive floor coverings and could inhibit proper concrete curing.

### 3.9 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
  - 1. Turf or Unpaved Areas: Plus, or minus 1 inch.
  - 2. Walks: Plus, or minus 1/2 inch.
  - 3. Pavements: Plus, or minus 1/2 inch.

- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.10 SUBBASE AND BASE COURSES UNDER PAVEMENTS

- A. Flexible pavement design recommendations have been developed for the given Traffic Indexes based upon the California Department of Transportation (Caltrans) design procedures and a design R value of 8. The flexible asphalt concrete pavement sections associated with the assumed Traffic Indexes for on-site asphalt pavements are summarized in the Geotechnical Report on Table 6.7-1.
- B. The flexible pavement should conform to and be placed in accordance with the Caltrans Standard Specifications, 2015. The aggregate base (Class 2) should comply with the specifications in Sections 26. The aggregate base and upper 12 inches of subgrade should be compacted to a minimum of 95 percent relative compaction as determined by Caltrans Test Method 216 (Dry determination) or ASTM D1557 test procedures.
- C. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- D. On prepared subgrade, place and shape subbase course and base course under pavements to required crown elevations and cross-slope grades.

### 3.11 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.12 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:

- 1. Hot-mix asphalt paving.

- B. Related Requirements:

- 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
- 2. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
- 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
- 4. SECTION 321713 "Parking Bumpers"
- 5. SECTION 321723 "Pavement Markings" for painted markings applied to asphalt and concrete pavement.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
  - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
  - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

### 1.4 ACTION SUBMITTALS

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

- 1. Include technical data and tested physical and performance properties.
- 2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

3. Job-Mix Designs: For each job mix proposed for the Work.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports for field density tests and source quality control tests.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the State of California Department of Transportation ( Caltrans ).

#### 1.7 REFERENCE STANDARDS

- A. The flexible pavement should conform to and be placed in accordance with the Caltrans Standard Specifications, 2015. The aggregate base (Class 2) should comply with the specifications in Sections 26.
- B. The aggregate base and upper 12 inches of subgrade should be Geotechnical Investigation Report compacted to a minimum of 95 percent relative compaction as determined by Caltrans Test Method 216 (Dry determination) or ASTM D1557 test procedures.
- C. Reference specifications: Except as may be modified by these specifications, work shall conform to State of California, Business, Transportation, and Housing Agency, Department of Transportation Standard (Caltrans) Specifications, latest edition.
- D. Comply with the County of Fresno, Public Works Standard Specifications for Asphalt Paving work.
- E. Producing, hauling, placing, compacting, and finishing of asphalt concrete

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  1. Prime Coat: Minimum surface temperature of 60 deg F.

2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations and approved by the Geotechnical Engineer.
- B. Uncured or improperly cured slag aggregates have caused serious problems. Delete slag aggregates in remaining paragraphs if not recommended for local use.
- C. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- D. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- E. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

### 2.2 ASPHALT MATERIALS

- A. Hot Mix Asphalt Concrete should conform to Caltrans Standard Specifications, latest edition.
- B. Aggregate Base: Aggregate shall conform to Caltrans Standard Specifications, Section 26, Class 2 Aggregate Base, 3/4 inch maximum gradation.
- C. Hot-Mix Asphalt Concrete pavement: Type A with 1/2-inch maximum, coarse aggregate gradation. Asphalt binder shall be steam refined AR-4000 grade in accordance with Section 92 of the Caltrans Standard Specifications.
- D. Binder coat (tack coat) shall be Type SS-1 conforming to the provisions of the American Asphalt Institute Specifications and Caltrans Standard Specifications, Section 94, Asphaltic Emulsions.
- E. Prime Coat: Emulsified asphalt Type RS-2 conforming to Caltrans Standard Specifications, Section 94, Asphaltic Emulsions.
- F. Asphalt Slurry Seal: Conform to Caltrans Standard Specifications, latest edition. Asphalt emulsion, sand aggregate, set-control additives and water.

- G. Contractor shall provide certifications from the manufacturer that materials provided conform to the Standard Specifications.
- H. Water: Potable.

### 2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement and reclaimed, unbound-aggregate base material that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- C. Sand: ASTM D 1073, Grade No. 2 or No. 3.
- D. Joint Sealant: ASTM D 6690, Type I hot-applied, single-component, polymer-modified bituminous sealant.

### 2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
  - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.



1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

### 3.3 SURFACE PREPARATION

- A. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
  1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- C. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
  1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
  2. Protect primed substrate from damage until ready to receive paving.

### 3.4 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  1. Place hot-mix asphalt surface course in single lift.
  2. Spread mix at a minimum temperature of 250 deg F.
  3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
  4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
  2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time.
  5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927, but not less than 94 percent or greater than 100 percent.
  2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041/D 2041M, but not less than 90 percent or greater than 96 percent.

- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549/D 3549M.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979/D 979M.
  - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site,

prepared according to ASTM D 2041/D 2041M, and compacted according to job-mix specifications.

2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726/D 2726M.
  - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
  - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726/D 2726M.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### 3.9 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes Concrete Paving and including the Following:
  - 1. Driveways Approaches.
  - 2. Curbs and gutters.
  - 3. Walks and ramps.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete".
  - 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
  - 3. Section 321713 "Parking Bumpers."
  - 4. Section 321723 "Pavement Markings."
  - 5. Section 321726 "Tactile Warning Surfacing" for detectable warning mats.

### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to concrete paving, including but not limited to, the following:
    - a. Concrete mixture design.
    - b. Quality control of concrete materials and concrete paving construction practices.
    - c. Schedules of work and Coordination with other trades.
    - d. Site access.

2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
  - a. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixtures.
  - c. Ready-mix concrete manufacturer.
  - d. Concrete paving Subcontractor.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following, from manufacturer:
  1. Cementitious materials.
  2. Steel reinforcement and reinforcement accessories.
  3. Admixtures.
  4. Curing compounds.
  5. Joint fillers.
- B. Material Test Reports: For each of the following:
  1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- C. Field quality-control reports.

#### 1.7 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

#### 1.9 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  2. Do not use frozen materials or materials containing ice or snow.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water.
  2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### PART 2 - PRODUCTS

#### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

## 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
  - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

## 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- D. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- E. Deformed-Steel Wire: ASTM A 1064/A 1064M.
- F. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- G. Tie Bars: ASTM A 615/A 615M, Grade 60; deformed.
- H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

## 2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, portland cement Type I or Type II.
  - 2. Fly Ash: ASTM C 618, Class C or Class F.
  - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.



- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 3/4-inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Chemical Admixtures:
  - 1. Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 2. No additives are to be used for retarding the concrete curing process.
  - 3. Submit list of admixtures proposed to be used to the Architect for his review before the placement of any concrete.
- D. Water: Potable and complying with ASTM C 94/C 94M.

## 2.5 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.

## 2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  2. Provide tie bars at sides of paving strips where indicated.
  3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
  2. Extend joint fillers full width and depth of joint.
  3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
  4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
  3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement where called for, and items to be embedded or cast-in.
- B. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- D. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- G. Screed paving surface with a straightedge and strike off.
- H. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8-inch-deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by a combination of these as follows:
  1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
  3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

### 3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
  1. Elevation: 1/4 inch.
  2. Thickness: Plus 3/8-inch, minus 1/4 inch.
  3. Surface: Gap below 10-foot-long; unlevelled straightedge not to exceed 1/4 inch.

4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

### 3.10 SIDEWALK CONSTRUCTION

- A. Sidewalks shall be 4 inches thick in walk areas and 6 inches thick in driveway areas, unless otherwise shown in the drawings. Reinforce as noted on the details. Walks shall slope a maximum of 1/4 inch per foot away from structures, unless otherwise shown in the drawings. Cross slopes shall not exceed 1/4" inch per foot. See Architectural Site Plan and details for joint pattern.
1. Place preformed asphalt expansion joints at intervals not exceeding 20 feet or less than 12 feet, where the sidewalk ends at a curb, and around posts, poles, or other objects protruding through the sidewalk. Place expansion joints between sidewalks and buildings or other structures.
  2. Place preformed asphalt expansion joint material between back of curbs and sidewalks.
  3. Provide contraction joints transversely to the walks at locations opposite the contraction joints in the curb and at intervals along the sidewalk such that the distance between contraction joints does not exceed 1.5 times the sidewalk width, typically noted on plans at 48 inches on center. These joints shall be 1/8 inch by one-fourth of the slab thickness weakened plane joints. They shall be straight and at right angles to the surface of the walk.
  4. Place, process, finish, and cure concrete in conformance with Section 03300.
  5. Broom the surface with a fine / medium hair broom at right angles to the length of the walk and tool at all edges, joints, and markings. Mark the walks at intervals noted on the drawings with a jointing tool. Upon completion of the finishing, apply an approved curing compound to exposed surfaces. Protect the sidewalk from damage.
  6. Finished sidewalk shall present a uniform appearance for both grade and alignment. Remove any section of sidewalk showing abrupt changes in alignment or grade or which is more than 2 inches away from its location as shown in the drawings and construct new sidewalk in its place at no additional cost to the Owner.

### 3.11 CURB AND GUTTER CONSTRUCTION

- A. Construct curbs and gutters in accordance with the details and locations as shown in the drawings.
1. Place preformed asphalt-impregnated expansion joints at intervals not exceeding 24 feet or less than 12 feet, at the beginning and end of curved portions of the

- curb, at each change in thickness in section, at the end of curbs at buildings and other structures, and at connections to existing curbs.
2. Place contraction joints in the curb at uniform intervals not exceeding 12 feet. Contraction joints shall be of the open-joint type and shall be provided by inserting a thin, oiled steel sheet vertically in the fresh concrete to force coarse aggregate away from the joint. Insert the steel sheet the full depth of the curb. After initial set has occurred in the concrete and before removing the front curb form, remove the steel sheet with a sawing motion. Finish top of curb with a steel trowel and finish edges with a steel-edging tool.
  3. As soon as the concrete has set sufficiently to support its own weight, remove the front form and finish exposed surfaces. Finish formed face by rubbing with a burlap sack or similar device that will produce a uniformly textured surface, free of form marks, honeycomb, and other defects. Remove and replace defective concrete at the Contractor's expense. Upon completion of the finishing, apply curing compound to exposed surfaces of the curb. Curing shall continue for a minimum of five days.
  4. Upon completion of the curing period, but not before seven days have elapsed since pouring the concrete, backfill the curb with earth free from rocks 2 inches and larger and other foreign material. Tamp backfill firmly in place.
  5. Finished curb shall present a uniform appearance for both grade and alignment. Remove any section of curb showing abrupt changes in alignment or grade or which is more than  $\frac{1}{4}$  inch away from its location as staked and construct new curb in its place at no additional cost to Owner.

### 3.12 HANDICAP ACCESS RAMP CONSTRUCTION

- A. Construct ramps to line and grade shown. Ramps shall conform to the details shown on the Architectural and Civil drawings. Provide medium broom finish, perpendicular to line of travel on ramp surfaces.

### 3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
  1. Testing Frequency: Obtain at least one composite sample for each 25cu. yd. or 2000 sq. ft. or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.
- 3.14 REPAIR AND PROTECTION
- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
  - B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.



- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

This page is intentionally left blank.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Cold-applied, fuel-resistant joint sealants.
3. Joint-sealant backer materials.
4. Primers.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing nontraffic joints in locations not specified in this Section.
2. Section 321313 "Concrete Paving" for paving expansion, isolation and contraction joint materials and installation requirements.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

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

- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

- C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of joint sealant and accessory.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Crafco Inc.
    - b. Pecora Corporation.
    - c. Sikaflex

- B. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Crafco Inc.
- b. Pecora Corporation.
- c. Sikaflex

### 2.3 COLD-APPLIED, FUEL-RESISTANT JOINT SEALANTS

- A. Fuel-Resistant, Multicomponent, Pourable, Modified-Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade P, Class 12-1/2 or 25, for Use T.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Pecora Corporation.
- b. Sikaflex

### 2.4 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

### 2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

#### 3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint-sealant backings.
  - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
  - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
  - 1. Place joint sealants so they fully contact joint substrates.
  - 2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

### 3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

### 3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving.
  1. Joint Location:
    - a. Expansion and isolation joints in concrete paving.
    - b. Contraction joints in concrete paving.
    - c. Other joints as indicated.
  2. Joint Sealant: Single-component, self-leveling, silicone joint sealant.
  3. Joint-Sealant Color: Manufacturer's standard gray color.
- B. Joint-Sealant Application: Joints within concrete paving.
  1. Joint Location:
    - a. Expansion and isolation joints in concrete paving.
    - b. Contraction joints in concrete paving.
    - c. Other joints as indicated
  2. Single component, pourable, urethane, elastomeric joint sealant.
  3. Joint-Sealant Color: Manufacturer's standard gray color.
- C. Joint-Sealant Application: Fuel-resistant joints within concrete paving.
  1. Joint Location:
    - a. Expansion and isolation joints in concrete paving.
    - b. Contraction joints in concrete paving.
    - c. Other joints as indicated.

FRESNO COUNTY SHERIFF SUBSTATION  
FRESNO, CA.

CONCRETE PAVING JOINT SEALANTS  
SECTION 321373 - 6

2. Joint Sealant: Fuel-resistant, multicomponent, pourable, modified-urethane, elastomeric joint sealant.
3. Joint-Sealant Color: Manufacturer's standard.

END OF SECTION 321373



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes concrete wheel stops.

### 1.3 ACTION SUBMITTALS

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

## PART 2 - PRODUCTS

### 2.1 PARKING BUMPERS

- A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 4000-psi minimum compressive strength, 4-1/2 inches high by 8 inches wide by 48 inches long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. American Precast Concrete Inc.
    - b. Bush Concrete Products, Inc.
    - c. Dura-Crete, Inc.
  - 2. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
  - 3. Mounting Hardware: Steel spike or dowel, 5/8-inch diameter, 10-inch minimum length or hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install wheel stops in bed of adhesive before anchoring.
- C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 321713

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.
- B. Related Requirements:
  - 1. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.
  - 2. Section 099123 "Interior Painting" for painting interior concrete surfaces other than pavement.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
    - a. Pavement aging period before application of pavement markings.
    - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
  - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
  - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of California State Department of Transportation for pavement-marking work.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials and 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Dunn-Edwards Corporation (a Nippon Paint Holdings Co. Ltd. company).
  - 2. PPG Paints.
  - 3. Sherwin-Williams Company (The).

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and most recent edition of the California Building Code, Accessibility Standards.

2.3 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
  - 1. Color: As indicated.
- B. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
  - 1. Color: As indicated.
- C. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.
  - 1. Roundness: Minimum 75 percent true spheres by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
  - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal..

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Detectable warning mats.
- B. Related Requirements:
  - 1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

### 1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Adhesive Application:
  - 1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering and wear.
    - b. Separation or delamination of materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and California Building Code for tactile warning surfaces.
  - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
- B. Source Limitations: Obtain each type of tactile warning surfacing, joint material], setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

### 2.2 DETECTABLE WARNING MATS

- A. Surface-Applied Detectable Warning Mats: Accessible truncated-dome detectable warning resilient mats, UV resistant, manufactured for adhering to existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of mat, and beveled outside edges.



1. Manufacturers: Subject to compliance with requirements.
2. Material: Modified rubber compound, UV resistant.
3. Color: As selected by Architect from manufacturer's full range of State of California approved colors.
4. Shapes and Sizes:
  - a. Rectangular panel in the size required for the full installation.
5. Dome Spacing and Configuration: In configuration and shapes required by the State of California current standards for spacing, size, height and pattern.
6. Mounting: Adhered to pavement surface with adhesive and fastened with fasteners.

### 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
  1. Furnish Type 304 stainless-steel fasteners for exterior use.
  2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.
- B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.
- C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

### 3.3 INSTALLATION OF DETECTABLE WARNING MATS

- A. Lay out detectable warning mats as indicated and mark concrete pavement at edges of mats.
- B. Prepare existing paving surface by grinding and cleaning as recommended by manufacturer.
- C. Apply adhesive to back of mat in amounts and pattern recommended by manufacturer and set mat in place. Firmly seat mat in adhesive bed, eliminating air pockets and establishing full adhesion to pavement. If necessary, temporarily apply weight to mat to ensure full contact with adhesive.
- D. Install anchor devices through face of mat and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with mat surface.
- E. Mask mat perimeter and adjacent concrete and apply sealant in continuous bead around perimeter of mat.
- F. Remove masking, adhesive, excess sealant, and soil from exposed surfaces of detectable warning mat and surrounding concrete pavement using cleaning agents recommended in writing by manufacturer.
- G. Protect installed mat from traffic until adhesive has set.

### 3.4 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Chain-link fences.
- 2. Privacy slats.

- B. Related Requirements:

- 1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for cast-in-place concrete equipment bases/pads for gate operators and controls and post footings.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review required testing, inspecting, and certifying procedures.

1.4 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - a. Fence and gate posts, rails, and fittings.
  - b. Chain-link fabric, reinforcements, and attachments.
  - c. Accessories: Privacy slats.
  - d. Gates and hardware.

- B. Shop Drawings: For each type of fence and gate assembly.

- 1. Include plans, elevations, sections, details, and attachments to other work.
- 2. Include accessories and hardware.

- C. Samples for Initial Selection: For each type of factory-applied finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chain-link fence.
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.9 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of chain-link fences that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to comply with performance requirements.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.

- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
  - 1. Design Wind Load: As indicated on Drawings.
    - a. Minimum Post Size: Determine according to ASTM F 1043 for post spacing not to exceed 10 feet for Material Group IA, ASTM F 1043, Schedule 40 steel pipe.
    - b. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.
- C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

## 2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
  - 1. Fabric Height: As indicated on Drawings.
  - 2. Steel Wire for Fabric: Wire diameter of 0.148 inch.
    - a. Mesh Size: 3 ½" x 5" inches.
    - b. Zinc-Coated Fabric: ASTM A 392, Type II, with zinc coating applied before weaving.
  - 3. Selvage: Knuckled at both selvages
    - a. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.

## 2.3 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083, Schedule 40 steel pipe:
  - 1. Fence Height: 72 inches and 96 inches as indicated on Drawings.
    - a. Line Post: 1.9 inches in diameter at 6' fence and 2.375 inches in diameter at 8' fence.
    - b. End, Corner, and Pull Posts: 2.875 at 6' fence and 4" inches at 8' fence.
  - 2. Horizontal Framework Members: Intermediate, top and bottom rails according to ASTM F 1043.
    - a. Top Rail: 1.66 inches in diameter.

3. Brace Rails: ASTM F 1043.
4. Metallic Coating for Steel Framework:
  - a. Type A: Not less than minimum 2.0-oz./sq. ft. average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating according to ASTM A 653/A 653M.

## 2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch-diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:
  1. Type I: Aluminum coated (aluminized).
  2. Type II: Zinc coated (galvanized) by hot-dip process, with the following minimum coating weight: Retain one of first four subparagraphs below.
    - a. Class 5: Not less than 2 oz./sq. ft. of uncoated wire surface.
  3. Type III: Zn-5-Al-MM alloy with the following minimum coating weight:
    - a. Class 60: Not less than 0.6 oz./sq. ft. of uncoated wire surface.
    - b. Class 100: Not less than 1 oz./sq. ft. of uncoated wire surface.
    - c. Matching chain-link fabric coating weight.

## 2.5 FITTINGS

- A. Provide fittings according to ASTM F 626.
- B. Post Caps: Provide for each post.
  1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
  2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails to posts.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

- H. Barbed Wire Arms: Pressed steel, with clips, slots, or other means for attaching strands of barbed wire, and means for attaching to post, integral with post cap, for each post unless otherwise indicated, and as follows:
  - 1. Provide line posts with arms that accommodate top rail or tension wire.
  - 2. Provide corner arms at fence corner posts unless extended posts are indicated.
  - 3. Single-Arm Type: Type I, slanted arm.
- I. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
  - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
    - a. Hot-Dip Galvanized Steel: 0.148-inch- diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
- J. Finish:
  - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.

## 2.6 FULL PRIVACY SLATS

- A. Tubular Polyethylene Slats: Minimum 0.023-inch-thick tubular polyethylene, manufactured for chain-link fences from virgin polyethylene with UV inhibitor, sized to fit mesh specified for direction indicated, with vandal-resistant fasteners and lock strips and fins for increased privacy factor.
- B. Color: As selected by Architect from manufacturer's full range or as indicated on the drawings.

## 2.7 BARBED WIRE

- A. Steel Barbed Wire: ASTM A 121, two-strand barbed wire, 0.099-inch-diameter line wire with 0.080-inch-diameter, four-point round barbs spaced not more than 5 inches o.c.
  - 1. Zinc Coating: Type Z, Class 3.
- B. Polymer-Coated, Galvanized-Steel Barbed Wire: ASTM F 1665, two-strand barbed wire, 0.080-inch-diameter line wire with 0.080-inch-diameter, four-point, round galvanized-steel barbs spaced not more than 5 inches o.c.:

## 2.8 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.

- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

## 2.9 GROUNDING MATERIALS

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
  - 1. Connectors for Below-Grade Use: Exothermic welded type.
  - 2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a certified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
  - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
  - 1. Install fencing on established boundary lines inside property line.
  - 2. See civil drawings for grades at boundary lines and mow strip.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.



- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
    - a. Concealed Concrete: Place top of concrete 2 inches below grade as indicated on Drawings to allow poured concrete wow strip, poured after posts are set.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at 10 feet o.c.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
  - 1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
  - 2. As indicated on Drawings.
- H. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- I. Intermediate and Bottom Rails: Secure to posts with fittings.
- J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1-inch bottom clearance between finish grade or mow strip surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

- K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.
- L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- N. Privacy Slats: Install slats in direction indicated, securely locked in place.
  - 1. Vertically, for privacy as indicated on Drawings.
- O. Barbed Wire: Install barbed wire uniformly spaced , as indicated on Drawings. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

### 3.4 GROUNDING AND BONDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fence Grounding:
  - 1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
  - 2. Install ground rods and connections at maximum intervals of 1000 feet.
  - 3. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
  - 4. Ground fence on each side of gates and other fence openings.
    - a. Bond metal gates to gate posts.
    - b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground according to IEEE C2 unless otherwise indicated.
- D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
  - 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.

2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.

E. Connections:

1. Make connections with clean, bare metal at points of contact.
2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
4. Make above-grade ground connections with mechanical fasteners.
5. Make below-grade ground connections with exothermic welds.
6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

- F. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests.
- B. Grounding Tests: Comply with requirements in Section 264113 "Lightning Protection for Structures."
- C. Prepare test reports.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences.

END OF SECTION 323113

This page is intentionally left blank.

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. See Drawings for Decorative Metal Fences and Gates detailing on the Architectural drawings.
- B. Section Includes:
  - 1. Shop fabricated decorative powder coated steel tubular picket fences.
  - 2. Swing and rolling gates with hardware.
  - 3. Gate operators, including controls.
- C. Related Sections:
  - 1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for cast-in-place concrete equipment bases/pads for gate operators and control, post footings and continuous concrete grade beam.
  - 2. See Hardware Schedule Section 087100 for gate hardware.
  - 3. Shop-primed and Field-painted per Section 099113 – Exterior Painting.

### 1.3 ACTION SUBMITTALS

- A. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - 1. Fence and gate posts, rails, and fittings.
  - 2. Chain-link fabric, reinforcements, and attachments.
  - 3. Accessories: Barbed wire.
  - 4. Gates and hardware.
  - 5. Retain subparagraph below for motorized gate operation.
  - 6. Gate operator, including operating instructions and motor characteristics.
  - 7. Samples: For color specified.
- B. Shop Drawings: For each type of fence and gate assembly.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Include accessories, hardware, gate operation, and operational clearances.
  - 3. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
  - 4. Wiring Diagrams: For power, signal, and control wiring.

5. Samples for Initial Selection: For each type of factory-applied finish.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For factory-authorized service representative.
- C. Product Certificates: For each type of operator.
- E. Field quality-control reports.
- F. Sample Warranty: For special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
  1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- C. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

#### 1.7 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

#### 1.8 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of high-security chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Failure to comply with performance requirements.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - c. Faulty operation of gate operators and controls.

- B. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 DECORATIVE STEEL FENCES

- A. Decorative Steel Fences: Fences made from steel tubing and shapes.
  - 1. Shop Fabricated.
- B. Posts: Square steel tubing, 4 by 4 inches with .1875-inch wall thickness at gates and 2 by 2 inches posts with .1875-inch wall thickness where noted.
- C. Rails:
  - 1. Steel Tube Rails: Square steel tubing 2 by 2 inches with .1875-inch wall thickness.
- D. Pickets: 3/4 inch square by 0.065-inch steel tubes.
  - 1. Picket Spacing: 4 inches on center, maximum.
- E. Fasteners: Stainless-steel carriage bolts and tamperproof nuts.
- F. Fabrication: Assemble fences into sections by welding pickets to rails.
- G. Finish for Bar Grating Infill: Powder coating.
- H. Finish: Shop-primed and Field-painted per Section 099113 – Exterior Painting.

### 2.2 SWING GATES

- A. Steel Frames and Bracing: Fabricate members from square tubes 2 by 2 inches formed from 0.108-inch nominal-thickness.
- B. Posts 4-inch square by .24-inch steel tubes.
- C. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide. Provide center gate stops and cane bolts for pairs of gates. Fabricate latches with integral eye openings for latching
  - 1. Refer to the Hardware Schedule in Section 087100.
- D. Steel Mesh Finish: Powder coating.
- E. Gate Finish: Shop-primed and Field-painted per Section 099113 – Exterior Painting.

### 2.3 TRASH ENCLOSURE SWING GATES

- A. Steel Frames and Bracing: Fabricate members from square tubes 2.5 by 2 inches angle iron frame of .25-inch nominal-thickness.
- B. Steel Posts: 4-inch square with .25-inch nominal thickness.
- C. Steel Siding: Match Building Siding on the Sheriff Storage Building. Minimum 24 gage. Color to match selected building siding color.
- D. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide. Provide center gate stops and cane bolts for pairs of gates. Fabricate latches with integral eye openings for latching.
  - 1. Refer to the Hardware Schedule in Section 087100.
- E. Finish: Shop-primed and Field-painted per Section 099113 – Exterior Painting.

### 2.4 ROLLING GATES

- A. Steel Frames: Fabricate members from rectangular tubes 2 by 3 inches formed from 0.1875-inch nominal-thickness. See drawing details for additional materials.
- B. Pickets: 3/4 inch square by 0.065-inch steel tubes.
  - 1. Picket Spacing: 4 inches on center, maximum.
- C. Hardware: Refer to the Hardware Schedule in Section 087100.
- D. Finish: Shop-primed and Field-painted per Section 099113 – Exterior Painting.

### 2.5 STEEL AND IRON

- A. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- C. Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

### 2.6 GATE OPERATORS

- A. Gate Operators:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Amazing Gates of America LLC.
    - b. Byan Systems, Inc.



- c. DoorKing, Inc.
  - d. USAutomatic Inc.
- B. Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
- 1. Provide operator with UL-approved components.
- C. Comply with NFPA 70.
- D. UL Standard: Manufacturer and label gate operators to comply with UL 325.
- E. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
- 1. Voltage: 120 V - NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
  - 2. Duty: Continuous duty at ambient temperature of 110 deg F and at altitude of 600 feet above sea level.
  - 3. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
  - 4. Phase: One.
- F. Gate Operators: Concrete base mounted and as follows:
- 1. Mechanical Gate Operators:
    - a. Duty: Heavy duty, commercial/industrial.
    - b. Maximum Gate Weight: 1,200 lb.
    - c. Frequency of Use: Continuous duty.
- G. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with [NEMA ICS 6, Type 1, pedestal mounting, and with space for additional optional equipment. Provide the following remote-control device(s):
- 1. Radio Control: UHF – RFID Sensor, Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide programmable transmitter(s).
- H. Vehicle Loop Detector: System includes automatic closing timer with adjustable time delay, and loop detector designed to open and close gate and hold gate open until traffic clears.
- I. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately stop gate in opening cycle and reverse gate in closing cycle, and hold until clear of obstruction.

J. Accessories:

1. Warning Module: Audio and Visual -light alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving; compliant with the United States Access Board's ADA-ABA Accessibility Guidelines.
2. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system.
3. Instructional, Safety, and Warning Labels and Signs: According to UL 325 and Manufacturer's standard for components and features specified.

2.7 MISCELLANEOUS MATERIALS

- A. Concrete: Normal-weight, ready-mix concrete complying with requirements in Section 033053 "Miscellaneous Cast-in-Place Concrete" with a minimum 28-day compressive strength of 2500 psi, 3-inch slump, and 1-inch maximum aggregate size.

2.8 GROUNDING MATERIALS

- A. Comply with requirements of Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Grounding Conductors: Size as indicated on Drawings. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
1. Material above Finished Grade: Copper.
  2. Material on or below Finished Grade: Copper.
- C. Grounding Connectors and Grounding Rods: Comply with UL 467.

2.9 STEEL FINISHES

- A. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
1. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- B. Grind all shop welds smooth and fill voids and gaps with Bondo filler. Sand surfaces smooth and clean.
- C. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- D. Shop-primed and Field-painted per Section 099113 – Exterior Painting.
- A. Steel Mesh Finish:

1. Surface Preparation: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Powder Coating: Immediately after cleaning, apply manufacturer's standard two-coat finish consisting of epoxy primer and TGIC polyester topcoat to a minimum total dry film thickness of not less than 8 mils (0.20 mm). Comply with coating manufacturer's written instructions.
3. Color and Gloss: Match Gate color and gloss selected by Architect

### PART 3 - EXECUTION

#### 3.1 DECORATIVE FENCE INSTALLATION

- A. Install fences according to manufacturer's written instructions.
- B. Install fences by setting posts as indicated with welded rails and infill panels to posts. Where bolted conditions occur peen threads of bolts after assembly to prevent removal.
- C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter and depth as noted on the drawings.
- D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
  1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
  3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
  4. Space posts uniformly at 8 feet o.c.

#### 3.2 GATE INSTALLATION

- A. Install gates, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

#### 3.3 GATE-OPERATOR INSTALLATION

- A. Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
- B. Excavation: Hand-excavate holes for posts, pedestals, and equipment bases/pads, in firm, undisturbed soil to dimensions and depths and at locations according to gate-operator component manufacturer's written instructions and as indicated.

- C. Vehicle Loop Detector System: Cut grooves in pavement, bury, and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
- D. Ground electric-powered motors, controls, and other devices according to NFPA 70 and manufacturer's written instructions.

### 3.5 GROUNDING AND BONDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Rolling Gate Grounding:
  - 1. Grounding for Rolling Gates and gate posts.
  - 2. Install ground rod.
    - a. Bond metal gates to gate posts.
    - b. Bond across openings, with gates, Use No. 2 AWG wire and bury it at least 18 inches below finished grade.
- C. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.
  - 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
  - 2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
- D. Connections:
  - 1. Make connections with clean, bare metal at points of contact.
  - 2. Make above-grade ground connections with mechanical fasteners.
  - 3. Make below-grade ground connections with exothermic welds.
  - 4. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- E. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

### 3.6 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Automatic Gate Operator: Energize circuits to electrical equipment and devices, start units, and verify proper motor rotation and unit operation.
- C. Test and adjust operator, controls, alarms, and safety devices. Replace damaged and malfunctioning controls and equipment.
- D. Lubricate operator and related components.
- E. Lubricate hardware and other moving parts.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain high-security chain-link fences and gates.

END OF SECTION 323119

This page is intentionally left blank.